

**Prefeasibility Assessment Report**  
**on**  
**Potential Agricultural Processing Industries in Karnali Province**

**Submitted to:**

**Ministry of Land Management, Agriculture and Cooperatives**  
**Karnali Province, Surkhet, Nepal**

**Submitted by:**



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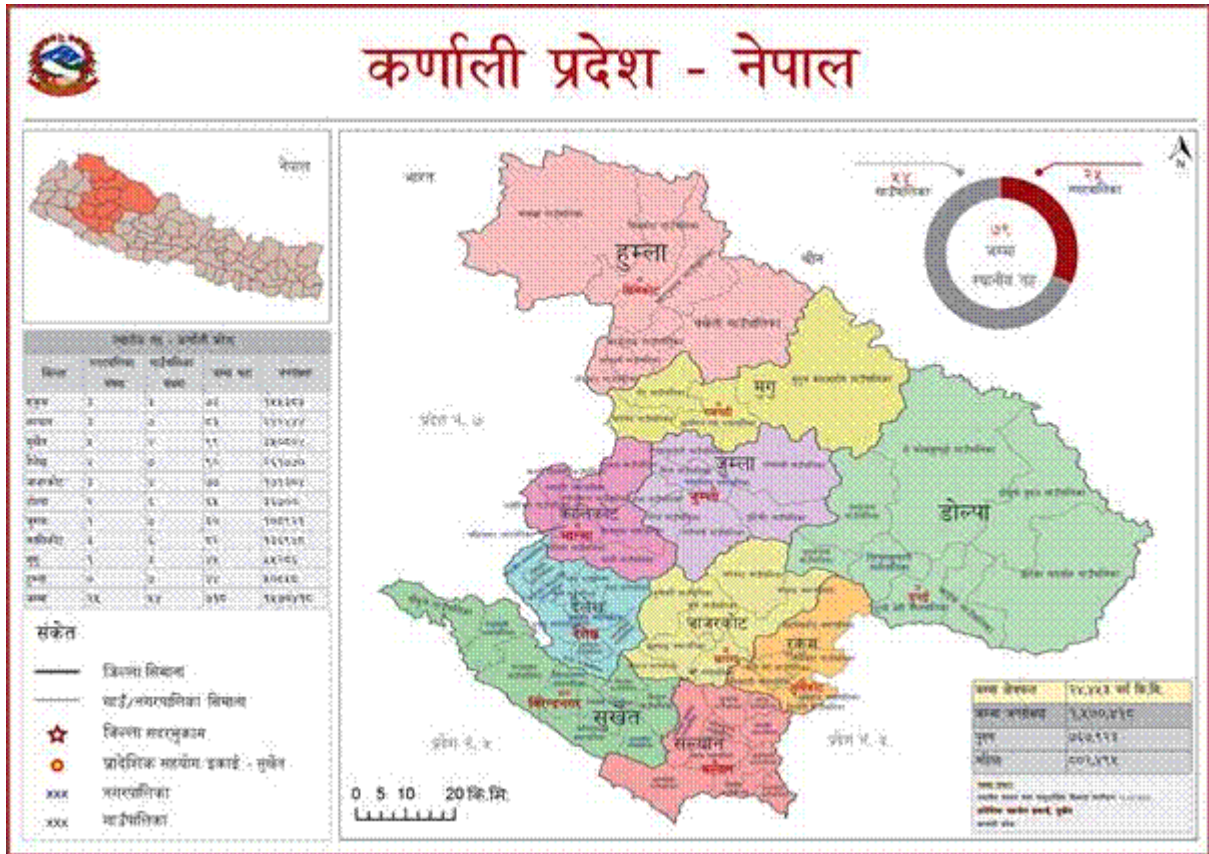
This report is prepared by the AEC/FNCCI Consulting Team with the partnership of Ministry of Land Management, Agriculture and Cooperatives, Karnali Province, Surkhet. All the findings, interpretations and conclusions expressed herein are entirely based on the information collected during the Rapid Market Appraisal and information provided by the institutions, professional experts and key informants contacted during field work. The interpretations and conclusions expressed herein entirely are those of the contributors and do not necessarily reflect the institutional view of Ministry of Land Management, Agriculture and Cooperatives, Karnali province, Surkhet and AEC/FNCCI.

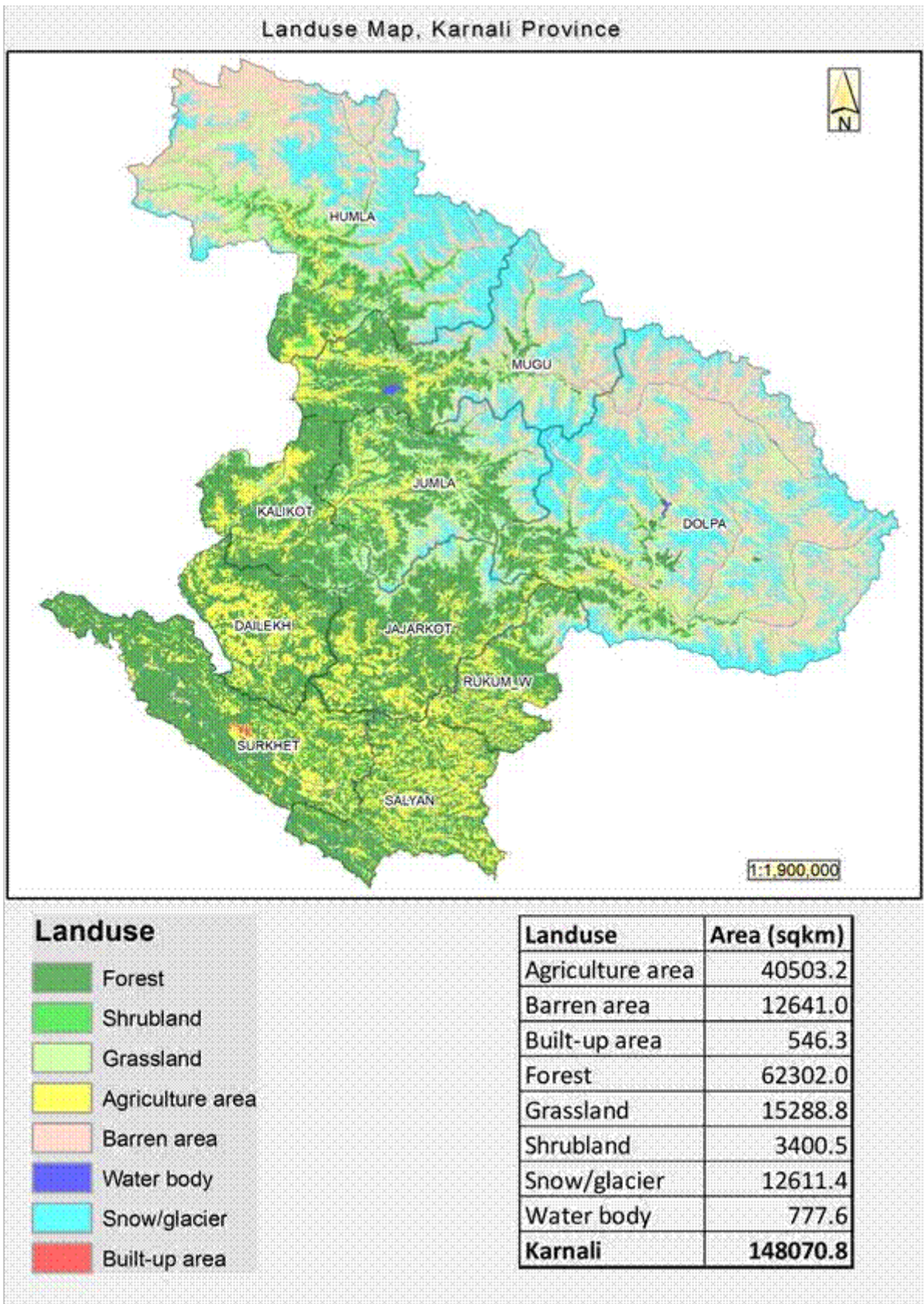
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The private sectors are major partner in achieving economic development and its sustainability. Businesses contribute to economic growth through supply of goods and services, creating employment, providing reliable incomes and improving livelihood opportunities to the local residence and contributing to the trade. In this regard, this study was conducted to facilitate investment of private entrepreneurs who wish to invest in the agribusiness sector within the territory of the Karnali Province. This report has summarized list of the potential micro and small scale value adding agricultural processing units with a brief snapshot based on the rapid market appraisal conducted in March –April 2020. The finding of the study could be useful to the both Provincial Government and potential investors who wish to invest. Besides, this prefeasibility study does not provide all the dimensions of the detail project report (DPR) for investment decision. However, we believe that this could be a cornerstone.

FNCCI/AEC had the lead role for the study; however, it would have never been possible to accomplish the task without the kind support and help of many individuals and organizations. FNCCI/AEC, would like to extend sincerest thanks to the MoLMAC of Karnali Province, headed by Honorable Minister Mrs. BimalaKC and Secretary Mr. Govinda Prasad Sharma, MoLMAC, and Secretary Mr. Rajendra Prasad Bhari, MoALD, Federal Government for entrusting AEC for this assignment and creating supportive working environment by providing guidance, and valuable suggestions throughout the study period.

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## SUMMARY

The assessment on "Potentiality of the establishment of the agricultural processing industries" in Karnali province has been accomplished with the partnership between Ministry of the Land Management, Agriculture and Cooperatives (MoLMAC) and Agro Enterprise Centre (AEC), Federation of Nepalese Chambers of Commerce and Industry (FNCCI) with the aim to foster and accelerate the growth oriented agribusiness enterprises mainly in the agro-processing sector, thereby helping the commercialization of agricultural production, increase agricultural incomes, and reduce poverty.

Natural resources in particular cultivable land, forest, water and human resources are bases for economic development in Karnali province, where a large proportion of rural population remains dependent on these resources for sustenance. Agriculture, forestry and fishing sector comprises more than 35% of the contribution to the provincial gross domestic products. Thus, transformation of the present agricultural production system to the commercial agribusiness is critical to attain provincial economic development and eradication of poverty.

The MoLMAC of Karnali province believes that inadequate market linkages and poor level of the value addition activities are the major constraints of agriculture sector in the province. These constraints have hampered the promotion of agribusinesses and commercialization of agriculture through the demand pull effects to motivate the entire farming community to increase their farm income. Therefore, this report provides prefeasibility snapshot of the seventeen types of the potential agriculture based industries. Rapid market appraisal including other participatory tools as well as iterative review process was adopted during the prefeasibility survey. The study design was review, iterative, and consultative process. The assessment entailed analyzing the provincial market, and other markets where agricultural products supplied from various channels against several indicators and associated questions.

A total of 1343.43 kilometers (Km) road is built in the province. However, only 777.77Km (Blacktopped-601.77 Km and Gravel 176 Km) road are good and ideal for transportation round the year. Dolpa is still lacking road connectivity upto headquarter and Tribeni-Dunai road (56 Km) is under construction. Rapti Rajmarga, Ratna Rajmarga, Karnali Rajmarga and Mid-hill Rajmarga (under construction) are the major road corridors for the connectivity and movement of the goods and services including other districts level roads that link to the agricultural production pockets. The Karnali province has eight airports with good connectivity of domestic air transport services. Most of these airports are providing connectivity to the remote areas of the province from both Kathmandu and Nepalganj. Surkhet airport is linked with the remote places, mostly to Humla, Dolpa, Mugu and Jumla.

A total of 541527 mt. of cereals were produced in the province with average productivity of 2209 kg/ha in the year 2017/2018. Maize, wheat and paddy are the major cereals crops and covers 93, 315 ha, 83,505 ha and 38,248 hectares (ha) of land with productivity of 2300 kg/ha, 1919 kg/ha and 3445kg/ha respectively. Additionally, the area under the millet was 18733ha with average productivity of 1,040kg/ha.

Both seasonal and off-season vegetables are grown in the province and area under fresh vegetable was 12,305 ha. A total of 1, 36,646mt of fresh vegetables was produced with average productivity of 11.1 mt/ha. The major vegetables grown in the province are: cauliflower (1030 ha), cabbage (931 ha), tomato (1000 ha), radish (734 ha), broad leaf mustard (700 ha), carrot (186 ha), various types of beans (467 ha) and chili (629 ha). Among the cash crops potato and oil seed constitutes 11, 723 ha and 6,938 ha with production of 141,168mt and 6,510mt respectively. Among the pulses crop, lentil occupies 3575 ha followed by chickpea (1092 ha) and black gram 653ha. out of 5,065 mt. of pulses produced in the year 2017/18.

Fruits crops occupies 7,432 ha of land and 58,911 mt. of fruits produced in the province. Out of total production, 22,799 mt. of winter fruits, 22,387 mt. of citrus and 13,725 mt of summer fruits was produced. Apple is the main winter fruit, cultivated in 7,172 ha land and almost 2/3rd of the total winter fruit production area is shared by the Apple. Jumla is the main apple growing district and constitutes more than half of the apple growing area. Dailekh, Salyan, Jajarkot and Rukum are the main citrus growing districts and area under the citrus crop was 4,877 ha and 22387 mt. of fruits was harvested with average productivity of 8.8 mt/ha. Likewise, summer fruits growing districts are Surkhet, Salyan, Rukum, Dailekh and Jajarkot and area under the summer fruits crop was 2051 ha with total production of 13725 mt with average productivity of 8.3 mt/ha.

Agricultural marketing in Karnali province has undergone notable changes during the last 15 years, regarding the increased in marketed surplus; increase in urbanization and income levels and consequent changes in the pattern of demand for marketing services; increase in linkages with distant and overseas markets; and changes in the form and degree of the intervention from the government as well as other development agencies. The private sector is emerging and leading agribusiness activities. Thus, promotion of the micro, small and medium sized enterprises (MSMEs) is a good option, rather than that of large enterprises. Investment in agro-processing is vital to create, grow and improve agricultural value chains by linking farmers to the entire market chain. This linkage will contribute to increase volume and diversity of products handled and will also make the value chain more cost-efficient.

High-value crops such as fruits, fresh vegetable, spices, goat, dairy, vegetable seed, poultry, MAPs and honey are the performing value chains in the territory of the Karnali. Therefore, future of the commercialized agriculture in the province largely depends on the growth of small, medium and large enterprises that goes beyond employing only family members. The major constraints that are related to the growth of the corporate agribusiness are access to suitable land, access to capital/credit, technology, marketing and other infrastructure. Land holding pattern is another constraint for low scale of farming and competitiveness. Over-regulation of land use zoning could be one of the contributing factors which substantially add to the cost of financing and accumulating large parcel of land for the processing business.

The marketing channels for agricultural commodities vary from commodity to commodity as (i) directly farm gate to consumers, (ii) farm gate to consumer through public agencies or cooperative organizations; (iii) farm gate to consumer through private wholesalers and retailers, and (iv) farm gate to consumer through processors. Dominance of the middle man is also critical in agricultural marketing system.

This report is the outcome of interaction by various stakeholders related to the sector, rapid appraisal of the major market places and the secondary information collected through the iterative review process. It is believed that outcomes of the survey provide foundation to the investors and stakeholders associate with agriculture based industries to invest in the selected value chain in Karnali province. This assessment provides only glimpse of the opportunities in the identified potential industries. Therefore, preparation of detail project report is recommended to know the financial viability and rate of returns on investment.

## ACRONYMS

|           |   |
|-----------|---|
| ADB       | Asian Development Bank                                    |
| AEC       | Agro Enterprise Center                                    |
| ASDP      | Agriculture Sector Development Project                    |
| ASHA      | Adaptation of Small farmers in Hilly Areas in Nepal       |
| GACP      | Good Agriculture and Collection Practices                 |
| FNCCI     | Federation of Nepalese Chambers of Commerce and Industry  |
| MSME      | Micro, Small and Medium Enterprises                       |
| MAPs      | Medicinal and Aromatic Plants                             |
| GDP       | Gross Domestic Product                                    |
| MoF/GOV/N | Ministry of Finance/Government of Nepal                   |
| NTIS      | Nepal Trade Integration Strategy                          |
| NGOs      | Non-government Organizations                              |
| HVAP      | High Value Agriculture Project                            |
| KISAN     | Knowledge based Integrated Sustainable and Nutrition      |
| CBS       | Central Bureau of Statistics                              |
| MPI       | Multi- Dimensional Poverty Index                          |
| UNDP      | United Nations Development Program                        |
| GIZ       | German Agency for International Development               |
| JABAN     | Jadibuti Association of Nepal                             |
| SNV       | Foundations of Netherlands Volunteers                     |
| DADO      | District Agriculture Development Offices                  |
| DLSO      | District Livestock Services Offices                       |
| PCCI      | Provincial Chambers of Commerce and Industry              |
| DCCI      | District Chambers of Commerce and Industry                |
| SEAN      | Seed Entrepreneurs Association of Nepal                   |
| NARC      | Nepal Agriculture Research Council                        |
| NSC       | National Seed Company                                     |
| NDDB      | National Dairy Development Board                          |
| PMAMP     | Prime Minister Agriculture Modernization Project          |
| RMA       | Rapid Market Appraisal                                    |
| HDI       | Human Development Index                                   |
| LPG       | Liquefied Petroleum Gas                                   |
| FAO       | Food and Agriculture Organizations                        |
| UN        | United Nations  |
| MOLMAC    | Ministry of Land Management, Agriculture and Cooperatives |
| MoALD     | Ministry of Agriculture and Livestock Development         |
| SMP       | Skimmed Milk Powder                                       |
| WMP       | Whole Milk Powder   |

## CHAPTER 1: INTRODUCTION

### 1.1 Background

Nepal is classified as a Low-income food deficit country. Agriculture is the main sector for employment and two-third of the national labor force depend principally on the agriculture sector for their livelihood. This sector contributed 27.59% to the national GDP in the year 2017/2018. However, per capita cereal production has declined and livestock production has remained stagnant over the last decade due to problems in agriculture sector. Most of the farm holdings are reported to produce primarily for home consumption, while few produce primarily for commercial sale. Migration for employment now affects agricultural system of the country, causing women to increasingly take responsibility for both household and farm management.

Alternatively, outbound migration for foreign employment now affects more than half of all Nepalese families and has led to an increasing 'feminization' in agriculture sector of Nepal. In recent years, poverty has gradually decreased due to factors like high economic growth, investment on social and economic infrastructure and increment in the flow of remittances. The population below absolute poverty line is estimated to have been 18.7 percent with per capita income of US \$ 1,034 in FY 2018/19 (Gov/N, MoF, 2018/2019).

Among the seven provinces of Nepal, Karnali province is the largest province of the country in terms of land mass with an area of 27,984 square kilometers. Around 11.85% of the total area of the province is cultivable and 75.5% of arable land is under farming activities. Similarly, irrigation is available in 22.9% of arable land including seasonal irrigation. Only 12% area receives year-round irrigation. This means large swathe of farm land in the area is dependent on rain water. It is one of the reasons behind low productivity of agriculture in the province.

Natural resources, in particular cultivable land, forest, water and human resources are basis for economic development of the Karnali province. Agriculture and forest based products are major source of income and employment for majority of the Karnali people. The agriculture, forestry and fishing sector comprises more than 35% of the contribution to the provincial gross domestic products (GDP)<sup>1</sup>. It is clear that transformation of the present agricultural production system to the commercial agribusiness is critical to attain provincial food security and to reduce poverty. Therefore, agriculture is the one of the priority sectors for the provincial development plan and aims to commercialize agriculture sector, recognizing its importance for sustainable economic development.

It clear that a large part of rural population of the Karnali province still remains either directly engaged in or dependent on agriculture for sustenance, despite the shift in economic structure from agriculture to services and industry. The agriculture sector has grown slowly and cash crops have had a mixed performance over the past decade due to collective efforts that have been done by the government, private sector, development partners and non-governmental organization. From the experience, it is understood that high-value crops such as fruits, fresh vegetable, spices, medicinal plants, goat, dairy, vegetable seed, poultry, MAPs and honey are the performing value chains in the territory of the Karnali. Besides, diversified microclimate of the province has the potential to produce a range of high value crops.

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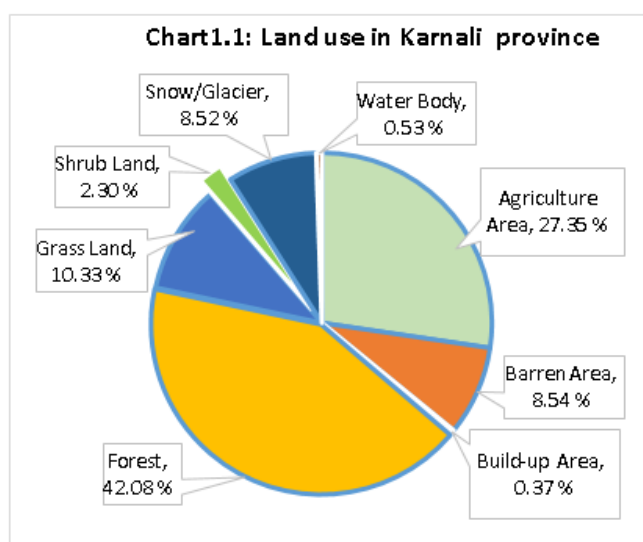
<sup>1</sup> CBS, (May 2020), Composition of Gross Domestic Product by Industrial Division at province (2075/2076), Table 3.

Evidently, future of the commercialized agriculture in the province largely depends on the growth of small, medium and large enterprises. The growth of such enterprises has been strong in recent years and most of the agro-enterprises make a profit and are confident about investing in the sector but it is to be noted that the development of such corporate agro-enterprise structure in Nepal is still lagging behind and is at very beginning stage. The major constraints that are related to the growth of the corporate agribusiness are access to suitable land, access to capital/credit, technology, marketing and other infrastructure. Fragmented nature of land allocation, unnecessary over-regulation of land use zoning and nature of land holding are some other the major constraints realized for low scale of economy and competitiveness and also affect the supply of marketable volume of the raw products.

## 1.2 An overview of the study area

Karnali is the largest province in area among the seven provinces of Nepal with an area of 24,453 square kilometers<sup>2</sup>. The province is surrounded by Gandaki Pradesh in east, Province No. 5 in south-east and south, Sudurpashchim Pradesh in the west and Tibet Autonomous Region of China in north. It extends from an altitude of 180m. at Jamukuine in Surkhet to 7,348 m of Churen Himal in Dolpa, the highest peak in the province.

The province has diversified terrain rich in bio diversity. Out of the total land area it has 27.35% agricultural and 42.08% forest land. (**Chart-1.1**)



The province extends across diversified ecological regions including four high hill Himalayan districts (Dolpa, Humla, Jumla and Mugu ), five mountain/mid hill districts (Kalikot, Dailekh, Jajarkot, Salyan and Rukum West), one district in the inner terai Valley (Surkhet). In most of the high hill districts, owing to ecological and weather conditions, cultivation activities are limited to one crop per year or in optimal conditions, three crops in two years in some of the district of this province.

The production potentiality of the Karnali province is very high for high value agricultural production and MAPs as compared to other provinces of the country. Fruits like apples, oranges, pomegranate and walnut are traded from the Karnali province in the various districts of the country. Maize, barley, wheat, millet, and paddy are the staple food crops. Similarly, mustard, soybean and hot chili are some of the noteworthy cash crops grown in the province. An indigenous variety of paddy known as Jumli Marshi is grown in Jumla as well as its peripheral districts in altitude ranges of 2400-3050 meter, which is the highest elevation in the world.<sup>3</sup> A substantial part of Marshi red rice is being consumed locally and partially traded to market. It is also argued that this red rice is suitable for the people with diabetes.

<sup>2</sup><http://ocmcm.karnali.gov.np/about> 'Karnali Pradesh Ek Chinari'

<sup>3</sup>Ghimire, S. (2017), Journal of Pharmacognosy and Phytochemistry, Agriculture and Forestry University, Nepal; SP1: 294-295.

The Karnali province is also known as the home MAPs and these high value MAPs could be the source for prosperity in the province. Most of the districts under the Karnali province belong to highly food deficit or food insecure region of the country and is still dependent on the cereal grain supplied from Terai region. However, the province has its own potentiality to feed its population based on the natural resources endowment. A large portion of the land mass of the province is virgin since long back and has remained organic zone by default. Therefore, promotion of organic farming practices could enhance increased household income of the rural farming dwellers from higher prices of product without increment in crop productivity.

The Karnali province lacks good connectivity and suffers from the transportation of both consumable and non-consumable goods due to poor quality narrow road that only links to the district headquarters. Besides, Surkhet, Dunai, Simikot, Gamgadhi and Jumla Airport connect people of Karnali with rest of the Nepal through air transportation. Likewise, the Chaurjhari and Rukum airports are also in operation. Food stuffs are expensive and rice supply is mostly dependent on the rice supplied from the National Food Corporation. Major trade centers of the province are Birendranagar, Gumgadhi, Mugu ; Sinja valley, Jumla, Jumla Khalanga; Dunai Dolpa; Simikot, Humla; Dailekh; Jajarkot Khalanga; Musikot, Rukum; Chaurjahari, Rukum and , Salyan khalanga and Shreenagar, Salyan .

### **1.3 The assignment and motivation**

The prefeasibility study on "Potentiality of the establishment of the Agricultural Processing Industries" in Karnali Province was accomplished with the partnership between MoLMAC and AEC/FNCCI. The required financial resources has been covered by the both the parties.

The private sectors are major development partner and contribute to economic growth, create employment, provide reliable incomes and improve livelihood opportunities to the local residence and contributing to the trade. The innovation and vision of the private sector helps chart to way to a stable and equitable future. Therefore, this study has been conducted to facilitate private sector entrepreneurs who wish to invest in the agribusiness sector within the territory of the Karnali Province.

Most of the districts of the Karnali province belong to the remote and undeveloped regions of Nepal characterized by low human development index due to widespread poverty and unemployment. The issue of food insecurity and child malnutrition, gender inequality, and other socioeconomic constraints has been raised since several decades. Government of Nepal (GoN) along with the support of development partners and multilateral funding agencies has invested huge resources through non-governmental organizations (NGOs) and spent a significant amount of resources towards assessing development initiatives through project intervention with the aim to create the equitable prosperous society.

However, development efforts that have been done in the past were not able to bring socioeconomic change as expected and such investment is not always based on the proper assessment of the local needs and expectations<sup>4</sup>. Besides, the multidimensional poverty index (MPI) clearly evoked the facts that Karnali province is poorest among the all provinces of Nepal with highest MPI of 0.230, which is well above the national MPI of 0.127. The headcount ratio of multidimensional poverty in Karnali province is 51.2%, meaning that more than half of the

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<sup>4</sup>Mahat, K. B. and Pokherel, B.B (2014), Enabling and Impending Factors of NGOs in Karnali Zone, Nepal, Journal of Advanced Academic Research, Pages 27-35.

population lives in an MPI poverty trap with poor performance in major human development indicators, the overall poverty rate across all five districts of Karnali is much higher<sup>5</sup>.

With respect to this fact, the Karnali province has already declared efficient utilization and identification of the resources in Karnali is a major concern of the provincial government. The dream of a prosperous Karnali shall only be realized by keeping in mind the motto: "Water, Mines, Agriculture and Forest – Our Youth, Our Resource". Thus, priority should be given towards the proper management and enhancement of organic agriculture, commercialization of agro-based production, fruits, and animal husbandry<sup>6</sup>. It is clear that Karnali province aims to transform its traditional agricultural sector giving priority to its development strategy and both federal as well provincial government is committed to uplift its agriculture sector focusing on organic farming, diversification and commercialization. Recently, provincial government is encouraging farming activities putting appropriate strategy to adopt suitable modern technology, giving priority to the fruits, vegetables, vegetable seed, dairy, goat, Timur, MAPs and honey value chains in the mid-hills and high hills. Cereal crops value chains such as Jumli Marshi, Paddy, Maize, Potato and Soybean are also priority crops in the province.

The government of Karnali province envisages improving agriculture business by improving value addition and post production activities to ensure higher return to the primary producers by linking them with processing units directly, so that it will strengthen self-reliance and market driven agribusiness. Inadequate attention to the agro-processing sector in the past has put both the producer and the consumer at a disadvantage and also hurt the local economy. A strong linkage among nodes of value chain development brings positive effects not only by motivating producers through good price signal but also through sustainability of the agriculture driven economy. Processing units serve dual functions of addressing market demands with products for consumption as well as providing sustainable sources of income for primary producers.

At the present context, development goals of the agriculture sector as job creation and inclusive growth of rural economy can be gained through efficient and sustainable utilization of natural resources to increase the productivity of the agriculture and forest base resources. For this, commercial agribusiness require a greater focus on supporting growth-oriented entrepreneurs engaged in downstream business activities (such as primary processing or end product processing as per the feasibility) to develop competitive enterprises to link effectively into productive value chains<sup>7</sup>. The Karnali province has comparative advantages in niche products such as Marshi -red rice; organic fruits and vegetables; cereal seeds; organic honey; goat and dairy products; and MAPs products with high commercial value. However, value chain integration process is weak, abrupt and unsustainable, though several efforts have been done in the past through various development initiatives executed by the GoN, development partners (ADB, UNDP, GIZ, SNV, etc) and non-governmental organizations. This uncertainty creates disincentive for producers, creating a scenario where people with investment funds do not find it attractive to scale up their production volume. Supply chain constraints such as low volume of production, product quality, scatter production sites

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<sup>5</sup>MPI Report 2018, Nepal's Multidimensional Poverty Index: Analysis Towards Action National Planning Commission, Government of Nepal Oxford Poverty and Human Development Initiative, University of Oxford

<sup>6</sup>Policy and Programme of The Government of Karnali province for Fiscal Year 2018/19, Government of Karnali province Office of the Chief Minister and the Council of Ministers Birendranagar, Surkhet

<sup>7</sup>infoDev (2013), Promoting Agribusiness Innovation in Nepal, Feasibility Assessment for an Agribusiness Innovation Center. World Bank

and uncoordinated value chains discourage investment to establish processing industries in the region.

Therefore, the prefeasibility study has been conducted to identify niche agriculture products with processing potentials, so that it will boost the contribution of agriculture; meet local demand of the processed end products in the Karnali province and to enhance export of the such products linking producers and end consumers for the sustainable development of the rural economy.

#### **1.4 Purpose and scope of the study**

This report provides output of the preliminary results on "Potentiality of establishment of the Agricultural Processing Industries" in Karnali province with the aim of promoting successful and sustainable agribusiness in the agro-processing sector to foster and accelerate growth in agro-processing sector with the aim to commercialize agricultural production, increase agricultural incomes, and reduce poverty.

Lessons gathered from this study will provide basis for agriculture planning and management at the provincial level as well as it also provides a brief snapshot for the identified agriculture based industry with potential opportunities and investment options. The study report will contribute to identifying innovative growth oriented value chains to the private investors, cooperatives and individual entrepreneurs who are wish to pursue business opportunities in the agricultural sector.

#### **1.5 Methodology adopted for prefeasibility study**

The prefeasibility assessment has focused inter alia on collecting data related to primary production and post-production value addition/processing of agriculture commodities. Thus, this prefeasibility study has been accomplished considering five fundamental values<sup>8</sup> : (i) review of the existing agricultural production status of the selected crops in Karnali province; (ii) examination and identification of potential opportunities in agribusinesses towards value addition and processing of local primary agriculture products, and (iii) assessment of the existing system of trade and distribution channels with respect to market dynamics (demand and supply) of the selected commodity and potentiality for up-scaling its production (raw materials), and (v) examination of the appropriate production technology, constraints and prospects of the products for regional, national and international export market.

The study designed was review, iterative, and consultative process. A significant part of the prefeasibility assessment entailed analyzing the provincial agriculture markets, and other markets where usually agricultural products supplied from the various channels and traded. In particular, methodology used for prefeasibility study involves a combination of desk research and secondary data mining from various sources. The study team reviewed several literatures to dig out secondary information. The team extensively analyzed available first hand records (policy, program and reports of federal and provincial government) and documents related to agriculture production and processing status including reports of donor agencies and other local actors. Primary data were collected from the field survey using different survey tools. For example, stakeholder analysis, key informant interviews, focus group discussions, and consultation with concerned stakeholders were also carried out. Such stakeholders included staff of Agriculture Development Offices (ADOs) and District Livestock Services Offices (DLSOs), representative of Provincial Chamber of Commerce and

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<sup>8</sup>Objectives and Scope of the Inception Report on "Potentiality of the Establishment of the Agricultural Processing in Karnali province"- A Prefeasibility study



Industry (PCCI) and District Chamber of Commerce and Industries (DCCIs), wholesale trader, and farmers. A check list for each types of the stakeholder capturing the information was developed. A direct field observation of the study areas for Rapid Market Appraisal was a fundamental part of this study.

**Table 1.1: Indicators and associated questions**

| S.N. | Indicator   | Specific Questions   |
|------|---|--|
| 1    | Supply of the raw materials (Agro –climate, status of the production)   | What is the present production status of the specific crops or value chain or agriculture sub-sector considered for value addition through the post-harvest management activities such as grading and packaging, processing (primary level or end product)? Is there any possibility for up-scaling raw material production with the enthusiasm of the producers (cost benefit) with geographical suitability? |
| 2    | Growth potentiality and Scalable production potential (with comparative advantage for local, national and international market) | Are there selected crops or agricultural sub-sectors and value chains with known comparative advantage that offer sufficient production of adequate quality within economic reach of processors, and can this be increased (if required) to facilitate beneficiation expansion? Is there export potentiality of the product in international market?   |
| 3    | Market Demand (Scalable, Accessible, & Viable markets, market Size, market growth)  | Can markets be identified that are scalable, accessible, and viable now and in the future? Who are the competitors? Is there possibility of market growth with respect to coverage and size?   |
| 4    | Potential for value addition, diversification and targeting high-value market opportunities                                     | Are there selected crops or agricultural sub-sectors and value chains based processing units that have possibility of product diversification? What are the opportunities that could harness high value market secondary level of processing?  |
| 5    | Import substitution or off-season marketing   | Are there selected crops or agricultural sub-sectors and value chains potential for off-season marketing or import substitution? Or are the products derived by processing enterprise from the use of selected crops or agricultural sub-sectors and value chains potential for import substitution and export market?   |
| 6    | Importance for rural livelihoods and social inclusion   | Are there crops or agricultural sub-sectors and value chains selected for potential enterprise that contribute to the rural society to increase their family income and social inclusion, particularly for women, deprived section of the society and ethnic group?  |
| 7    | Environment and conservation of natural resources   | How selected crops or agricultural sub-sectors and value chains identify for post-harvest based agro-enterprise or industry will effect to the natural Resources (positive and negative aspects)? What could be done for waste disposal and hazard management?   |
| 8    | Infrastructure, policy and regulation   | Is there sufficient infrastructure available and does the regulatory environment provide incentives for entrepreneurs to take advantage of the value addition opportunity?   |
| 9    | Input Supply, size of Investment and degree of associate risk   | Is required technology easily available? What is the present mechanism of production input supply? What is the size of investment required for start up the business? What are the risk associated with the business and level of the risk?  |

The Rapid Market Appraisal (RMA) method was used developing extensive market appraisal tools. These included checklist for market chain analysis, list of sets of indicators prepared for product identification, set of criteria developed for the assessment of strength of specific crop or value chain identified as potential for the establishment of the processing agribusiness. The feasibility study was completed in three steps. These were: (i) assessment of the production potential, problems and

constraints of the supply side, (ii) assessment of the local and national market demand and export potential of the selected products to selected target markets, and (iii) preparation of a consolidated report based on the findings and recommendations gained through Steps 1 and 2.

During the RMA major wholesale markets, local markets or district level markets were visited and surveyed where agricultural products are usually trading. For instance, Jumla Agriculture product Collection Center (Cooperative), Bulbule Chhetriya Krishi Upaj Bazaar, Sukhet; Kohalpur Agricultural Produce Wholesale market, Attariya Agricultural Produce Wholesale Market, Butwal Agriculture Wholesales Market; Ghorahi Agriculture Produce Wholesale Market and Fruits and Vegetable Wholesale Market, Tulsipur Dang were surveyed.

## **1.6 Limitations**

The field work of the study was affected by unexpected snowfall in the high hills of the Karnali and field Team returned from the Jumla shortening their field trip scheduled for Mugu and Dolpa. However, data were collected with the help of the District chamber of Commerce and Industries of respective districts and relevant stakeholders through email and telephone communication. The field work of Salyan district was affected by the COVID 19 pandemic. Time remained as constrained for this study and the COVID 19 also affected scheduled meeting and secondary collection from the central level institutions. However, the study team has successfully surveyed major destination market places and trading points.

## CHAPTER 2: THE KARNALI PROVINCE

### 2.1 Introduction of the province

Karnali province is one of the seven federal provinces formed by the Constitution of Nepal 2072.<sup>9</sup> It is one of the largest provinces in Nepal by land mass and comprises ten districts.<sup>10</sup> The province is boarder with the Tibet Autonomous Region of China in the north, Sudurpaschim province in the west, Gandaki province in the east and Province 5 in the south.

The total area of this province is 24,453 square kilometer. It is one of the least developed province of Nepal with human development index (HDI) 0.469 and literacy rate of 62.77%. The official language is Nepali and other spoken languages are Magar, Kham Tamang and Khas. The province occupies higher mountain land of north and mid hills of Nepal. It is one of the remote provinces of Nepal treasuring high natural resources and sceneries. Kubi Gangri, Changala, Kanjiroba Mountains, Shey Phoksundo national park (the largest park of Nepal), Rara Lake (the largest lake of Nepal) and Phoksundo Lake are located in Karnali. Karnali River is the biggest and longest river and Seti and Bheri Rivers are the attributes of Karnali River. Karnali province is considered as an old civilization in Nepal. Archaeological sites found in Jumla, Surkhet and Dailekh assume that the area was a part of Khas kingdom situated in present Jumla district established during 11<sup>th</sup> century. Birendranagar is the provincial capital of the province.

### 2.2 Socio-economic characteristics of the Karnali province

#### 2.2.1 Demography

Karnali province is one of the least populated provinces among seven provinces of Nepal. The total population of the province is 15, 70,418, which comprises 8, 02,495 female and 7, 67,923 male with population density of 56.33 per square Kilometers as of 2011. The estimated population of the province in 2016 is 17, 01,800(**Table 2.1**). The density of population in this province is 56.33 per square kilometers with male female ratio of 95.78:100. Based on the census 2011, three highest populated districts are Surkhet (350,804) followed by Dailekh (261,770) and Salyan (242, 444) and least populated districts are Dolpa (36,700), Humla (50,858) and Mugu (55,286). On comparison to population census 2001, maximum population growth rate is observed in Kalikot 29.71 followed by Jajarkot 27.02 and Humla 25.28 percent.

| <i>District</i> | Census 2001    | Census 2011    | Changeover 2001 (%) | Projected(2016) |
|-----------------|----------------|----------------|---------------------|-----------------|
| Jumla           | 89427          | 108921         | 21.80               | 117958          |
| Humla           | 40595          | 50858          | 25.28               | 55261           |
| Mugu            | 43937          | 55286          | 25.83               | 60109           |
| Dolpa           | 29545          | 36700          | 24.22               | 39832           |
| Kalikot         | 105580         | 136948         | 29.71               | 149371          |
| Dailekh         | 225201         | 261770         | 16.24               | 281758          |
| Jajarkot        | 134868         | 171304         | 27.02               | 186375          |
| Surkhet         | 288527         | 350804         | 21.58               | 387858          |
| Salyan          | 213500         | 242444         | 13.56               | 259309          |
| Rukum west      | 140387         | 155383         | 10.68               | 163969          |
| <b>Total</b>    | <b>1311567</b> | <b>1570418</b> | <b>19.74</b>        | <b>1701800</b>  |

Source: Central Bureau of Statistics ,Nepal

<sup>9</sup>The administrative unit formed under the provisions of the Nepal's Constitution 2072 (2015) as per the federal structure of the Government

<sup>10</sup>Jumla, Humla, Mugu, Dolpa, Kalikot, Dailekh, Surkhet, Jajarkot, Rukum and Salyan

## 2.2.2 Religion, ethnicity and language

The Karnali province is enriched with cultural and linguistic diversity. Development agenda of the province has realized that linguistic and cultural diversity are the assets of the society and contribute in overall development of the nation. Provincial government has given top priority to maintain the cultural and linguistic diversity of the province. More than 50 languages are spoken in the province but the official registration of some of the ethnic groups and linguistic identity are still missing because of unexplored ethnic and linguistic identity of some communities.

Major ethnic dwelling in the province are Braman, Chhetri, Magar, Kami, Gurung, Damai, Thakuri, Badi, Muslim, Sarki, Sanyasi (Dashanami), Rai, Lohar, Gaine, Raji, Newar, Majhi, Kumal, Tamang, Dolpo, Bhote, and Bantaba etc. The official language of the province is Nepali and it is spoken by majority of the population and a single language for communication between all ethnic groups. Likewise other languages that are spoken in the province are

Magar, Gurung, Urdu, Kham, Tamang, Newari, Maitheli, Tharu, Abadhi,

Sherpa, Dolpali, Kaike, Bhote, and Bantaba etc. Languages of some minor communities are now disappearing and it requires preservation. The province also has an ethnic group called Raute, which leads a nomadic life in the forest and still have not settled in the community (Table 2.2).

**Table 2.2: Population by religion and language**

| Population by religion |         |         | Population by language spoken at home |         |         |
|------------------------|---------|---------|---------------------------------------|---------|---------|
| Religion               | Number  | Percent | Language                              | Number  | Percent |
| Hindu                  | 1497277 | 95.34   | Nepali                                | 1501320 | 95.6    |
| Buddhism               | 48551   | 3.09    | Magar                                 | 32334   | 2.1     |
| Christian              | 20390   | 1.30    | Tamang                                | 10860   | 0.7     |
| Islam                  | 2840    | 0.18    | Tharu                                 | 5846    | 0.4     |
| Others                 | 1360    | 0.09    | Others                                | 20058   | 1.28    |

Source: Population census 2011

## 2.3 Agriculture system in Karnali

### 2.3.1 Agricultural land holdings

Total number of the agricultural holding in Karnali province is 2,61,770 and area under the holdings is 1,41,695ha. The average size of the holdings is 0.54 ha. Further, 2,37,659 (90%) of holdings owned agricultural land with average of 0.53ha. per holdings (Table-2.3).

**Table 2.3: Agriculture land holding by tenure**

| Description          | No. of holding | Area (ha)  | Average Size |
|----------------------|----------------|------------|--------------|
| Owned holdings       | 237659         | 126145.1   | 0.53         |
| Rented from other    | 172            | 40.1       | 0.23         |
| Other Tenures        | 912            | 288.4      | 0.32         |
| More than one tenure | 23026          | 15221.33   | 0.66         |
| Total holdings       | 261770         | 1,41,694.9 | 0.54         |

Source: Source: National Sample Census of Agriculture, 2011

### 2.3.2 Irrigation

The data available on irrigation for Karnali province vary based on the reporting sources. However, based on the FAO's report on Global Map of Irrigation areas in Nepal reported 49,444 ha (49,114ha surface water and 330 ha ground water) irrigable land available in Karnali

**Table 2.4 : Irrigation facility available by sources (ha)**

|              | Ground water | Surface water | Total         |
|--------------|--------------|---------------|---------------|
| <b>Total</b> | <b>330</b>   | <b>49,114</b> | <b>49,444</b> |

Source: Global map of irrigation areas of Nepal, FAO/UN

province, which is 34.9% of the total cultivated (or cultivable) land of province. (Table-2.4). 5 out of 10 districts: Dolpa, Mugu, Humla, Jumla and Kalikot districts are food insecure district according to

data on food security of Karnali province. Irrigation facilities has to be improved urgently to improve food production in these districts

### 2.3.3 Electricity

The Karnali province is very remote and does not have access to full-fledged electricity. Only 21.8 % of population issuing electricity for lighting against the national average of 67.3%. This is considerably below and therefore, development of the electricity infrastructures is very crucial for the overall development of the province and to provide access to basic facilities to its population. More than 38% of households are using other sources of fuel for lightening (e.g. Diyalo and oily woods) followed by solar 33.4% .Nearly 6% of the population are still using Kerosene(**Table-2.5**).

**Table 2.5: Households by main type of lighting fuel**

| Fuel type   | Karnali Province |         | Nepal   |
|-------------|------------------|---------|---------|
|             | Households       | Percent | Percent |
| Electricity | 64858            | 21.8    | 67.3    |
| Solar       | 99495            | 33.4    | 7.4     |
| Kerosene    | 16552            | 5.6     | 18.3    |
| Biogas      | 414              | 0.1     | 0.3     |
| Other       | 115099           | 38.6    | 6.1     |
| Not stated  | 1764             | 0.6     | 0.7     |

Source: Karnali Province-Profile data-Nepal map

### 2.3.4 Drinking water

More than 61% of population has access to tap piped and safe drinking water against national average of 47.8%, which is credibly higher. But, still almost 39% of the populations are still using unsafe drinking water. The other sources of drinking water in the province are spring water, covered and uncovered well, river and stream and tube well. Availability of drinking water by type of water sources and population are presented in **Table 2.6**.

**Table 2.6: Availability of drinking water by source**

| Sources        | No. of Household | Percent | Nepal (%) |
|----------------|------------------|---------|-----------|
| Piped tap      | 182981           | 61.4    | 47.8      |
| Sprout water   | 71865            | 24.1    | 5.7       |
| Uncovered well | 21590            | 7.2     | 4.7       |
| Covered well   | 5277             | 1.8     | 2.5       |
| River/stream   | 11803            | 4       | 1.1       |
| Not stated     | 1733             | 0.6     | 0.6       |
| Other          | 1472             | 0.5     | 2.4       |
| Tube well      | 1453             | 0.5     | 35.1      |

Source: Karnali province-Profil data-Nepal map

### 2.3.4 Fuel used for cooking

Diverse types of the cooking fuel used in Karnali province such as firewood, LPG, Boi-gas, Kerosene and electricity.

More than 94% of the households are using fire wood for cooking fuel. Only 3.9% of the population has access to LPG as

**Table 2.7: Households by main type of cooking fuel**

| Fuel type | HH     | Percent | Nepal(%) | Fuel type   | HH   | Percent | Nepal (%) |
|-----------|--------|---------|----------|-------------|------|---------|-----------|
| Fire Wood | 281662 | 94.5    | 63.9     | Kerosene    | 586  | 0.2     | 1         |
| LPG       | 11587  | 3.9     | 21       | Electricity | 191  | 0.1     | 0.1       |
| Cow dung  | 1076   | 0.4     | 10.4     | Not stated  | 1761 | 0.6     | 0.6       |
| Bio gas   | 988    | 0.3     | 2.4      | Other       | 323  | 0.1     | 0.4       |

Source: Karnali province-Profile data-Nepal map

against of national average of 21%. Similarly, merely 191(0.1%) households are using electricity as cooking fuel. Further, Only 0.3% of the households using bio gasand 0.4% households using cow dung (**Table-2.7**).

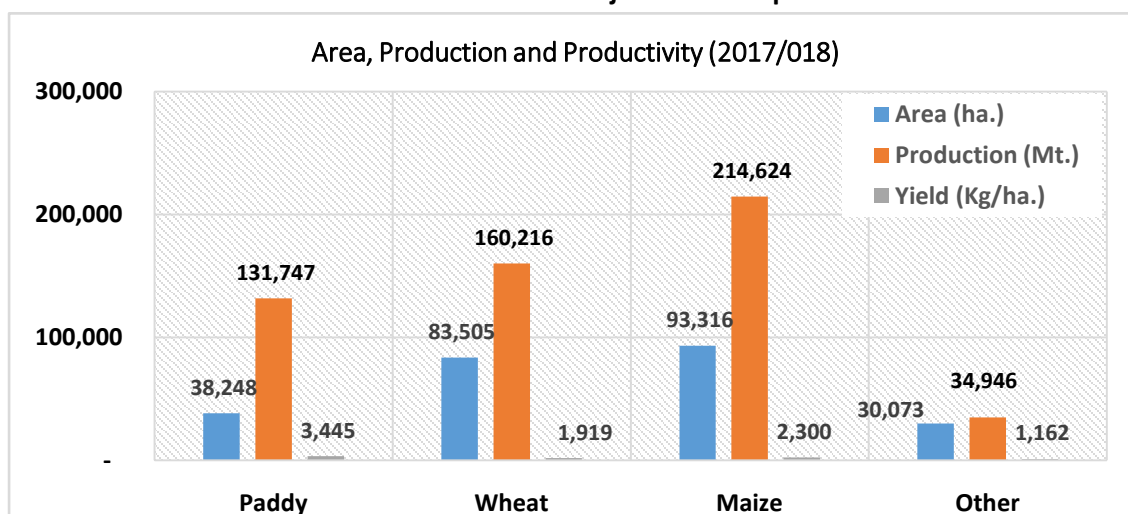
## 2.4 Agricultural status of the province

Only 11.8% of the total area is cultivable and 75.5 % of the cultivable land is arable (MoLMAC, Karnali province). Similarly, Irrigation is available in only 34.9 % of the cultivated land (FAO/UN). Huge area of cultivable land is dependent on rain water which is one of the reasons of low productivity in this province. Food balance sheet data shows that Surkhet, Dailekh, Jajarkot, Salyan and Rukum west are self-sufficient in food and remaining districts Dokpa, Humla, Mugu, Jumla and Kalikot are food deficit (MoALD 2016/17). Despite of food insecurity the province has huge potential of production of cereals, fruits, pulses and vegetables.

### 2.4.1 Cereal crop production

A total of 54, 1527 mt. of cereals was produced in the year 2017/18 in Karnali province with an average productivity of 2,209 kg/ha. Maize and wheat ranked first and second in both area and production respectively. Maize is cultivated in 93,316 ha. of land and it yields 2300 kg/ha. Likewise, wheat is grown in 83,505 ha. with the productivity of 1,919 kg/ha. Paddy ranked at the third position and cultivated in 38,248 ha. of land with average productivity of 3,445 kg/ha. The other potential cereals grown in the province are millet (area: 18733ha, Productivity: 1040 kg/ha), Barley and buckwheat. Altogether, these crops are grown in 30,073ha. with average productivity of 1,162/ha. (Chart 2.1)

Chart 2.1: Production of Major cereals in province



The district-wise production data reveals that almost one third of the total paddy is produced in Surkhet (12,639 ha) alone followed by Dailekh (7,958 ha), Salyan (6,674 ha), Jumla (2,745 ha), Jajarkot (2,426 ha) and Kalikot (2,379 ha). Dolpa, Humla and Mugu comprise very less area of paddy production because of high elevation. Similarly, area under maize cultivated is highest in Dailekh (21,415 ha) followed by (Salyan (21,096 ha), Surkhet (16,209 ha), Jajarkot (14,980 ha) and Rukum west (8,657 ha).

Dailekh, Surkhet, Jajarkot and Salyan produced more than two third of total wheat production. Almost all the districts produced millet but maximum area under millet cultivation was in Mugu (4,218 ha), followed by Jumla (3,756 ha), Dailekh (2,427 ha) and Surkhet (2,098 ha). Likewise, Jumla alone constitutes one third of total barley production area (3,375 ha) followed by Mugu (1,026 ha), Jajarkot and Surkhet. Buckwheat is also cultivated in Dolpa (633 ha), Humla (633 ha), Mugu (459 ha), and Kalikot (106 ha) (Table 2.8).

**Table 2.8: Area, production and yield of cereal crops by districts (2017/18)**

| District  |                | Dolpa | Mugu | Humla | Jumla | Kalikot | Rukum west | Sayan | Jajarkot | Dailekh | Surkhet |
|-----------|----------------|-------|------|-------|-------|---------|------------|-------|----------|---------|---------|
| Paddy     | Area(ha)       | 191   | 899  | 556   | 2745  | 2379    | 1781       | 6674  | 2426     | 7958    | 12639   |
|           | Prod(mt)       | 320   | 1150 | 887   | 5999  | 5477    | 5416       | 27188 | 8837     | 25880   | 50593   |
|           | Yield(Kg/ha)   | 1674  | 1279 | 1595  | 2185  | 2302    | 3042       | 4074  | 3642     | 3252    | 4003    |
| Maize     | Area(ha)       | 2343  | 585  | 137   | 4783  | 3116    | 8652       | 21096 | 14980    | 21415   | 16209   |
|           | Prod(mt)       | 3167  | 933  | 243   | 7134  | 6488    | 20101      | 47055 | 35897    | 50075   | 43531   |
|           | Yield(Kg/ha)   | 1352  | 1597 | 1774  | 1492  | 2082    | 2323       | 2230  | 2396     | 2338    | 2686    |
| Wheat     | Area(ha)       | 2745  | 3245 | 898   | 2472  | 5148    | 5573       | 14785 | 14853    | 18789   | 14997   |
|           | Prod(mt)       | 4778  | 3119 | 1129  | 4620  | 6149    | 13117      | 33467 | 19118    | 31049   | 43670   |
|           | Yield(Kg/ha)   | 1740  | 961  | 1257  | 1869  | 1194    | 2354       | 2264  | 1287     | 1652    | 2912    |
| Millet    | Area(ha)       | 291   | 4281 | 1284  | 3756  | 1237    | 460        | 1047  | 1853     | 2427    | 2098    |
|           | Prod(mt)       | 308   | 3312 | 1483  | 3845  | 1277    | 603        | 1115  | 1897     | 2738    | 2907    |
|           | Yield(Kg/ha)   | 1056  | 774  | 1155  | 1024  | 1032    | 1312       | 1065  | 1024     | 1128    | 1385    |
| Buckwheat | Area(ha)       | 635   | 459  | 633   | 80    | 106     |            | 59    | 26       | 26      |         |
|           | Prod(mt)       | 678   | 436  | 775   | 84    | 121     |            | 69    | 28       | 25      |         |
|           | Yield (Kg /ha) | 1067  | 950  | 1223  | 1048  | 1143    |            | 1173  | 1061     | 986     |         |
| Barley    | Area(ha)       | 351   | 1026 | 617   | 3375  | 815     | 410        | 971   | 630      | 182     | 938     |
|           | Prod(mt)       | 335   | 1140 | 798   | 5625  | 1200    | 519        | 1277  | 700      | 236     | 1415    |
|           | Yield (Kg /ha) | 954   | 1111 | 1294  | 1667  | 1473    | 1266       | 1315  | 1111     | 1295    | 1509    |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

#### 2.4.2 Cash crop production

The major cash crops grown in Karnali province are oilseeds and potato. Area under the cash crop in the province is 18,663 ha. Potato constitutes highest area of 11,723 ha. followed by the oil seeds as 6938 ha. A total of 1, 41,168mt. of potato tuber and 6,510mt. of oil seeds was produced in the year 2017/018. The productivity of the potato is 12mt per hector while the productivity of the oilseeds is 938kg per ha. Potato is grown in most of the districts and Jumla, Kalikot, Dailekh and Surkhet are the major potato producing districts in the province (Table 2.9).

**Table 2.9: Area, Production and yield of Cash crops (2017/18)**

| Crop         | Area(ha)      | Production(mt) | Yield(kg/ha) |
|--------------|---------------|----------------|--------------|
| Oil seeds    | 6,938         | 6,510          | 938          |
| Potato       | 11,723        | 1,41,168       | 12042        |
| Sugarcane    | 2             | 68             | 34000        |
| <b>Total</b> | <b>18,663</b> | <b>147,746</b> |              |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

#### 2.4.2 Vegetable production

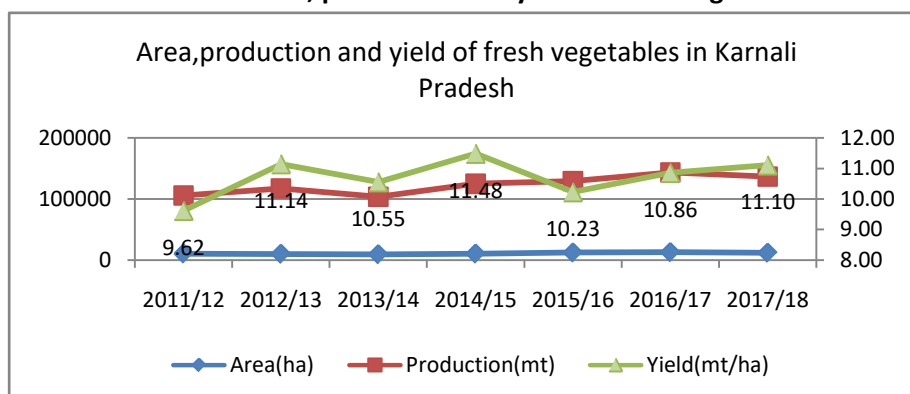
The province has ecological benefit of producing vegetable at all seasons. In winter vegetables can be produced in lowland and basin area while in summer, it can be produced in high hills. Total area of vegetable in the province is 12304 ha which produced 1, 36,645 mt vegetables in F/Y 2017/018. An average productivity of vegetable in the province seems 11.1 mt/ha.

The major vegetables grown in the province are; cauliflower (1030 ha), cabbage (931ha), tomato (1000 ha), radish (734 ha), broad leaf mustard (700 ha), carrot (186 ha), colocasia (460 ha) different beans (467 ha) and chili (629 ha). Besides these, bitter gourd, bottle gourd, snake guard, spinach, fenugreek, and chamsur are also grown in small areas. Area, production and productivity of under different vegetables from the year 2011-2019 is presented in **Chart-2.2**.

The **chart 2.2** revealed that cultivation area of fresh vegetable is almost stagnant over the year with slight variation in year 2013/14 and 2017/18. Though, the yield is increasing in most of the year.

Yield of fresh vegetables has increased by 15.3% in the year 2017/18 as compared to 2011/12. However, slight variation occurred during some year due to some environmental and external factor.

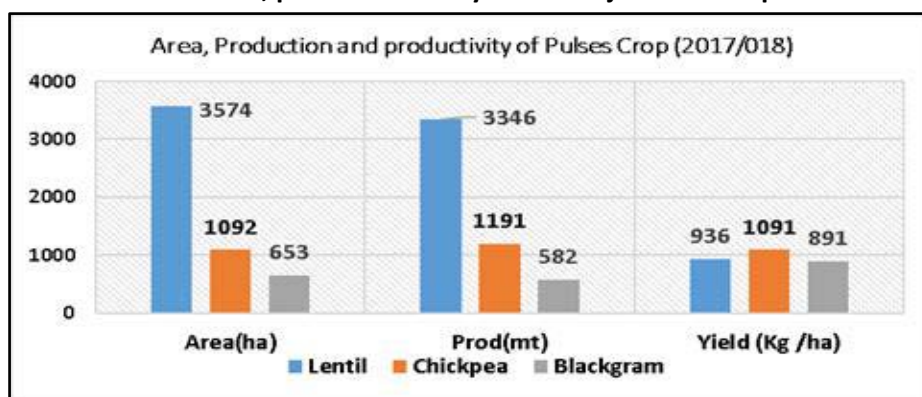
**Chart2.2: Area, production and yield of fresh vegetable**



### 2.4.2 Pulses production

Major pulse crop grown in the province are lentil, chickpea, Black gram and beans. Bean is also considered as fresh vegetable and thus the information are incorporated under fresh vegetable. Among the pulses crop lentil occupies the highest area 3,575 ha, with productivity of 936 kg/ha followed by chickpea 1,092 ha (1,091 kg/ha) and black gram.653ha.(891 kg/ha) in the year 2017/18.Surkhet,Salyan, and Dailekh are the main lentil and chickpea producing districts. Black gram is produced in very less area in all districts except Jumla and Jajarkot. Area, production and productivity of pulses crop is shown in **Chart-2.3**.

**Chart 2.3: Area, production and yield of Major Pulses in province**



### 2.4.3 Fruit production

Karnali province has endowed with diverse agro-ecological climate with wide climatic variation, where different types of fruit crops ranging from tropical to temperate can be grown. Higher mountain and hill temperate climate is potential for production of winter fruits like Apple, walnut, Pear, and apricot etc. primarily in Mugu, Dolpa, Humla, Jumla and

| Crop          | Area (ha)    | Productive area(ha) | Production (mt) | Yield (mt/ha) |
|---------------|--------------|---------------------|-----------------|---------------|
| Winter fruits | 10504        | 3861                | 22799           | 5.9           |
| Citrus fruits | 4877         | 2543                | 22387           | 8.8           |
| Summer fruits | 2051         | 1662                | 13725           | 8.3           |
| <b>Total</b>  | <b>17432</b> | <b>8066</b>         | <b>58911</b>    | <b>7.3</b>    |

Source: Statistical information on Nepalese Agriculture 2017/18,MoALD

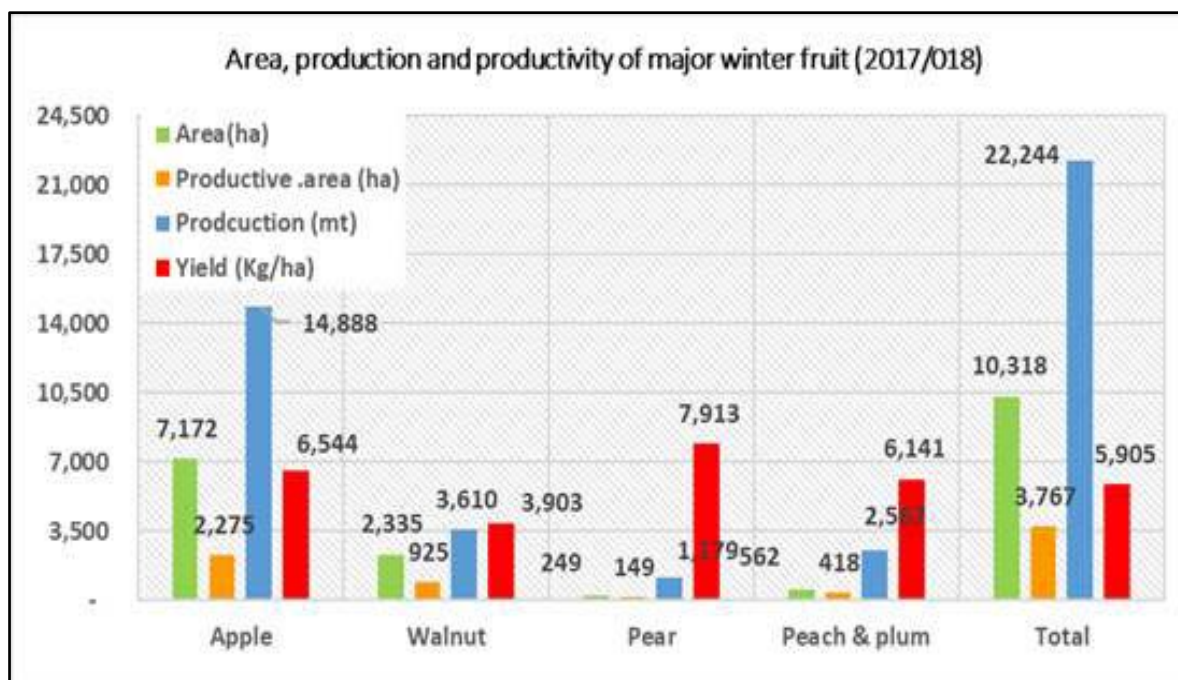


kalikot. The mid hill districts of the province for instances, Dailekh, Salyan, Rukum west and Jajarkot are high potential for citrus fruits. Further, the foothills of the Mid-hills are potential for summer fruits like mango, litchi, banana etc., especially in Surkhet, Salyan and Rukum districts. Total fruit plantation area of this province is 17,432 ha. with productive area of 8,066 ha, and total production 58,911mt. with average productivity 7.3 mt/ha.(Table-2.10).

#### 2.4.4 Winter fruit production

The provincial government has declared karnali zone for organic apple production and wish to market apple fruits with organic branding. Winter fruits covered a total of the 10,318 ha with productive area of 3,767 ha. A volume of 22,244 mt. of winter fruits produced with an average productivity of 5.9 mt/ha. Major winter fruits grown in the province are apple, walnut, pear, plum, apricot etc. Apple is the main winter fruit and cultivated in 7172 ha land among all which occupies almost 2/3rd of the total winter fruit production area. The maximum apple producing district is Jumla grown in 3,658 ha. followed by Dolpa (955 ha), Mugu(937 ha) Humla (515 ha) and Kalikot (624 ha) and average productivity of apple in the province is 6.5 mt/ha. Similarly, pear, peach, walnut, apricot, plum are the other winter fruits grown in the province (Chart2.4).

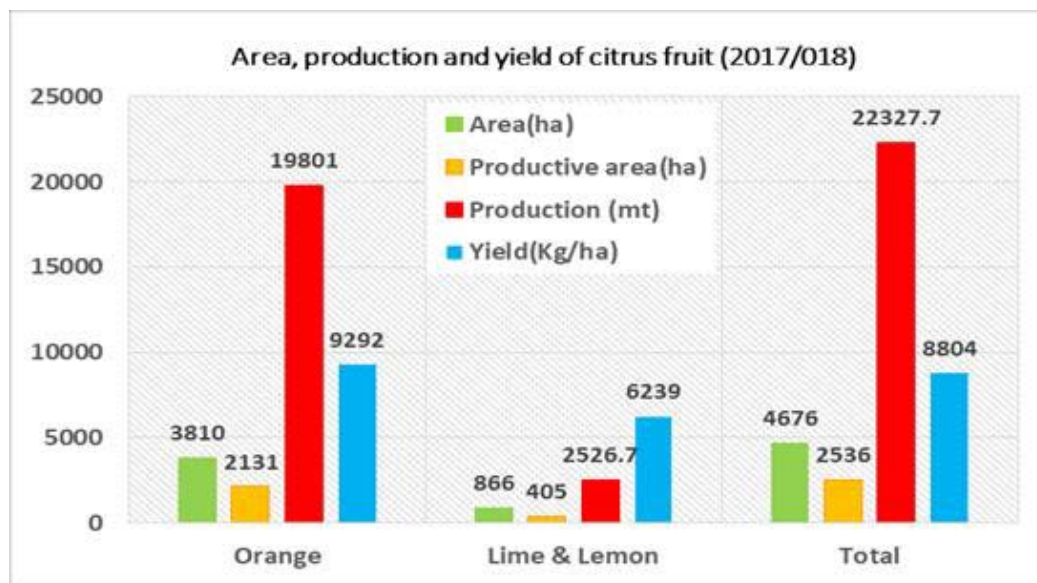
Chart 2.4: Area, Production and Productivity of Major winter fruits (2017/018)



#### 2.4.5 Citrus fruits

Major citrus grown districts of the province are Dailekh, Salyan, Jajarkot and Rukum. The area under the citrus fruits is 4,877 ha. with productive area of 2,536ha and nearly 22,328 metric ton of production in the year 2017/018. The average productivity of the citrus fruit is 8,804kg per ha. Out of total area under the citrus fruit, orange, and lime & lemon constitute 3,810 and 866ha. respectively. Further, orange shared nearly 90% of the total production and remaining proportion is shared by the lime and lemon (Chart 2.5).

Chart 2.5: Area, Production and yield of Citrus fruit (2017/018)



#### 2.4.6 Summer fruits

The major summer fruits grown in the province are Mango, Banana, Litchi and Jack fruit. These fruits are grown in the foot hills of the mid-hill, flat terrain and river basin of Surkhet, Salyan, Rukum, Dailekh and Jajarkot districts. The total area under fruit crops is 1910 ha. with productive area of 1,547ha.

|                     | Mango   | Banana  | Guava   | Jackfruit | Litchi  | Total   |
|---------------------|---------|---------|---------|-----------|---------|---------|
| Area(ha)            | 1,114   | 382     | 241     | 72        | 101     | 1,910   |
| Productive area(ha) | 906     | 324     | 182     | 55        | 80      | 1,547   |
| Production(mt)      | 6,881   | 3,061   | 1,394   | 591       | 714     | 12,641  |
| Yield(Kg/ha)        | 7594.92 | 9447.53 | 7659.34 | 10745.45  | 8925.00 | 8171.30 |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

A total of 12,641mt. of summer fruits produced in the year 2017/018 with average productivity of the 8,171kg/ha of yield. Mango constitutes the highest area and production among the summer fruits crops. The per unit yield of Jackfruit is highest among the summer fruit crops in the province (**Table 2.11**). Besides, new interventions are also started for cultivation of the avocado and kiwi in the Dailekh, Jajarkot, Surkhet and Salyan districts of the province.

## 2.5 Connectivity and existing agriculture market

### 2.5.1 Concepts and importance

Marketing of agricultural products encompasses all operations involved in the movement of farm produce from the producer to the end consumer. It includes collecting, grading, processing, preserving, and transportation of the agricultural products and financing at each level of the operation as required. Infrastructures associated with marketing operations are very critical. However, there are provincial constraints like connectivity of the good road infrastructure as well as other basic premises required for efficient marketing operations. Basically, agricultural marketing system is a link between the farming community and the non-farm sectors for example fertilizers,

pesticides, Agricultural equipment, machinery, electricity and repair and maintenance services etc. Besides, the expansion in the size of farm or scale of economy requires marketing premises and facilities such as transportation, storage, milling or processing, packaging and retailing to the consumers.

Truly, access to market and its functions is vital for agriculture not only in stimulating production and consumption, but also in accelerating the pace of economic development in countries like Nepal as well as in the Karnali province, where agriculture is the main basis of the rural livelihood. It is argued that a marketing system can become a direct source of new technical knowledge and influence farmers to adopt updated scientific methods of cultivation. Market transmits the price signals to the farming community. Therefore, it helps to: (i) increase farm income offering fair price of the products, (ii) commercialization of agriculture and specialization in agribusiness through reducing cost of marketing and attaining efficiency in marketing process, (iii) develop agricultural industries by supplying raw materials, (iv) develop coordination between value chain actors reducing role of ugly middlemen process of marketing, (v) adoption of the technology and product standardization, and (vi) stabilize the price volatility through systematic marketing process.

## 2.5.2 Connectivity: Road and air services

From the perspective of the connectivity, 1343.43 KM road is built in the province. However, only 777.77KM (Blacktopped-601.77 KM and Gravel 176 KM) road remains good for all season. Dolpa is lacking road connectivity and Tribeni-Dunai road (56 KM) is under construction. The earthen work of Hilsa-Simikot- Dulya Road (90 KM) has been completed.

**Table 2.12: Summary of Road Infrastructure in the province (KM)11**

| Road type        | Blacktop      | Gravel road   | Earthen road  | Total          | Under Construction | Planned road  |
|------------------|---------------|---------------|---------------|----------------|--------------------|---------------|
| National highway | 392.54        | 5.00          | 2.66          | 400.20         | 0.00               | 0.00          |
| Feeder road      | 209.23        | 23.00         | 446.00        | 678.23         | 117.00             | 206.00        |
| Mid-hill road    | 0.0           | 148.00        | 117.00        | 265.00         | 0.00               | 0.00          |
| <b>Total</b>     | <b>601.77</b> | <b>176.00</b> | <b>565.66</b> | <b>1343.43</b> | <b>117.00</b>      | <b>206.00</b> |

Source: Government of Nepal, Department of Road

The track of Nagma- Gamgadhi road is completed (Annex 2 and Annex 3)<sup>13</sup>. East-west highway provides connectivity at Koholpur through the Nepalgunj- Surkhet road. Rukum West and Salyan district of the Karnali province are linked with East-west highway at Lamahi through the Lamahi-Tulsipur- Rukum road and at Amiliya through Amileya- Tulsipur- Rukum road (**Table 2.12& 2.13**).

**Table 2.13: Major Road Network of Karnali province (2017/2018)<sup>12</sup>**

| Code       | Sector                | Length (KM) | Code       | Sector                      | Length(KM) |
|------------|-----------------------|-------------|------------|-----------------------------|------------|
| <b>H11</b> | <b>Rapti Rajmarg</b>  | 168.54      | <b>H13</b> | <b>Karnali Rajmarga</b>     | 232.00     |
| 11.1       | Ameliya-Tulsipur      | 27.63       | 13.1       | Bangesimal-Dailekh/Saigaon  | 112.00     |
| 11.2       | Tulsipur-Salyan       | 55.71       | 13.2       | Dailekh/Saigaon-Jumla-Manma | 39.00      |
| 11.3       | Salyan-Musikot        | 85.2        | 13.3       | Manma-Jumla                 | 81.00      |
| <b>H12</b> | <b>Ratna Rajmarga</b> | 113.08      | <b>H18</b> | <b>Mid-hill</b>             |            |
| 12.1       | Jamunia-Kohalpur      | 22          | F15        | Lamahi-Tulsipur             | 49.00      |
| 12.2       | Kohalpur-Surkhet      | 86          | F48/144    | Tallo Dungeshwor-Dailekh    | 28.00      |

Source: Government of Nepal, Department of Road

<sup>11</sup>Ibid

<sup>12</sup>Ibid

<sup>13</sup>Gov/N, DoR (2017/2018), Statistics of Strategic Road Network, Government of Nepal, Department of Roads, Kathmandu

Karnali province has good connectivity with air service and there are eight airports. Most of these airports are providing connectivity to the remote areas of the province from both Kathmandu and Nepalgunj. Surkhet Airport is linked with the remote places, mostly in Humla, Dolpa, Mugu and Jumla. (Table 2.14). These airports are very crucial for transportation of food stuff, drug and medical equipment, and other necessary supplies in the places with no good road connectivity, and during the monsoon when the road is blocked due to landslide.

| S.N. | Location                 | Name of Airport           | Status        |
|------|--------------------------|---------------------------|---------------|
| 1    | Birendranagar, Surkhet   | Surkhet Airport           | Daily Service |
| 2    | Chandannath, Jumla       | Jumla Airport             | Daily Service |
| 3    | Chaurjahari, West Rukum  | Rukum Chaurjahari Airport | Once a week   |
| 4    | Juphal, Dolpa            | Dolpa Airport             |               |
| 5    | Pahada, Dolpa            | Masinechaur Airport       |               |
| 6    | Rara National Park, Mugu | Talcha Airport            | Once a week   |
| 7    | Musikot, West Rukum      | Rukum Salle Airport       | Once a week   |
| 8    | Simikot, Humla           | Simikot Airport           |               |

Source: Government of Nepal, Department of Road

### 2.5.3 Agricultural marketing system

Agricultural marketing system is not still well organized and developed in Karnali province and market centers are inadequate in number, especially in hills and mountain regions of the province. The marketing system varies from place to place and involvement of a large numbers of intermediaries is common in the distribution process of agricultural produce marketing. District headquarter is the main market for trading with a very few market centers that is existing at the location where settlement is dense. However, majority of the farmers need to travel long distances to reach the nearest market centers. A number of middlemen are involved in taking the farm products from the place of production to the ultimate consumer. There may be several middlemen, engaged at different levels, and this increases the gap between price paid by the consumer and that received by the producers.

The volume of marketable surplus is generally small and seasonal price volatility is common due to subsistence nature of the farming and low volume of the production. Mostly, smallholder farmers' sell their products to village level purchasers or to the collectors who are roaming before the harvest of the crop or immediately after harvesting. Due to unorganized nature of the agriculture marketing, quality of the products is not well maintained because of lack of appropriate grading and packaging practices. Price of the products is controlled by the vendor or middleman with measurement problem in some cases. The marketing infrastructures are poor and storage facilities are rarely available. Price of the agricultural products and MAPs is directly influenced by Indian price and quality of commodities.

Nepalgunj, city of Banke district is the main marketing hub for most of the districts of the Karnali province for trading of both consumable and non-consumable goods. However, Birendranagar-provincial capital of the Karnali is becoming major market hub for the province. The Nepalgunj city is located in the western Terai region of Nepal in the Province 5. It is also gateway to the Indian market specially for trading of MAPs products because it borders with the India at Jamunaha. Besides, both cities Butwal and Dang Tulsipur are the main market for Salyan and West Rukum.

#### a. Agriculture produce markets in Karnali province

Several types of the agricultural produce market are operating in the Karnali province and services offered. Transaction volumes of the markets vary based on the types of the market. A large number of the small farmers either sell their product from production sites or send it to local markets themselves. Presence of the contractors or middlemen is common when the volume of the produce is considerably large. There are also farmer's organizations involving in managing agriculture produce markets. Major agricultural markets offering services in the Karnali province are as follows.

- i. **Local market (Sale in Villages):** Local markets are located nearby village settlement where farmers can conveniently bring their produce for sale to prospective purchasers. A large number of farmers who produced small quantities of the agricultural products mostly sell their products in local market. Generally, existence of the middlemen is common in the local or village market. The roles of the middlemen are collection of the agricultural produce from a large number of farmers, and send them to the district or central markets. However, middlemen commonly offers lower price for the products.
- ii. **Collection Centre:** Collection Centers are managed by farmers groups or an individual (rarely) and agricultural produce collected at the collection Centre is managed by two ways, (i) directly disposed to the district market or wholesale market by market management committee of the group or cooperatives, and (ii) agricultural produce directly purchased by the representative of the traders or middlemen and then disposed to the district or wholesale markets.
- iii. **Districts market:** Both fresh or processed agriculture produce are traded in the district markets. Fresh fruits and vegetables assembled from the village markets or collection centers. Some agricultural commodities are processed at district level markets and sold to the consumers. For example production of Apple Brandy in Jumla, milling and packaging of the Marshi Rice etc. Surplus volume of agriculture produce is disposed to the regional wholesale market. There are special shops, also called gift shops (Kosheli Ghar) operating in each district of the province and offering local products to the domestic and international tourist or visitors. Such products are, honey, Beans, local rice, millet flour, ghee, and dried fruits etc.
- iv. **Farmer's organizations:** Farmer's organizations or an association of farmers and other rural households such as farmers' group and cooperatives are actively involving marketing of agriculture produce in Karnali province. Most of the producers' cooperatives are engaged in the marketing activities with the primary aim of providing marketingservices to its members. Such types of the Farmers' organization are operating both collection center and agriculture market for its members. Agriculture cooperatives are involved in the production, processing and marketing of agricultural products.

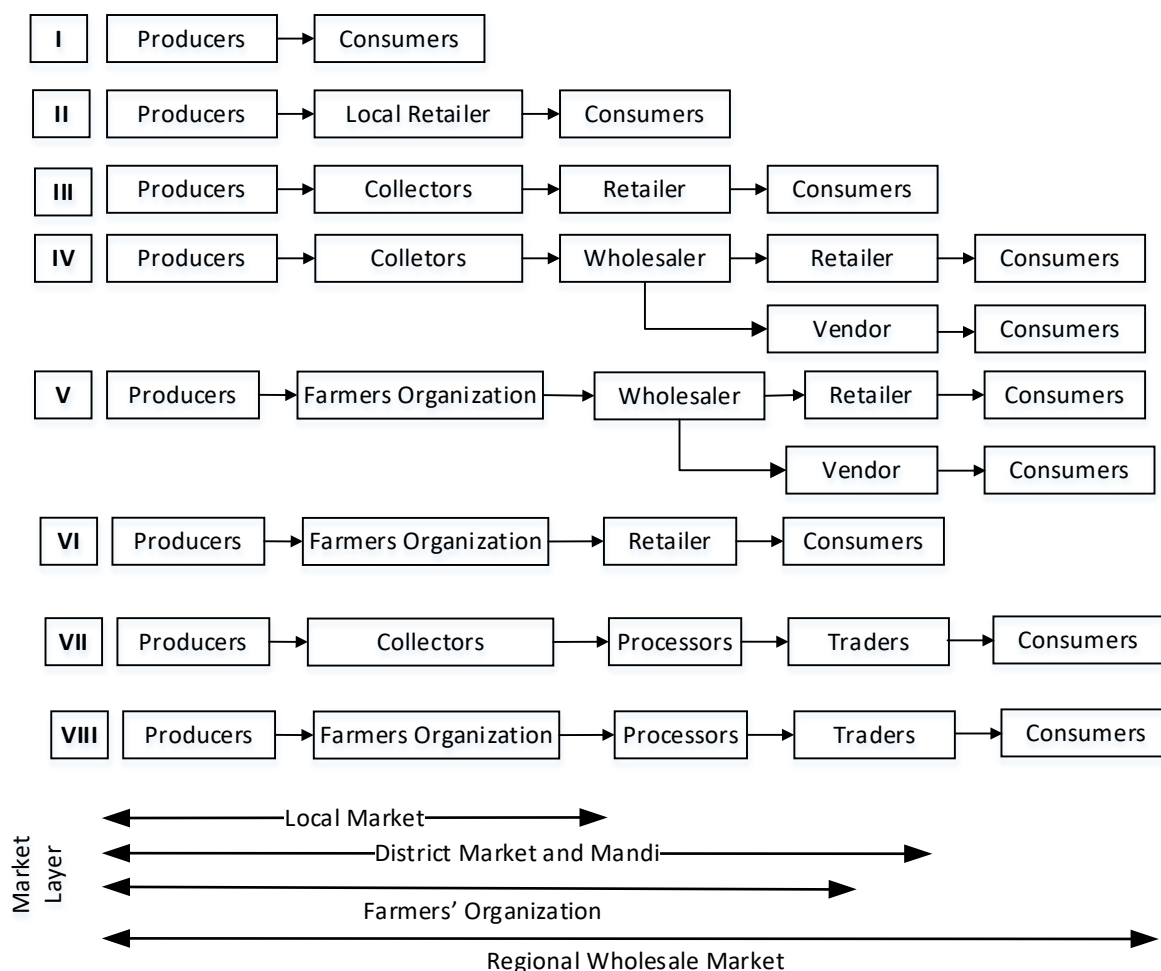
Marketing Cooperatives are offering effective marketing role by reducing number of intermediaries providing appropriate value of the produce and also involving in value addition through processing activities. The farming community are enjoying fair price and providing markets for their products and strengthening the bargaining powers of the farmers. These cooperative generally offer two types of the marketing services, viz. (i) collection, processing and trading of the agriculture produce, and (ii) supply of the production inputs. It is notable that farmers-owned marketing cooperatives are typically involved in the first stage of marketing activities by successfully establishing collection centers for fruits and vegetables; seed, honey, and milk etc. at the farm gate on the behalf of their members. Further, these cooperatives are also involved in primary level of processing. Fresh fruits and vegetable; seed; and milk are assembled, graded and sold to market. However, Honey, millet flour, Beans, local

rice; ghee, and dried fruits etc. are processed at primary level or processed for end products before market disposal. Co-operative marketing also shortens the marketing channel and is able to reduce marketing cost through large volume of the product transaction and charging minimum level of the management cost.

- v. **Fruits and vegetable mandi:** Fruits and vegetable Mandis are operating by the individual traders generally found in district headquarter and are very small in size. However, these Mandis provide market place for farmers thereby giving assurance of returns though the rate of returns could vary and sometimes even be lower than expectation. It is a closed system of marketing, there might not be opportunity to access this market to everyone. Mostly, farmers carry their produce to the Mandi and sell their produce to the wholesaler. Middleman also supplies collected fruits and vegetables to the Mandi on the contact basis. Fruits and vegetable Mandi operating in the Surket district is the largest Mandi of the Karnali province. If there is surplus volume of the produce, these wholesalers also supply those farm produce to the processors.
- vi. **Wholesale market:** The Regional Agriculture Wholesale Market – **Bulbule Chhetriya Krishi Upaj Bazaar** established in 2005 is only the large regional market of the Karnali province offering marketing services for fresh vegetables and fruits and a large numbers of farmer community and traders are befitting from its service. This market opens every day and it is managed by the market management committee. It is regulated and single central market of the Karnali province built in an area of 0.6 ha. Of land with cold storage facility of the 200mt.**Jumla Agriculture product collection center, Chandan Nath** was established in 2009 and provides marketing services to the farming community. The collection Centre opens every day and it is managing by the Cooperative Community.  
**Kohalpur Agricultural Produce Wholesale Market, Banke** is second important regulated agriculture market offering marketing services for the agriculture produce mostly for fruits and vegetables that grown in Karnali province since 1998. All the districts of Karnali province are benefitting from this market to sell large volume of the products. Further, **Tulshipur Fruits and Vegetable Market, and Ghorai Agriculture Produce Wholesale Market ,Dang** is also offering services to the Salyan and Rukum districts for fresh vegetables and seasonal fruits specifically citrus, lime, Turmeric, Garlic, Timur, etc.

#### **b. Marketing channels**

The farm product is transferred to the ultimate consumers through the hands of various marketing agents or channels. Higher the numbers of marketing players, higher will be the price and vice versa. Market has itself organized the intermediaries so that market functions well. The marketing channels for agricultural commodities vary from commodity to commodity as (i) directly farm gate to consumers, (ii) farm gate to consumer through public agencies or cooperative organizations; (iii) farm gate to consumer through private wholesalers and retailers, and (iv) farm gate to consumer through processors. The followings are the dominant agriculture marketing channels existing in the province. **(Figure 2.1)**



**Figure 2.1: Marketing channels and level of market**

It is notable that some important characteristics and changes in marketing channels has been witnessed during the last decades as well, there is some opportunities in the cross-cutting areas.

RMA analysis exposed the following facts:

- Proportion of the marketed volume of the products directly from farmers to end consumer has considerably decreased and the role of the transport agencies in the marketing channel has increased credibly, which is accelerated by transport infrastructure and establishment of the wholesale market.
- Traders involved in agricultural marketing are specialized in commodity based marketing services and their role of marketing functions has shown an increasing tendency. Agribusiness corporate is initiating grading, packaging and processing activities for example, Apple Cider and Brandy, Dried fruits, graded, packed and labeled honey and cereal products.
- Geographic expansion of the market has increased demand for the high value products, there by expansion of the pockets along the road corridor is visible. Besides, the length of marketing channel has tended to increase due to increase in demand for value-added services.
- Not a single value chain represents a sufficient quantity of raw products that could be available for large scale Agricultural industry, while the market opportunities are promising. The marketing channel and trade of the products is still influenced due to low coordination between the value chain actors.

- There are some interesting cross-cutting market opportunities existing in the province for example, organic branding, product branding; certification and compliance, packaging, recycling, dryer innovation, traceability, and logistics. Therefore, the provincial government should encourage and enable the start-up and growth of innovative enterprises in these areas.
- Existing entrepreneurs across the dominant value chains experience challenge for the development of domestic, regional, and international markets.
- The share of private trade in handling marketed surplus is higher than the surplus that is handled by cooperatives and public agencies. It is estimated that private trade handles around 80 percent of the total marketed quantities of agricultural commodities

#### 2.5.4 Opportunities in agribusiness

During the RMA survey, it was understood that Agricultural marketing in Karnali province has undergone notable changes during the last 15 years, regarding the increased in marketed surplus; increase in urbanization and income levels and consequent changes in the pattern of demand for marketing services; increase in linkages with distant and overseas markets; and changes in the form and degree of the intervention from the government as well as other development agencies. The private sector is emerging and leading agribusiness activities.

To promote entrepreneurship skill of the rural areas for creation of large number of jobs at local by mobilizing local resources, enterprise which are more efficient and viable have to be establish. Besides, availability of the required raw materials could be one constrain due to scattered production pockets. Hence, promotion of the micro, small and medium sized enterprises (MSMEs) is a good option, rather than that of large enterprises which requires initial huge investment. Investment in agro- processing is vital to create, grow and improve agricultural value chains by linking farmers to suppliers on the one side and consumers on the other. Otherwise farming will remain a low-productivity subsistence activity, largely isolated from the market economy. This linkage will contribute to increasing volume and diversity of products handled and making the value chain more cost-efficient, principally by reducing loss and wastage, enhancing quality, and traceability and exploiting economies of scale by moving higher and more stable volumes of produce<sup>14</sup>. The challenge for agriculture commercialization in Nepal is therefore to create mechanisms to work with industry stakeholders to plan and manage the commercialization processes by focusing on individual value chain systems and their linkages<sup>15</sup>. Therefore, the province needs to focus on value addition activities through post-harvest processing of agriculture and MAPs products. The Karnali province has a comparative advantage on agro-products and MAPs with significant growth potential in both production and value addition with motto of organic products taking account of: (i) supply-side constraints in terms of both quantity and quality of the products, (ii) Increasing market demand of the products at local, provincial, national, and international level, and (iii) Improvement of the poor marketing and management capabilities, and (iv) Investment on basic infrastructures, such as irrigation channel, link roads, power, research and human resources to support agro-based industry.

Thus, the current strategic approach could be (i) mobilizing government and non-government service providers in partnership and on a contractual basis, (ii) promoting cooperative and

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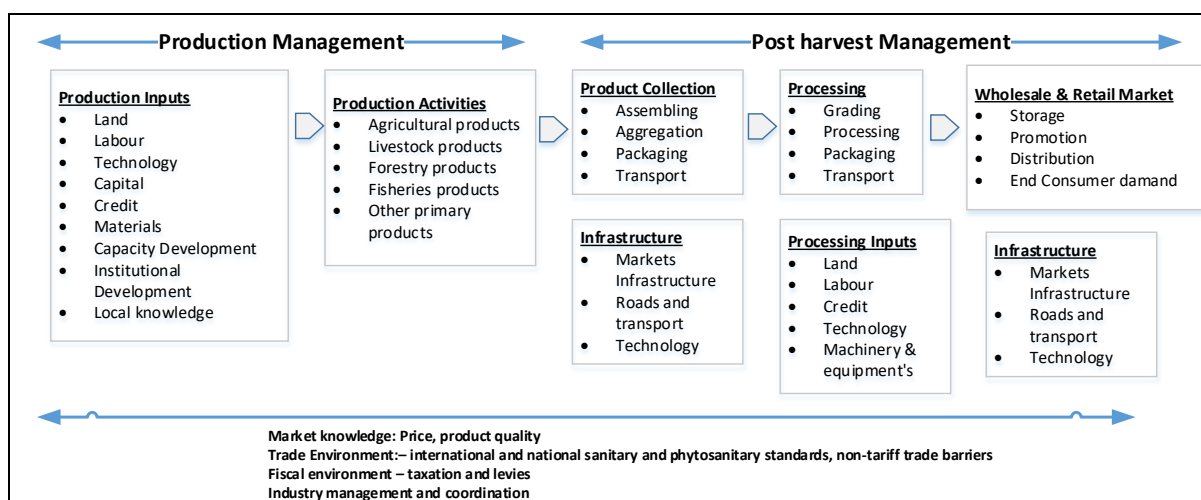
<sup>14</sup>Ibid

<sup>15</sup>A DB (2013), Value Chain Analysis, Nepal, High Mountain Agribusiness and Livelihood Improvement Project



contractual farming and providing technical backstopping, (iii) devolving local agricultural programs to local bodies that can enhance food security and processing agribusiness, (iv) strengthening agricultural research stations as resource centres, and (v) partnership with private sector, enabling investment environment for agribusiness. In this regard, the province needs to focus on the value chain development approach as the maximization of the benefits (or value added) from the agribusiness activity entirely depends on the production of niche products for sale rather than on-farm consumption, demand and delivery of quality products at competitive prices to the consumer; coordination with actors to make value chain efficient and profitable. The generic value chain system for agricultural products is illustrated in **Figure 2.2**.

**Figure 2.2: Generic Agricultural Value Chain System**



Source: Adapted from ADB, 2013

From the perspective of the economic development, Karnali province have to consider its strength and weakness. Therefore following are the key points that need to be considered for agribusiness promotion:

- The province is natural place for organic production. The geography of the Karnali province suitable for temperate fruits, oranges, wide range of the vegetables, Marshi paddy and beans. Thus, niche products and high value crops can provide much higher income than cereal crops as these crops are considered suitable for smallholders' because they are labor intensive and offer higher returns per unit area of land as compared to food grains.
- Poor connectivity in the provinces is causing low level of market integration and post – harvest management and processing business in the agriculture sector. Improvement in connectivity and transport system could help to increase the access to market, explore comparative advantage and understand their competitiveness relative to regional suppliers and market place. Therefore, to transition from largely subsistence agricultural production systems to commercial agribusiness, particularly in hills and mountain investment, connectivity is crucial including other production infrastructures such as irrigation, storage facility, collection centers. Various development initiatives has already started value chain integration for example, HVAP, RISMFP, KISAN and ASDP and therefore, province needs to expedite and upscale the learnings for these intervention.
- There has been a substantial growth in the number of commercial Bank and diverse MFIs, resulting increasing access to finance. However, cost of obtaining credit and the problem of collateral as a part of lending is still an issue. Therefore, easy access to finance for agribusiness resolving these issues are very crucial including availability of small farm credit.

- Mostly, post-harvest activities in agriculture are managed by the private sector. During the pace of development, several business associations have emerged and represent the interests of their members with government and to tackle issues of industry problems in common. These institutions are PCCI/DCCI/Besides, SEAN, Producers' associations etc. Cooperatives societies, Small farmers' agriculture cooperative limited, farmers groups, individual private entrepreneurs are emerging as private companies. Facilitating these institutions will accelerate agribusiness and agro-processing industries in the province by creating forward and backward linkages<sup>16</sup>.
- The province is a good habitat for MAPs including rare herbs. These natural products are one of the major resources base for the civilization of the Karnali people. The collection of the MAPs and herbs takes place from forests credibly contributes to the cash income and livelihood improvement and poverty reduction of the local communities. Thus, MAPs and herbs sector is one of the major potential sectors for business for inclusive growth of the province.
- The Agriculture Sector Development Programme (ASDP) and Pri-minister Agriculture Modernization Project are also implemented priority value chains.

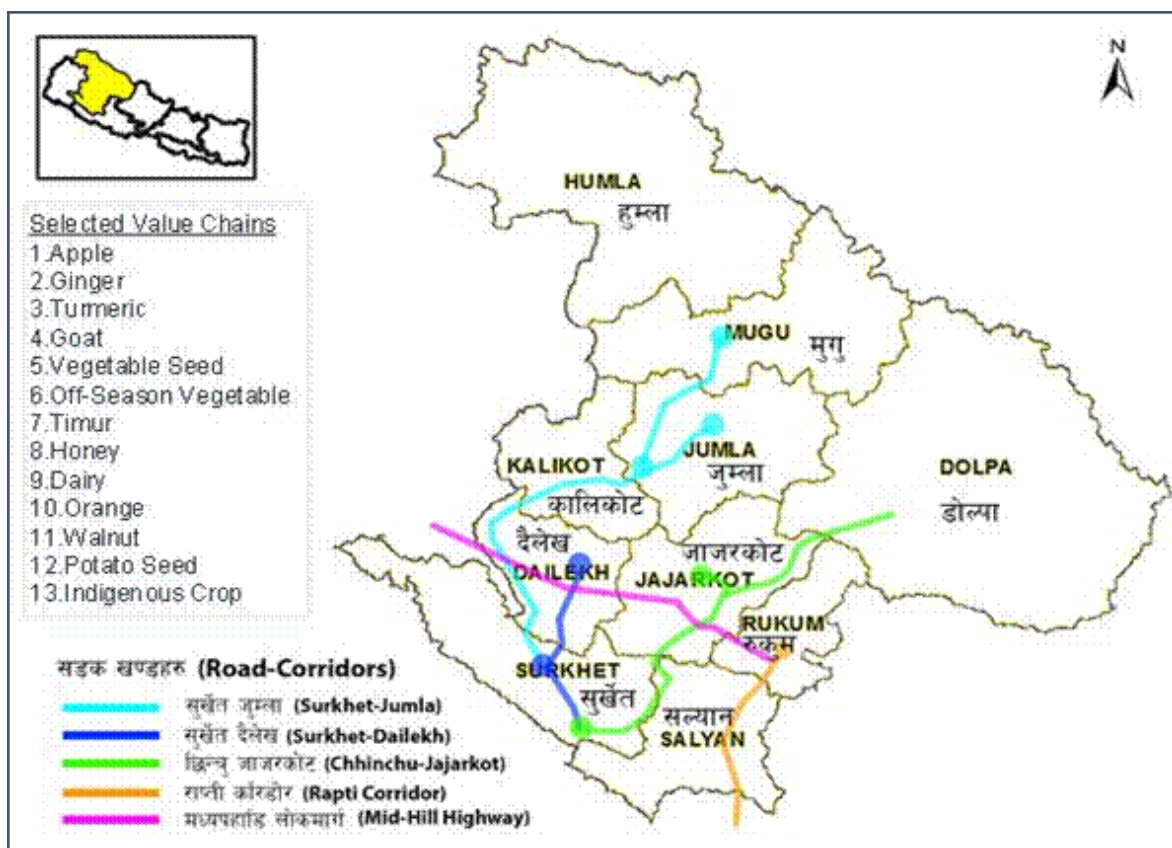


Figure 2.3 Selected Value Chain for Programme Implementation in Karnali province

Source: <https://www.asdp.gov.np/about-us/project-area>

<sup>16</sup>Ibid

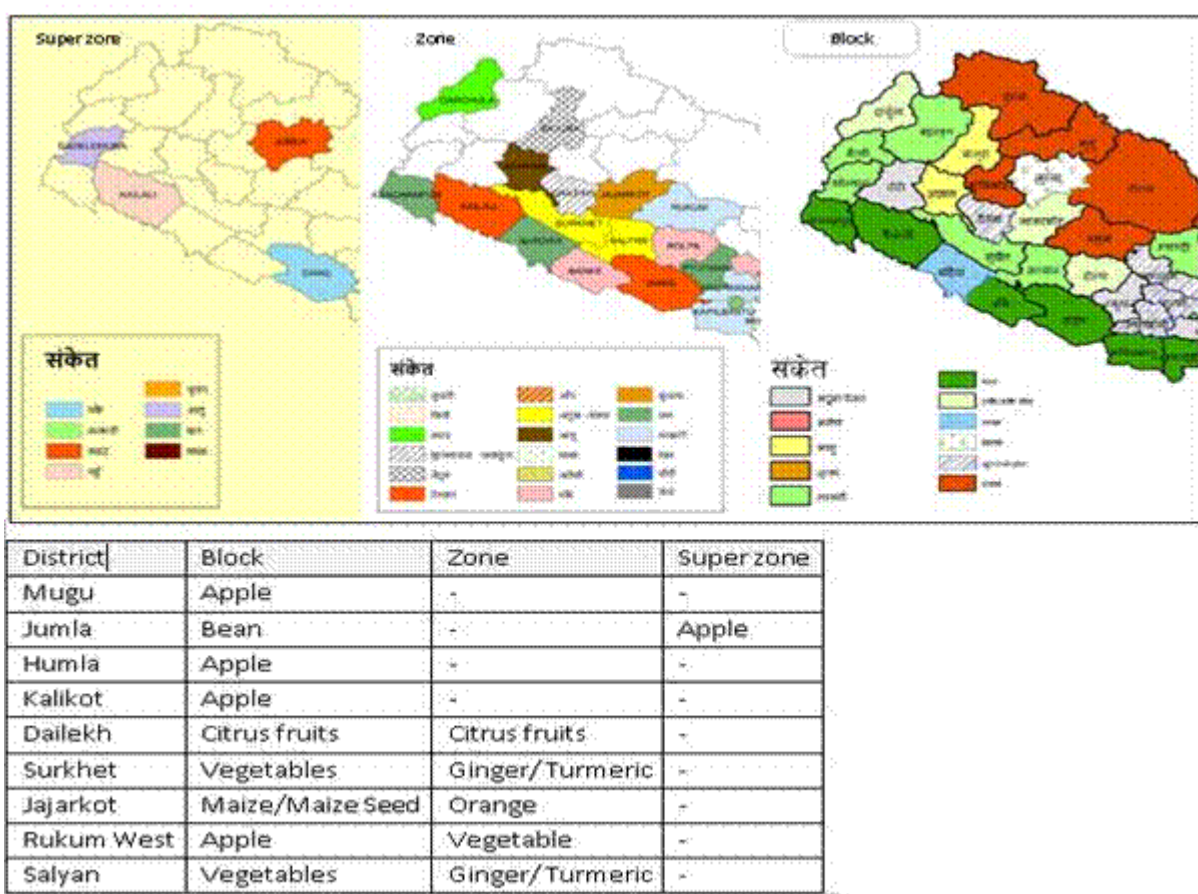


Figure 2.4: The Block, Zone and Super Zone of the Commodity Value Chain under PMAPMP

Source: <http://pmamp.gov.np/>

The province needs to draw upon lessons learned from the development initiatives focusing on the value chain approach for the promotion of the agribusiness for example, HVAP, ASDP and ASHA etc. The priority value chain for the province with its constraints, opportunities and leverage point for intervention are placed in **Table 2.15**.

Table 2.15: Potential value chain constraints, opportunities and leverage points for implementation

| Value chain                                  | Constraint  | Opportunity   | Leverage Point   |
|--|---|---|--|
| <b>Temperate Fruits (Apple, walnut etc.)</b> | <ul style="list-style-type: none"> <li>Low size of marketable production</li> <li>Low productivity due to less productive varieties and lack of production technologies</li> <li>Poor quality of the post-harvest handling (grading, packaging, drying, branding)</li> <li>Lack of good connectivity due to poor road network in the production pocket</li> <li>Lack of business development and marketing services at farm level and dominance of the middleman lead to high price volatility</li> <li>Poor extension services and research and lack of processing industry</li> <li>Lack of business conducive</li> </ul> | <ul style="list-style-type: none"> <li>Organic production can fetch good price of the fruits and its diversified products to increase farm income</li> <li>Suitable agro-climate offers possibility to increase scale of the production through the dissemination, improve variety compact orchard management practices</li> <li>Research &amp; Development with respect to varietal development, post-harvest management, and market demand</li> <li>Improvement in the present practices of post-handling could reduce losses and quality of the product intact</li> <li>Possibility of value added as</li> </ul> | <ul style="list-style-type: none"> <li>Ensure quality extension services at the farm and community level tacking account of orchard management, high density plantation, organic farming technologies</li> <li>Capacity development of the producers, collectors, cooperatives and traders in post-harvest handling</li> <li>Support private entities in the post-harvest processing</li> <li>Undertake a market survey &amp; awareness creation campaign through FNCCI/AEC &amp; other concerned public private entities</li> <li>Invest in research and</li> </ul> |

| Value chain          | Constraint   | Opportunity  | Leverage Point   |
|----------------------|--|--|--|
|                      | environment for private sector   | products, Improve processed dried fruit, juice, jams/jellies, and alcoholic beverages  | development of good variety, plant protection measures, and post-harvest technologies  |
| <b>Citrus Fruits</b> | <ul style="list-style-type: none"> <li>• Low productivity due disease and pest</li> <li>• Low size of marketable production</li> <li>• Poor quality of the post-harvest handling (grading, packaging, drying, branding) and lack of the storage facility</li> <li>• Lack of good connectivity due to poor road network in the production pocket</li> <li>• Lack of marketing and business development services at farm level and dominance of the middleman lead to high price volatility</li> <li>• Poor extension services and research and Lack of processing industry</li> <li>• Lack of business conducive environment for private sector</li> </ul>  | <ul style="list-style-type: none"> <li>• Organic production can fetch good price of citrus and its diversified products to increase farm income</li> <li>• Suitable agro- climate offers possibility to increase scale of the production through the dissemination, improve variety compact orchard management practices</li> <li>• Research &amp; Development with respect to varietal development, post-harvest management, and market demand</li> <li>• Improvement in the present practices of post-handling could reduce losses and quality of the product intact</li> <li>• Possibility of value added as products, juice and jams</li> </ul>  | <ul style="list-style-type: none"> <li>• Ensure quality extension services at the farm and community level tacking account of orchard management, high density plantation, organic farming technologies</li> <li>• Capacity development of the producers, collectors, cooperatives and traders in post-harvest handling</li> <li>• Support private entities in the post-harvest processing</li> <li>• Undertake a market survey &amp; awareness creation campaign through FNCCI/AEC &amp; other concerned public private entities</li> <li>• Invest in research and development</li> </ul>   |
| <b>MAPs</b>          | <ul style="list-style-type: none"> <li>• Lack of policy and system to implement Good Agriculture and Collection Practices (GACP) and domestication as very few products are being cultivated currently</li> <li>• Lack of knowledge on sustainable collection practices, threatening the existence of some species that are unique to Nepal</li> <li>• Incomplete legal and institutional framework to protect Nepal's genetic resources as well as frequent obstacle in transportation</li> <li>• Lack of marketing infrastructures as storage and processing facilities</li> <li>• High dependency on exports to neighboring countries lead to high volatility in price</li> <li>• Lack of accredited quarantine facilities at the customs points</li> <li>• Inadequate Pest Risk Analysis for major products, and insufficient fumigation facilities</li> <li>• Weak Intellectual Property protection is leading to loss of rights on indigenous knowledge</li> </ul> | <ul style="list-style-type: none"> <li>• Organic and unique, as most of them are collected from the forest in wild form and most of the species are endemic to the Himalayan region and a wide range of species of MAPs is found in Nepal</li> <li>• Source of employment and income to significant number of population in the remote places</li> <li>• Well documented sector, with large number of studies done on potentials as well as benefits at all stages of the value chain</li> <li>• Expanding world markets for organic herbs and potential for domestication</li> <li>• High business opportunity-potentials to capture greater share of value in the overall global value chain through improved collection, storage and processing facilities</li> <li>• Priority commodity for NTIS for export promotion</li> </ul> | <ul style="list-style-type: none"> <li>• Develop appropriate strategy for the utilization and conservation of the these resources with participation of the local community</li> <li>• Invest and collaborate with, JABAN &amp; other private sector entities for post-harvest handling and processing</li> <li>• Capacitate MAP collectors and cultivators to be made aware of improved sustainable management techniques for the harvesting, cultivation, primary processing of economically important MAPs</li> <li>• Need to develop appropriate legal framework for the MAPs, including more fair means of taxation and regulation with the participation of all sector stakeholders</li> </ul> |
| <b>Wool</b>          | <ul style="list-style-type: none"> <li>• Low volume of wool production due to low rate of</li> </ul>   | <ul style="list-style-type: none"> <li>• Suitable climate provides potential for sheep and goat</li> </ul>   | <ul style="list-style-type: none"> <li>• Ensure quality extension services at the farm and</li> </ul>  |

| Value chain           | Constraint   | Opportunity   | Leverage Point   |
|-----------------------|--|---|--|
|                       | <p>wood extraction and poor farm management practices and inbreeding</p> <ul style="list-style-type: none"> <li>• Lack of feed and forage as well as pastures are poor and it need to improve</li> <li>• Poor quality antiquated post-harvest processing of wool</li> <li>• Lack of modern yarn dyeing plant and facilities causing difficulties in product diversification as well changing market demand and price</li> <li>• Import of wool at higher price due to lack of yarn processing plants in wool producing regions</li> <li>• Lack of silk production in Nepal necessitates import of silk at higher prices from India</li> <li>• Weak networking in international market, thereby limiting ability to explore new markets or further penetrate existing ones</li> </ul>                 | <p>farming in the mountain and it is good option to increase farm income</p> <ul style="list-style-type: none"> <li>• Demand for diversified pashmina products are increasing</li> <li>• Investment opportunity to invest in domestic yarn production activities to reduce wool import.</li> <li>• Successful introduction of the "Chyangra Pashmina" mark for branding by Nepalese producers increase potentials to expand in existing and new markets</li> <li>• Traditional manufacturing methods, quality and designs are unique selling points for Nepalese products in niche market</li> <li>• High employment opportunities and ability to handle small high value orders</li> <li>• Priority commodity for NTIS</li> </ul>  | <p>community</p> <ul style="list-style-type: none"> <li>• Support to communities in rangeland management and livestock breed improvement</li> <li>• Support to agro-vets and farmers in animal health services</li> <li>• Capacitate farmers in herd management and post-harvest processing of wool &amp; pashmina.</li> <li>• Improved legal framework and support to textile industry</li> </ul>   |
| <b>Vegetable</b>      | <ul style="list-style-type: none"> <li>• Low productivity due to less productive varieties and lack of production technologies</li> <li>• Low size of marketable production and scattered production pocket</li> <li>• Poor quality of the post-harvest handling ( grading and packaging)</li> <li>• Lack of good connectivity due to poor road network in the production pocket</li> <li>• Lack of business development and marketing services at farm level and dominance of the middleman lead high price volatility</li> <li>• Inadequate awareness on modern technology of vegetable farming such greenhouse culture SMART irrigation system, suitable variety and seasonality</li> <li>• Poor business development and marketing services at community level for commercial farming</li> </ul> | <ul style="list-style-type: none"> <li>• Suitable agro-ecological setup provides high potentiality of the both seasonal and off-seasonal vegetable farming</li> <li>• Gradually improving road network (Karnali Highway, Chhinchu- Jajarkot- Dolpa road, Midhill High way) &amp; other district level connecting road provides high potentiality for commercial vegetable farming in various pockets of the province</li> <li>• Vegetable farming is good option for the rural community to improve their livelihood and income through employment</li> <li>• High demand of vegetables within the province as well as surplus vegetable easily exported to the other national market though the wholesale market established at Surkhet</li> <li>• Policy of the province is conducive and potential for investment in processing industry.</li> </ul> | <ul style="list-style-type: none"> <li>• Ensure quality extension services at farm and community level</li> <li>• Introduce advance farm and irrigation technology</li> <li>• Capacitate farmers and farmers based organizations</li> <li>• Promote agro –vets for firsthand private services including bio –technical products</li> <li>• Collaborate with private entities and cooperatives for effective marketing and post-harvest handling</li> <li>• Undertake a market survey &amp; awareness creation campaign through FNCCI/AEC &amp; other concerned public private entities</li> <li>• Ensure agribusiness development and marketing services through competent institution</li> <li>• Initiate contract farming</li> </ul> |
| <b>Vegetable Seed</b> | <ul style="list-style-type: none"> <li>• Poor linkage with sources seed producing institution accompanied by inadequate varietal choice</li> <li>• Lack of awareness about the importance of the improved</li> </ul>   | <ul style="list-style-type: none"> <li>• Well established Institutional setup of the NARC across the country can capitalize for quality seed production through supply of source seed and R &amp; D activities</li> </ul>   | <ul style="list-style-type: none"> <li>• Ensure quality extension services at farm and community level</li> <li>• Introduce advance farm and irrigation technology</li> <li>• Capacitate farmers and</li> </ul>  |

| Value chain   | Constraint  | Opportunity   | Leverage Point  |
|---------------|---|---|---|
|               | <p>seed among the majority of the farmers accompanied by slow varietal replacement because of poor extension services</p> <ul style="list-style-type: none"> <li>• Lack of proactive marketing mechanisms and poor quality of seeds due to mismatch in postharvest handling</li> <li>• Difficulty in seed quality monitoring as seed multiplication steps are not adequately maintained</li> <li>• Lack of seed processing and storage infrastructure to maintain seed quality</li> <li>• Ineffective seed planning lead to mismatch on demands and supply mechanism/networks – access to source and high quality seeds</li> <li>• Low involvement of the private sector in the high altitude areas</li> <li>• Lack of priority in hybrid vegetable seed production and low investment in research and development</li> </ul> | <ul style="list-style-type: none"> <li>• Priority sector for government and increasing awareness of the farmers on quality seed use</li> <li>• Potential sector for involvement of the private sector especially for post-harvest handling, processing and marketing.</li> <li>• Involvement of private entrepreneurs and cooperatives in seed multiplication expand employment with business</li> <li>• Network of Seed entrepreneurs' association could be capitalize for seed marketing and distribution effectively</li> </ul>  | <p>farmers based organizations</p> <ul style="list-style-type: none"> <li>• Collaborate with private entities and cooperatives</li> <li>• Initiate contract farming</li> </ul>  |
| <b>Ginger</b> | <ul style="list-style-type: none"> <li>• Inadequate availability of quality planting materials</li> <li>• High crop loss due to diseases and poor extension services</li> <li>• Limited storage and processing facilities</li> <li>• Lack of internationally accredited laboratories with sufficient test parameters</li> <li>• Limited skilled human resources</li> <li>• Volatility in price and low competitiveness due to poor quality and high production cost as compared to neighboring</li> </ul>   | <ul style="list-style-type: none"> <li>• Favorable geo-climatic conditions for ginger cultivation and credible source of income and employment for rural farmers</li> <li>• Nepal is ranked as among the 5 largest producer of ginger in the world and it can be inter-cropping with other agriculture crops</li> <li>• Nepalese ginger regarded as high quality in world market and increasing global demand</li> <li>• Potentiality of higher productivity and area expansion for large volume of the production</li> <li>• Due to richness in oil and oleoresin, high potential for value addition</li> <li>• Rising demand in Ayurvedic medicines and other uses</li> </ul> | <ul style="list-style-type: none"> <li>• Ensure quality extension services at farm and community level</li> <li>• Ensure supply of high quality planting materials</li> <li>• Collaborate with private entities and cooperatives for post-harvest management and processing</li> <li>• Initiate contract farming</li> </ul> |
| <b>Honey</b>  | <ul style="list-style-type: none"> <li>• Lack of facilities and equipment to maintain good quality honey</li> <li>• Absence of proper equipment and laboratory facilities to test for residue presence (MRLs)—a bottleneck for EU market and</li> </ul>   | <ul style="list-style-type: none"> <li>• Organic and fair trade honey and sale through visitors and tourism</li> <li>• Growing domestic market for consumption</li> <li>• Growing number of commercial beekeepers</li> <li>• Good Ecological spectrum and</li> </ul>  | <ul style="list-style-type: none"> <li>• Ensure quality extension services at farm and community level</li> <li>• Collaborate with private entities and cooperatives for post-harvest management and processing</li> </ul>  |

| Value chain | Constraint   | Opportunity   | Leverage Point  |
|-------------|--|---|---|
|             | <p>others</p> <ul style="list-style-type: none"> <li>Weak road/transportation access to pasture areas</li> <li>Lack of pasture management</li> <li>Low volume of production</li> <li>Competition from both India and China in major markets</li> <li>Use of pesticide in bee pasture area</li> <li>Lack of technical knowledge at farm level to increase production and quality maintain due to weak extension system</li> </ul> | <p>abundance of natural flora and fauna</p> <ul style="list-style-type: none"> <li>Unique flavor due to climatic conditions and flora</li> <li>Good option for smallholders with positive socioeconomic impact, especially income to poor landless farmers</li> <li>Involvement of a large number of entrepreneurs in the processing and marketing of honey</li> <li>High quality production</li> </ul> | <ul style="list-style-type: none"> <li>Support for post handling activities to maintain quality</li> <li>Initiate contract farming</li> </ul> |

## CHAPTERS-3 POTENTIAL AGRI-BASED BUSINESSES IN KARNALI PROVINCE

This chapter summarized potential agri-business industries that could be established in the province. The estimated summary statistics about the availability of the raw products was placed in Annex 1.

### 3.1. Fruit juice processing industry in Surkhet

#### a. Overview

Fruit Juice has health benefits, provides value addition and increases longevity after proper processing and packaging. These days' the demand is rapidly growing as people consume juice for its benefits and easy availability. The Province has good potentiality in terms of juice processing of fruits like apple and citrus.

#### b. Raw materials and market

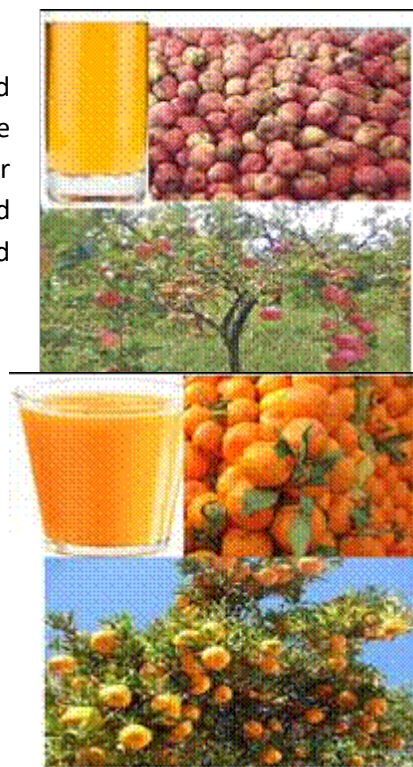
Major fruits grown in the Province are apple, pear, peach, plum, orange, lemon, mango, banana, guava and litchi. However apple and citrus are famous around the country for their quality and taste and have huge potentiality of juice processing.

Karnali's total apple production in the year 2017/018 was about 14, 125 mt. from five major districts: Jumla, Kalikot, Mugu, Dolpa and Humla.

The apples produced in Jumla are graded as A, B, C and D - 'A' being the superior and 'D' the inferior. These superior fresh apples are sold for direct consumption at higher price while the inferior apples are sold for very low price and sometimes thrown away due to lack of market which can be processed for value addition. Recently value addition of these low graded apples has started at Jumla in a very low scale. Proper collection of raw materials and development of other infrastructure is required to scale up the production to be exported out of Jumla. At present, around 4,000 mt. graded low quality apple can be collected in Karnali for value addition.

Similarly, the citrus; sweet oranges, mandarin and lemon have good market price and most of the production are marketed as fresh fruits. Besides

these, low quality graded citrus are either marketed fresh or traditionally processed for making concentrates. It is estimated that annually about 5,000 mt. such low graded citrus fruits can be



**Table 3.1:Area, Production and productivity of Apple & Citrus in 2017/018**

|                      | Apple  | Citrus | Total  |
|----------------------|--------|--------|--------|
| Area (ha)            | 7,172  | 4,676  | 11,848 |
| Productive area (ha) | 2,275  | 2536   | 4,811  |
| Production (mt)      | 14,888 | 22,328 | 37,216 |

**Table 3.2:Area, Production and productivity of fruit crops in 2017/018**

|                      | Temperate | Citrus | Tropical | Total  |
|----------------------|-----------|--------|----------|--------|
| Area(ha)             | 10,318    | 4,676  | 1,910    | 16,904 |
| Productive Area (ha) | 3,767     | 2,536  | 1,547    | 7,850  |
| Production (mt)      | 22,244    | 22,328 | 12,641   | 57,213 |



collected for processing and value addition. Moreover, at rainy season, guava can be also collect from Surkhet and used for juice making.

### c. Investment opportunities

Study shows almost all of the fruit flavored juice consumed in the Karnali province is imported and dominated by foreign company - Pran's Litchi and frooto brand (144000pcs/month). Surkhet accounts for almost 90% of this consumption while the remaining 10% is consumed at Karnali highway's corridor market. These can be replaced by locally produced apple and orange juice. Based on consumption and availability of the raw materials, it would be better to establish fruit juice industry in Surkhet. This is the suitable location for plant installation as availability of the basic infrastructure like: electricity, road, water supply, facility of industrial areas etc. with access to the potential regional markets of the proposed product in Nepalgunj. Fruits juice will mostly be targeted to the Terai than the hill areas so linkage of the Surkhet with Nepalgunj and other Terai cities is an advantage.

Small scale apple pulp extraction unit can successfully be installed in Kalikot, Jumla and Mugu districts with coordination of local producer's group and cooperative where graded apples can be collected, pulped and supplied to the main factory in Surkhet. Similarly, for citrus small pulp extractor unit can be installed in Dailekh, Salyan and Jajrkot districts where citrus fruits can be collected, pulped and supplied to the main factory. The main factory requiring investment of nearly NRs. 50 million initially with capacity of 1-2 ton per hour which could be operated round the year seems profitable and sustainable. This can be done by co-investment from public and private sector or certain percent grant can be provided to the eligible private investor by the Province government.

### d. Investment constraints

The constraints and risks associated with the opportunity are: lack of skilled human resources for operation of the machines, limited knowledge and skill of farming community for quality production, lack of business development services, unavailability of market information system etc. These can be overcome by joint efforts of all stakeholders with the support of the Province government.

| Medium Sized Juice Factory Needs following basic Machines and Equipment  |  |  |
|--|--|--|
| Pulping processing line  | Sugar Syrup preparation  | Blending, Homogenization   |
| <ul style="list-style-type: none"> <li>Working table (8X3x3 ft. MS frame)</li> <li>Papaya peeler (SS 2-3 hp, 200kg/hr)</li> <li>Fruit mill/ crusher (2mt/hr, 3hp MS Stand)</li> <li>Pulper (3/5 hp motor, MS Frame)</li> <li>Steam double jacketed kettle (10/10 SWG with pressure gauge &amp; safety valve, 225 lt.) MS Stand</li> </ul>  | <ul style="list-style-type: none"> <li>Sugar syrup preparation tank (SS 304, with agitator, 100 lt)</li> <li>Filter press (8", 6 plates, 1hp motor, 200lt/hr)</li> <li>PHE for Heat Transfer (200lt/hr)</li> </ul> | <ul style="list-style-type: none"> <li>Blending tank (SS, with agitator, 200 lt.)</li> <li>Transfer pump to homogenizer (SS, 200 lt/hr)</li> <li>Homogenizer (Double Stage, 200 lt/hr, Electric Power -4kw)</li> <li>Transfer Pump to Storage tank (SS 316, 1/3 hp motor) Mounted with MS frame</li> <li>Storage tank (SS 304, with agitator, 200lt)</li> <li>Pasteurizer (Shell &amp; tube type, SS, tube size 6", 250lt/hr)</li> <li>Filling tank (SS, 100lt)</li> <li>Pneumatic filler (Complete made of SS, filling range 200-1000 ml., 20/25 bottle/min)</li> </ul> |
| <ul style="list-style-type: none"> <li>Compressor (20 hp), Hydraulic Trolley, Shink Wrap Machine, Refracto Meter, Cap Sealer (0.5 hp motor, ), Rotary bottle washer (30 BPM, with spray nozzles), Steam boiler (200 kg/hr, wood fired), CIP system, Two cavity Pet blow machine (total Set), RO + UV ( 200 lt/hr), SS Moving Tank (50 lt), Moving Conveyer for Jam Bottle, SS Pipe Line (All interconnecting), Digital Weighing Machine</li> </ul> |  |  |

## 3.2. High-hill potato chips

### a. Overview

'Potato chips'– one of the favorite snacks has huge demand, provides considerable value addition to potatoes and increases the longevity, when processed and packed properly.

Potato crop is cultivated widely on almost every areas of the province. Mostly, potato produced in high-hills of Karnali namely Jumla, Mugu, Dolpa and Humla are considered as superior in comparison to the potato that grown in the southern foot plains of the mid-hill and terai region of the Nepal. The high-hills contributed to 51912.32 mt, (about 37%) of 141, 167.7 mt potato produced in Karnali Province. Cereal cultivation is replacing potato cultivation lately as potatoes have been dominantly used for staple rather than value addition. Immediate measures for encouragement of cultivation, storage, value addition processes, promotion and transportation of potatoes are required.



### b. Raw materials and market

The annual growth rate of the both area under cultivation and production is 1.9% and 3.2% with annual 1.3% of annual yield growth.

In the year 2017/018 the average yield of the potato crop is only 12.04/ha. Thus,

there is high potential to increase supply of the potato tuber improving crop management practices. Purchasing Potatoes - 'the base material in potato chips' directly from farmers benefits both farmers and producers linking production directly to value addition. Potato chips will only be as good as the potato itself and other raw materials used.

High-hills local potato of Karnali would be good for chips production. Inspection and proper quality control measures during potato

purchase will ensure the quality of chips to be produced.

**Table 3.3: Area and production of Potato in Karnali**

|                 | 2013/14 | 2014/15  | 2015/16 | 2016/17 | 2017/18  | Annual growth |
|-----------------|---------|----------|---------|---------|----------|---------------|
| Area (ha)       | 10890   | 12042    | 12470   | 12664   | 11723    | 1.9%          |
| Production (mt) | 124671  | 135970.5 | 129149  | 150079  | 141167.7 | 3.2%          |

**Table 3.4: Production status of potato in high hill of Karnali**

| District     | 2015/16     |              | 2016/17     |              | 2017/18     |                 |
|--------------|-------------|--------------|-------------|--------------|-------------|-----------------|
|              | Area (ha)   | Prod (mt)    | Area (ha)   | Prod (mt)    | Area (ha)   | Prod (mt)       |
| Dolpa        | 960         | 7725         | 900         | 10465        | 900         | 10779           |
| Mugu         | 635         | 5188         | 587         | 5623         | 587         | 5821            |
| Humla        | 785         | 6437         | 1024        | 7784         | 1024        | 8018            |
| Jumla        | 2650        | 26500        | 2600        | 26500        | 2600        | 27295           |
| <b>Total</b> | <b>5030</b> | <b>45850</b> | <b>5111</b> | <b>50372</b> | <b>5111</b> | <b>51912.32</b> |

Source: Statistical information on Nepalese Agriculture 2015/16, 2016/17 and 2017/18, MoALD

Only local variety of potato that was grown in high hill areas of the province few years back but now days, other improved varieties are also started to introduce for cultivation. Hence, increase in supply of tuber in future is obvious.

The potential location for Chips production in Karnali would be Jumla as it is equipped with Transportation facilities, electricity, and potential for supply of require volume of the potato as raw materials for chips. It is estimated that about 1000mt of potato can be collected yearly from Jumla<sup>17</sup>. But proper storage should be ensured as potato is a seasonal harvest. Humla and Dolpa districts are also potential for high hill potato production and now days the potato production is increasing yearly.

### c. Investment opportunities

Potato Chips being one of the favorite instant snacks have ample demands. A potato chips production facility can be started with small capital initially and can be expanded later on. Potato chips when prepared and packed properly have longevity and can be transported in quantities.

Jumla will be appropriate place where small scale semi-automatic chips making plant can be installed with initial investment of NRs. 20.5 Million. While small scale manual types of factory for chips making can be also establish in Dolpa and Humla also with the initial investment estimated Nrs. 5 million to prepare high-hill potato chips production facility. The investment can be done by public-private partnership approach.

### d. Investment constraints

Investment constraints associated with Potato Chips industry are: Lack of high voltage electricity (national grid), lack of skilled human resources, knowledge, market linkage, and market information systems are some constraints and risks associated with this investment. Besides, market competition is high for chips due to quality of potato chips in comparison to renounced multi-national brand like Lays and Pringles.

## 3.3. Vegetable and tomato sauce/ketchup industry

### a. Overview

'Ketchup/sauce' cannot be missed while consuming fast foods. Chowmin, French Fries, chops, Burgers, Chips and even Momos ketchup/sauce goes together with almost every fast food. With the fast food market growing rapidly, the demand for ketchup/sauce is increasing in Karnali.

### b. Raw materials and market

Tomato, Pumpkin and Green chilly considered good raw materials for Ketchup/sauce production are cultivated in Karnali. Among the all 10 district of the province, Surkhet, Jumla, Salyan, Rukum, Jajarkot and Dailekh are main tomato, pumpkins and chilly producing districts



<sup>17</sup> Field survey and interaction with traders and stakeholders (2020 March)

Among these six districts, Dailekh has highest tomato production while Salyan has highest production of Pumpkin and Chilli (Table 3.5) and indicates the potentiality of the small scale value addition activities in those areas. The collection and proper storage of these raw materials in the main season is cost effective and helps to avoid shortage during off season.

| Districts | Tomato    |           | Pumpkin   |           | Chilli    |           |
|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|           | Area (ha) | Prod (mt) | Area (ha) | Prod (mt) | Area (ha) | Prod (mt) |
| Dailekh   | 279       | 2,934     | 116       | 1,278     | 77        | 833       |
| Salyan    | 266       | 2,818     | 121       | 1,454     | 176       | 1,071     |
| Surkhet   | 201       | 3,727     | 80        | 1,247     | 106       | 586       |
| Rukum     | 57        | 682       | 23        | 212       | 14        | 176       |
| Jumla     | 52        | 315       | 7         | 35        | 79        | 399       |
| Jajarkot  | 36        | 291       | 65        | 692       | 14        | 88        |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

### c. Investment opportunities

The practice of sauce consumption is increasing daily and it is imported to the province. In this situation utilization of the available raw materials for ketchup production is necessary.

Mainly, sauces available in the Surkhet is three types: foreign brand (like Maggi), Nepalese brand these are demanded in high standard hotels and high-class households whereas, the third and highly demanded type is local vegetable sauce produced in Terai areas which has higher demand in smaller local restaurants. According to stakeholders' sauce and ketchup produced locally, have good market in the province. Based on this discussion and availability of the raw materials, it would be better to establish a small scale industry.

Both vegetable sauce and tomato ketchup need to be produced to sustain the business. It is notable that Tomato Ketchup has higher production cost and low local demand. Thus, combination of the both products considering market demand is very crucial. Vegetable sauce can be produced in higher quantities as production cost of vegetable sauce is lower and has higher demand locally in the province.

The small scale plants would cost about 2-4 million per plant initially. This capacity plant can get business most of the days of the year and business would be profitable and sustainable. The investment can be done by co-financing from public and private sector or promotional grant could be provisioned for eligible

| Proposed Districts/<br>Locations            | Jumla | Salyan | Rukum | Jajarkot | Dailekh | Surkhet |
|---|-------|--------|-------|----------|---------|---------|
| Estimated Investment Amount (NRs. million.) | 2.5   | 2.0    | 2.0   | 2.0      | 2.5     | 4       |

private investor by the Province government for establishment of the facility.

### d. Investment constraints

Constraints and risks associated with the business are: lack of high voltage electricity (National Grid) in Jumla, lack of skilled human resources for operation of the machines, limited knowledge and skill of farming community for quality raw material production, lack of linkages of products to the urban market, lack of business development services, unavailability of market information system etc. These constraints can be overcome by joint efforts of all stakeholders with the support of the Province government.

### 3.4. Spices industry

#### a. Overview

A spice is a seed, fruit, root, bark, or other plant substance primarily used for flavoring, coloring or preserving food. Spices can be defined as “vegetable products used for flavoring, seasoning and imparting aroma in foods” (FAO, 2005). Spices are the main item that is used in daily meal of the Nepalese people for taste, flavor and garnishing of food. A spice may be available in several forms: fresh, whole dried, or pre-ground dried. Generally, spices are dried.



Spices may be ground into a powder for convenience. A whole dried spice has the longest shelf life, so it can be purchased and stored in larger amounts, making it cheaper on a per-serving basis. A fresh spice, such as ginger, is usually more flavorful than its dried form, but fresh spices are more expensive and have a shorter shelf life. Some spices like turmeric must be purchased in ground form. Spices processing business in Karnali are doing good even exporting ginger powder. Rapid Market Appraisal reveals that there is high potentiality for establishment of small scale spices processing unit in Kalikot, Rukum, Salyan and Jajarkot.

#### b. Raw materials and market

Many spices garlic, coriander, dry chilli, ginger, turmeric are grown in various locations of the province. Salyan, Jajarkot, Rukum, and Kalikot are the most potential districts for spices farming with good quality and quantity. Spices processing unit at Surkhet and Dailekh are in operation. Small processing unit in Kalikot, Salyan, Jajarkot and Rukum are potential. Increment on production of potential spices crop is necessary in these districts. Government of all level and private sector are attracted towards commercial production of the spices like ginger and turmeric, increasing production volume and value addition activities.

| Districts  | Garlic    |           | Turmeric  |           | Chili     |           | Ginger    |           |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|            | Area (ha) | Prod (mt) | Area (ha) | Prod (mt) | Area (ha) | Prod (mt) | Area (ha) | Prod (mt) |
| Kalikot    | 47        | 110       | 27        | 142       | 18        | 21        | 22        | 123       |
| Rukum west | 16        | 57        | 13        | 55        | 9         | 42        | 127       | 1,260     |
| Salyan     | 523       | 3,349     | 319       | 3188      | 177       | 307       | 2,035     | 25,598    |
| Jajarkot   | 28        | 136       | 134       | 980       | 114       | 452       | 93        | 1,116     |
| Total      | 614       | 3,652     | 492       | 4364      | 318       | 823       | 2,277     | 28,097    |

#### c. Investment opportunities

Most of the spices are imported to the province, even though; some of the raw materials for spices are grown in the local areas. Due to the unavailability of processing unit, locally grown spices raw materials are sold in nominal price to the collector and processed spices imported later at a higher price. The Rapid Market Appraisal reveals that there are high potentialities to invest spice processing business using local raw materials. At present, a small scale spices processing units one each in

Kalikot, Salyan, Jajarkot and Rukum district would be sustainable based on the supply scenario of the raw materials.

The initial estimated cost for small scale spices processing unit would be NRs. 2 -3 millions. The investment can be done by co-financing from public and private sector or promotional grant could be provision to the eligible private investor by the Province government for establishment of the facility.

#### d. Investment constraints

Constraints and risks associated with spice business are: Assured supply of electricity in Kalikot; lack of skilled human resources for processing activities and machine operation; limited knowledge and skill of farming community for quality raw material production, poor linkage of products to the urban market; lack of business development services; and unavailability of market information system etc. These constraints can be overcome by joint efforts of all stakeholders with the support from the Provincial government.

### 3.5. Bakery industry

#### a. Overview

Baking is a food cooking method that uses prolonged dry heat by convection. Bakery products contain high nutritive value and are manufactured from food grain-flour, sugar, baking powder, condensed milk, fat, salt, jelly, dry fruits, various essences and flavoring etc. Bakery products are quite popular in Nepal. Different type of bakery products can be classified as: Dry Bakery Products, Biscuits and Cookies, Bread, Cakes, pastries, doughnuts, muffins etc.



#### b. Raw materials and market

Quality production of any product depends on: good quality raw material, state of the art tools and equipment and skills of the human involved. If any of these requirements is not met, quality product cannot be produced.

| District     | Wheat        |               | Millet        |               | Barley       |               | Buck Wheat   |              |
|--------------|--------------|---------------|---------------|---------------|--------------|---------------|--------------|--------------|
|              | Area (ha)    | Prod (mt)     | Area (ha)     | Prod (mt)     | Area (ha)    | Prod (mt)     | Area (ha)    | Prod (mt)    |
| Dolpa        | 2745         | 4778          | 291           | 308           | 351          | 335           | 635          | 678          |
| Mugu         | 3245         | 3119          | 4,281         | 3,312         | 1,026        | 1,140         | 459          | 436          |
| Humla        | 898          | 1129          | 1,284         | 1,483         | 617          | 798           | 633          | 775          |
| Jumla        | 2472         | 4620          | 3,756         | 3,845         | 3,375        | 5,625         | 80           | 84           |
| Kalikot      | 5148         | 6149          | 1,237         | 1,277         | 815          | 1,200         | 106          | 121          |
| Rukum west   | 5573         | 13117         | 460           | 603           | 410          | 519           |              |              |
| Salyan       | 14785        | 33467         | 1,047         | 1,115         | 971          | 1,277         | 59           | 69           |
| Jajarkot     | 14853        | 19118         | 1,853         | 1,897         | 630          | 700           | 26           | 28           |
| Dailekh      | 18789        | 31049         | 2,427         | 2,738         | 182          | 236           | 26           | 25           |
| Surkhet      | 14997        | 43670         | 2,098         | 2,907         | 938          | 1,415         |              |              |
| <b>Total</b> | <b>83505</b> | <b>160213</b> | <b>18,733</b> | <b>19,483</b> | <b>9,313</b> | <b>13,244</b> | <b>2,024</b> | <b>2,215</b> |

Source: Statistical Information on Nepalese Agriculture, 2017/2018, MoALD

Quality and special tasty breads, biscuits and some other bakery item of Surkhet and organic branded bread bakery item

of Jumla are potential for the marketing purpose. At present, small scale bread making is there in Surkhet and some entrepreneur in Jumla also making bakery item but those are producing just for local consumption only in low volume.

### c. Investment opportunities

Products like; biscuits, cookies, bread, cakes and wafer biscuit are manufactured in bulk. These bakery products are more demanded and liked by the people across the nation. Growing popularity of these products creates opportunities of investment in this sector. Considering supply of the raw materials and other basic facilities, It would be better to establish a small sized bakery manufacturing unit in Jumla with initial investment of NRs 1.5 to 2 million and another medium sized unit in Surkhet with Initial investment of NRs.6 to 7 million. Manual machine can be installed in Jumla. But it would be better to install semi-automatic machine in Surkhet. Investment in Bakery industry can be done by public private partnership approach, with cost sharing basis or provision of the promotional grant by Province government to the eligible entrepreneur for establishment of the facility.



### d. Investment constraints

Constraints and risks associated with the proposed business are:. Difficulties to manage high voltage electricity in Jumla, lack of skilled human resources for processing activities and machine operation, limited knowledge and skill of farming community for quality raw material production, poor linkage of products to the urban market, lack of business development services, unavailability of market information system etc. are major constraints listed. These constraints can be overcome by joint efforts of all stakeholders and support from the Provincial government.

#### **Basic ingredients of bakery products:**

**Flour:** Different crops grains can be used for flour.

**Eggs:** For taste and nutritious value increment this is good but without egg also can be made.

**Salt:** For taste, flavor and yeast control

**Milk:** Liquid, Whole, Skimmed, powder milk is required as per need.

**Sugar:** For taste & to provide basis for yeast (this helps to produce CO<sub>2</sub> gas that raises the dough fabric)

**Yeast:** Yeast causes fermentation producing CO<sub>2</sub> gas, which raises the dough fabric. Yeast in baked products increases the volume and improves the grain, the texture and the flavour.

**Fats:** Fat improves the nutritional value of bread. It lubricates the effect on gluten strands, & improves the ability of making the slices of the bread. It increases weight also.

**Ammonium Carbonate:** It contains the constituents of CO<sub>2</sub> gas, which is liberated from the ammonium carbonate by decomposition due to heat and moisture in the baking process. If used, in baked products, it improves their quality & texture, bring about more uniform symmetry and increase volume.

**Flavoring Material:** Although, these can't be considered as the basic ingredients in bakery products, they are important in producing the most desirable flavour.

#### **Essential Tools & Equipment for Bakery Industries**

**Mixers :** A large dough mixer, an emulsion blender with whisk attachments, and countertop mixers are typically considered necessary

**Oven/Bhatti:** Stone deck ovens create amazing hearth breads, and convection ovens are good for cakes and cookies.

**Dough proofer:** Proofer makes the dough-rising process simple by optimizing heat and humidity.

**Bake ware:** Like; quality bread pans, muffin tins, cake pans, etc.

**Small wares:** Like; spatulas, spoons and mixing bowls, pastry knives, icing tips and flour sifters.

**Dough sheeter , Bread slicer**

**Sheet pan racks:** Need space to cool.

**Dry storage, Refrigeration, Doughnut cake fryer, Display case , Wood Top Work Table etc.**

### 3.6 Local fruit based brewery industry

#### a. Overview

Fruit brewery is basically liquor made with particular fruit. The practice of making brewery from the fruit is quite popular and liked by people due to its quality and taste in most areas around the world.

The demand of the Karnali fruit based liquor would be high due to its organic nature as well as special taste to liquor lovers. The use of fresh fruits is mostly seasonal so the brewer will be limited to making liquor only on seasons or use pulped fruit. The brewer may have to do a lot of processing (washing, pitting, etc.) depending on the kind of fresh fruit chosen.



#### b. Raw materials and market

Liquor can be produced from different fruits like: apple, pear, pulm and raspberry (Aiselu). These fruits brewery can be established in the Province based on the availability of fruits. The local level consumption rate, existence of Brewery Company, and availability of quality raw materials should be analyzed before establishment of brewery. It

| Districts    | Apple       |                |              | Pear       |                |             | Pulm       |                |             |
|--------------|-------------|----------------|--------------|------------|----------------|-------------|------------|----------------|-------------|
|              | Area (ha)   | Prod area (ha) | Prod (mt)    | Area (ha)  | Prod area (ha) | Prod (mt)   | Area (ha)  | Prod area (ha) | Prod (mt)   |
| Kalikot      | 624         | 254            | 1,781        | 35         | 12             | 85          | 20         | 12             | 52          |
| Rukum west   | 195         | 95             | 389          | 12         | 9              | 94          | 7          | 5              | 37          |
| Salyan       | 64          | 20             | 89           | 35         | 24             | 216         | 21         | 20             | 111         |
| Jajarkot     | 136         | 22             | 110          | 6          | 2              | 14          | 41         | 29             | 201         |
| Dailekh      | 73          | 20             | 150          | 64         | 38             | 479         | 43         | 29             | 304         |
| Dolpa        | 955         | 331            | 1,654        | -          | -              | -           | -          | -              | -           |
| Jumla        | 3,658       | 935            | 6,545        | 45         | 25             | 151         | 87         | 52             | 311         |
| Mugu         | 937         | 393            | 2,748        | -          | -              | -           | 21         | 14             | 58          |
| Humla        | 515         | 200            | 1,397        | 12         | 8              | 56          | 19         | 16             | 104         |
| Surkhet      | 15          | 5              | 25           | 40         | 31             | 84          | 16         | 15             | 136         |
| <b>Total</b> | <b>7172</b> | <b>2275</b>    | <b>14888</b> | <b>249</b> | <b>149</b>     | <b>1179</b> | <b>275</b> | <b>192</b>     | <b>1314</b> |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

would be better to establish a small sized brewery in Humla and Dolpa and one medium sized in Surkhet based on the mentioned factors. The establishment of small sized brewery would be better in Humla and Dolpa where limited apple processing facilities exist and apples are easily available. Brewed apple beverage would be easy to transport in comparison to apple itself and would provide value addition. Local millet and other crops can also be used for beverage production in Humla and Dolpa.

Raw materials like apple, pulm, pear and some other along with wild fruits like: Raspberry (Aiselu) can be collected easily in Surkhet making it suitable location for medium sized brewery company.



### c. Investment opportunities

The organic productions of Karnali Province are liked by many for its uniqueness and taste. The market of the locally produced liquor has potential throughout the nation. Some entrepreneurs have been producing local fruit based brewery but their supplies are limited to the certain areas only.

Therefore strategy for proper market linkage is also required along with the establishment of brewery. The linkage would create high potentiality to sell Karnali's brewery in proper price.

The establishment of small sized brewery in Dunai of Dolpa and Simikot of Humla with tentative investment of NRs. 40 million and medium sized brewery in Surkhet with tentative initial investment of NRs. 1000 million would be feasible. These investment cost can be done by public private partnership approach.

| Proposed Locations for Brewery Industries |  |
|---|--|
| Locations                                 | Estimated Tentative Initial Investment |
| Small sized Brewery                       |  |
| Humla (Simikot)                           | 40 million                             |
| Dolpa (Dunai)                             | 40 million                             |
| Medium Sized Brewery                      |  |
| Surkhet                                   | 100 million                            |

### d. Investment constraints

Some constraints and risks associated are lack of: proper electricity infrastructure in Dolpa and Humla, lack of skilled human resources for processing activities and machine operation, limited knowledge and skill of farming community for quality raw material production, poor linkage of products to the urban market, lack of business development services, unavailability of market information system etc. Investment constraint can overcome by joint efforts of all stakeholders with the support from the Provincial government.

## 3.6. Grading and packaging of agriculture products

### a. Overview

Karnali Province is known for special indigenous agricultural products like: Marshi rice, Bean, Foxtail Millet, Buck wheat, apple, honey etc. Karnali beans, Foxtail millet, millet, buck wheat are some crops that are healthiest & tastiest as they are grown in fresh weather & higher altitude. They are rich in fiber, nutrition and benefit the health of the people. The demand of Karnali produced special crops are increasing in urban areas of the country. Some of them have specific geographical origin i.e high altitude like; Dolpa, Humla, Mugu, Jumla districts and possess special qualities and reputation. Standard grading and packing will create good market value of these products.



### b. Raw materials and market

Karnali region is rich in agricultural product and have high quality organic production. This Province has potential among all for some special agricultural production and their taste. Producing unique and indigenous crops like: foxtail millet, Chino rice, Marshi rice, Karnali Beans, Walnuts, Amaranth

and other. The collection and grading of the locally produced item is a potential business in Dolpa, Humla, Mugu and Jumla.

The production of Karnali beans (somewhere called Jumli Beans), foxtail millet, chino rice, millet, walnut and amaranth is good in Dolpa, Humla, Mugu and Jumla. The local traders collect it from farmers and

| District     | 2016/17    |                 |             | 2017/18      |                      |              |
|--------------|------------|-----------------|-------------|--------------|----------------------|--------------|
|              | Area (ha)  | Productive (ha) | Prod (mt)   | Area (ha)    | Productive area (ha) | Prod (mt)    |
| Dolpa        | 380        | 85              | 420         | 570          | 128                  | 630          |
| Jumla        | 180        | 160             | 390         | 270          | 184                  | 736          |
| Mugu         | 198        | 68              | 167         | 208          | 71                   | 286          |
| Humla        | 132        | 45              | 207         | 142          | 48                   | 223          |
| <b>Total</b> | <b>890</b> | <b>358</b>      | <b>1184</b> | <b>1,190</b> | <b>431</b>           | <b>1,874</b> |

sale in district and regional and even national markets. These products are marketed in different locations including "Koseli Ghar" of some districts. These organic products have good demand in urban market of the country but the supply is yet to be met.

Some local organizations are working in the promotion of the Karnali indigenous products have started marketing of locally packed item with the name of organic product and have high demand in Nepal.

|  | F/Y 2073/074  | F/Y 2074/075   |
|--|---|--|
| In Jumla<br>Bean (Local<br>& Other )   | Area-2275 ha<br>Production-3387 mt.<br>Productivity-1.488mt/ha. | Area-2275 ha<br>Production-4600 mt.<br>Productivity-2.02mt/ha. |
| In Kalikot<br>Bean (Local<br>& Other ) | Area-200 ha<br>Production-101 mt.<br>Productivity-0.5mt/ha.     | Area-175 ha<br>Production-120 mt.<br>Productivity-0.68mt/ha.   |

### c. Investment opportunities

The increasing demand of Karnali's organic agro-products in urban areas is due to its taste, nutritional values and their farming at high altitude fresh, organic environmental condition. Consumers are ready to pay handsome price for these organic products. Some traders collect Karnali products from the local places and sell at Kathmandu but the supply is not enough against the higher demands. This represents high potentiality to sell Karnali product national wide in good price and opportunities to generate income to Karnali's people.

Establishment of collection, grading and packaging facilities would be good investment opportunities to promote local crops and raise the income of the local grower. An estimation of about Nrs. 2-3 million initial investments is required for development of all those facilities i.e. Collection, grading, packaging and storage facilities. This can be done by public private partnership approach, in which co-investment can be done or certain percent grant to the eligible private sector investor can be provided by the Province government for establishment of the facility.

### d. Investment constraints

Some constraints and risks are also associated with related to unavailability of the good voltage electricity for higher capacity grading and packaging machine operation, scattered production area and difficulties to collect in a single collection facility, limited knowledge and skill of farming community for quality production, lack of linkages of urban market, lack of business development

<sup>18</sup> Barsik Krishi Bikash Karyakram tatha Tathyank Ek Jhalak, 2076/077, by Province Government/MoLMAC/ADD/ADO, Jumla & Krishi Bikash Karyakram tatha uplabdhi, 2075/076, by Agriculture Development Office, Manma Kalikot .

services, unavailability of market information system etc. which can overcome by joint efforts of all stakeholders with the support from the Province government.

### 3.7. Flour mill for millet, buckwheat and other grains

#### a. Overview

Foxtail millet, finger millet, buckwheat are some crops that are healthiest & tastiest as they are grown in chilled fresh weather & higher altitude and can be processed for flour. These are rich in fiber and nutrition that benefit the health of the people. It is considered as good source of energy. As a result, the demand of Karnali produced flour from special crops is increasing in urban areas of the country. Some of them have specific geographical origin i.e. high altitude like: Mugu and Jumla districts and possess special qualities and reputation due to their origin. Therefore collection, processing, packaging and branding will create good market for these Karnali originated agriculture products.



#### b. Raw materials and market

Karnali region is rich in agricultural product and have high quality organic production. This Province has potential among all for some special agricultural production and their taste. Producing unique and indigenous crops like: foxtail millet, Chino rice, Marshi rice, Karnali Beans, Walnuts, Amaranth and other. The collection and grading of the locally produced item is a potential business in Dolpa, Humla, Mugu and Jumla. Most of these highly demanded crops are grown in high altitude which makes their taste special. Proper collection, grading and flouing of the locally produced item like millet, buckwheat barley is one of the potential business in Dolpa, Humla and Mugu and flour mill is also available there locally.

**Table 3.12: Production status of Different crops (2017/018)**

| District     | Buckwheat    |              | Barley       |              | Millet       |              |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
|              | Area (ha)    | Prod (mt)    | Area (ha)    | Prod (mt)    | Area (ha)    | Prod (mt)    |
| Dolpa        | 635          | 678          | 351          | 335          | 291          | 308          |
| Mugu         | 459          | 436          | 1,026        | 1,140        | 4,281        | 3,312        |
| Humla        | 633          | 775          | 617          | 798          | 1,284        | 1,483        |
| Jumla        | 80           | 84           | 3,375        | 5,625        | 3,756        | 3,845        |
| <b>Total</b> | <b>1,808</b> | <b>1,972</b> | <b>5,369</b> | <b>7,898</b> | <b>9,612</b> | <b>8,947</b> |

In some areas these items are collected by local traders and floured in general mill and packed in ordinary packets and sold in local and nearby markets. These products are marketed in different locations including "Koseli Ghar" of some districts. These organic products have good demand in urban market of the country.

#### c. Investment opportunities

The increasing demand of Karnali's organic agro-products in urban areas is due to its taste, nutritional values and their farming at high altitude fresh, organic environmental condition. Consumers are ready to pay handsome price for millet, buckwheat, foxtail millet, barley's flour packed attractively. Some traders collect Karnali products from the local places and sell at Kathmandu but the supply is not enough against the higher demands. This represents high potentiality to sell Karnali product in good price national wide and opportunities to generate income to Karnali's people.

Establishment of collection, grading and packaging facilities would be good investment opportunities to promote local crops and raise the income of the local grower. An estimation of about NRs. 2 million initial investments is required for development of all those facilities i.e. Collection, grading, packaging and storage facilities. This can be done by public private partnership approach, in which co-investment can be done or certain percent grant to the eligible private sector investor can be provided by the Province government for establishment of the facility.

#### d. Investment constraints

Some constraints and risks are also associated with this, there is the unavailability of the good voltage of electricity for good quality grading and packaging machine operation, scattered production area and difficulties to collect in a single collection facility, limited knowledge and skill of farming community for quality production, poor linkages with urban market of the local product, lack of business development services, unavailability of market information system etc. Which can be overcome by joint efforts of all stakeholders with the support of the Province government.

### 3.8. Marshi rice processing industry in Jumla

#### a. Overview

Marshi rice is one of the rice varieties grown in highest elevation (2400-3050 meter) rice-growing areas of the world. Jumli Marshi rice is one of the healthiest & tastiest rice grown in chilled fresh weather and higher altitude. It is rich in fiber and nutrition that benefits the health of the people. The demand for Marshi rice is increasing in urban cities of the country. It has specific geographical origin i.e. Jumla and adjoining districts and possess special qualities and reputation due to its origin. This rice is sweet in taste and high in nutritional value compared to other varieties.



#### b. Raw materials and market

Marshi rice is known as 'Rati Kali Marshi' and 'Seti Kali Marshi' among local people due to the color of its husk. The inside of both is almost red in color, but the husk can be white or black. This variety is grown along the bank of Tila River. Chhumjul valley of Jumla is widely popular for production of Jumli Marshi. The major Marshi production areas within Jumla are: Sinja valley, Hanku and Tatopani (former VDCs) including other areas of the districts. The District Agriculture Development Office, Jumla informed about 3500 mt Marshi rice was marketed in Jumla in 2019. Besides Jumla, it is

**Table 3.13: Status of Paddy in Jumla<sup>19</sup>**

|                                  | F/Y 2073/074   | F/Y 2074/075  |
|----------------------------------|--|---|
| <b>Paddy</b><br>(Marshi & other) | Area: 2900 ha<br>Production: 5900 mt.<br>Productivity: 2.034mt/ha. | Area:2900 ha<br>Production:6090 mt.<br>Productivity:2.1mt/ha. |

<sup>19</sup> Barsik Krishi Bikash Karyakram tatha Tathyank Ek Jhalak, 2076/077, by Province Government/MoLMAC/ADD/ADO, Jumla

also grown in Mugu and Kalikot as well. Yearly about 4000mt<sup>20</sup> Marshi can be collected in Jumla bazar for processing despite its scattered production areas.

Organic branded Marshi rice of Jumla has huge market and potential. Marshi rice is mostly milled manually through Dhikki/Okhal (traditional milling tool) in remote villages. In some areas, small type rice mills are also installed for milling Marshi paddy which is marketed in different locations including "Koseli Ghar" of Jumla. But, such rice has broken grains and impurity reduces its quality and market price. The recovery of the small type rice mill is just of 53-55% and this type of mill is unable to produce high quality rice. Local organizations involved in the promotion of the Marshi rice have started marketing of locally packed rice as organic Marshi rice, which has high demand in Nepal.

### c. Investment opportunities

The increasing Marshi rice demand in urban areas of the country has huge market. The demand is due to its taste, nutritional values, farmed at fresh, organic, high altitude environmental condition. In Kathmandu, the price of Marshi ranged from Rs. 250- 350 per kg depending on season and demand. There is a huge supply gap to meet the demand of Marshi rice in urban cities at a great price.

The establishment of two stage milling system in Jumla with capacity of 1 mt to 2 mt per hour will produce high quality Marshi rice and increase production. The milling performance of the two stage rice mill is superior to the single stage rice mill as milling recoveries are normally above 60%.

An estimation of NRs. 50 million initial investments is requirement for milling facilities, storage facilities and packaging facilities installation. This can be done by public private partnership approach.

### d. Investment constraints

Some constraints and risks associated with this are lack of: regular and good voltages electricity power supply, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, poor linkages with urban market of local product, lack of business development services, unavailability of market information system etc. which can be overcome by joint efforts of all stakeholders with the support from the Province government.

## 3.9. Corn & millet flakes production industry

### a. Overview

There is a high demand for Ready to Cook food (RTC) in major urban centers of Nepal. Ready to Cook foods can be produced from corn and millet flakes. Among the major grains, corn is widely growing crops along with minor crops like; barley, millet, buckwheat, foxtail millet etc. in the Karnali Province.

The production of these crops is decreasing due to people's perception that these crops are for people



<sup>20</sup> Based on field interaction in Jumla, 2020

from low income level and related government apathy towards its development. At the same time there is a good demand for RTC foods which can be easily produced from these indigenous crops.

Even though, efforts are made for the promotion of the local indigenous crops but without value addition it does not benefit as expected. The only way possible to make farmers produce these crops is to create brand for the local product highlighting its taste and quality, with strategic marketing in the name of highly nutritious organic product.

### b. Raw materials and market

Major raw materials for the flakes are; corn and millet (including foxtail millet). These crops are largely growing in different areas of the Province. Surkhet, Daileh, Salyan, Jajarkot, Rukum and Kalikot districts have higher production of corn. Most of the corn produced in this province, exported to the other part of the country and used in different industrial use. During the study, interaction with the different stakeholders suggested for the corn based processing activities. Also, suggested that, if corn processing industries established in the Province, that can motivate farming community to expand the cultivation area of corn. So, corn can be easily available for the cornflakes.

Similarly, Dailekh, Surkhet, Jumla, Mugu, Kalikot, Humla, Jajarkot, Salyan are the major millet producing districts in the province. Interaction with stakeholders of Kalikot and Jumla districts suggested for requirement of value additional activities for millet, foxtail millet and other indigenous crops which are decreasing in production despites of high nutritious importance. So, required volume of millet and foxtail millet can be available for the flakes production.

| District     | Millet        |                | Maize         |                 |
|--------------|---------------|----------------|---------------|-----------------|
|              | Area (ha)     | Production(mt) | Area (ha)     | Production (mt) |
| Dolpa        | 2,343         | 3,167          | 291           | 308             |
| Mugu         | 585           | 933            | 4,281         | 3,312           |
| Humla        | 137           | 243            | 1,284         | 1,483           |
| Jumla        | 4,783         | 7,134          | 3,756         | 3,845           |
| Kalikot      | 3,116         | 6,488          | 1,237         | 1,277           |
| Rukum        | 8,652         | 20,101         | 460           | 603             |
| Salyan       | 21,096        | 47,055         | 1,047         | 1,115           |
| Jajarkot     | 14,980        | 35,897         | 1,853         | 1,897           |
| Dailekh      | 21,415        | 50,075         | 2,427         | 2,738           |
| Surkhet      | 16,209        | 43,531         | 2,098         | 2,907           |
| <b>Total</b> | <b>93,316</b> | <b>214,624</b> | <b>18,734</b> | <b>19,485</b>   |

### c. Investment opportunities

Flakes can be produced in Karnali and supply it to the urban areas of the country, would be the good investment potentiality in agriculture sector of the Province. Government level intervention and creation of encouraging efforts for agri-business promotion makes favorable investment environment. If flakes produced in the province, due to its taste, nutritious characteristics, demand in urban areas will remain high and consumer will ready to pay handsome price for these products.

| Proposed Locations | Machine Types and Capacity  | Investment Estimated |
|--------------------|---|----------------------|
| <b>Dailekh</b>     | Semi-Automatic Corn Flakes / Multigrain Flaking Plant, Capacity: 300 Kg/h | 4 million Nrs.       |
| <b>Surkhet</b>     | Semi-Automatic Corn Flakes / Multigrain Flaking Plant, Capacity: 400 Kg/h | 6 million Nrs.       |
| <b>Jumla</b>       | Semi-Automatic Corn Flakes / Multigrain Flaking Plant, Capacity: 200 Kg/h | 3.5 million Nrs.     |

For all this, it would be better to establish a semi-automatic flaking plant, capacity: 300 Kg/hr in Dailekh with initial investment of Nrs. 4 Millions, semi-automatic flaking plant, capacity: 400 Kg/h in Surkhet with initial investment of Nrs. 6 Million, and semi-automatic flaking plant, capacity: 200 Kg/h in Jumla with initial investment worth Nrs. 3.5 Million. In Dailekh and Surkhet, corn and millets can

be used for flakes production while in Jumla, corn, foxtail millet, millet and some other indigenous crops can be used for flakes production. Investment can be done by public private partnership approach, in which co-investment can be done or certain percent grant to the eligible private sector investor can be provided by the Province government for establishment of the facility.

#### d. Investment constraints

Some constraints and risks associated with this are related to availability of regular and good voltage electricity in Jumla, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, poor linkages with urban market for local product, lack of business development services, unavailability of market information system etc. Investment constraints can be overcome by joint efforts of all stakeholders with the support from the Province government.

### 3.10. Soybean processing industry

#### a. Overview

After rice, wheat and maize crops, Soybean is popular one of the Karnali province's that cultivated largely. At present, use of soybean for human as well as for animal and poultry is increasing. It is mostly used for animal feed and soya oil production in Nepal.



Mostly soybeans are used in soybean oil production. It is the most consumed edible vegetable all over the world. There are two main production steps of soybean oil; getting crude oil and refining. Here it would be better to process soybean and produce crude oil and flakes that is used for human and animal feed.

#### b. Raw materials and market

In most of the districts of the Karnali, soybean is growing. In the province, Salyan has highest and Dolpa has the lowest production of soybean in F/Y2017/018.

During interaction with stakeholders in Surkhet DCCI, a trader collected about 600 mt from - Dailekh, Kalikot, Jajarkot and supplied to Kathmandu, Biratnagar, Jhapa in the year 2076 BS. Besides this, local traders, collect and directly supply to the Nepalgunj and other markets<sup>21</sup>. Thus, if the processing unit established in Surkhet (within the industrial area), local soybean as a raw material can be available.

| District     | Area(ha)     | Prod (mt)    |
|--------------|--------------|--------------|
| Dolpa        | 12           | 10           |
| Mugu         | 124          | 114          |
| Humla        | 35           | 26           |
| Jumla        | 58           | 81           |
| Kalikot      | 53           | 42           |
| Rukum west   | 124          | 76           |
| Salyan       | 1,469        | 1,910        |
| Jajarkot     | -            | -            |
| Dailekh      | 238          | 128          |
| Surkhet      | 330          | 343          |
| <b>Total</b> | <b>2,442</b> | <b>2,730</b> |

Source: Statistical information on Nepalese Agriculture 2017/18, MoALD

<sup>21</sup> During field interaction in Dailekh, A local trader- Mr. Khagendra Prasad Regmi, Proprietor of Regmi Tarkari tatha Falful Byabsaya, Dailekh collected 1200 mt soybean in 2076 and supplied to Birgunj, Nepalgunj, Butwal

During field interaction in Surkhet, traders informed to the study team that- there is the Soybean Neutral producer inside Surkhet industrial area who is buying raw material (flakes) from India (Rajastan) due to unavailability of processed soybean flakes in the local market. So, flakes produced from soybean processing, if established in Surkhet, can be supplied to Soybean Neutral producer of Surkhet and Nepalgunj along with supplied to the animal feed industries.



### c. Investment opportunities

Soybean price at farm gate is Nrs. 56-57 per kg during collection period of Kartik to Mangshir and traders collect local production by Paush-Magh of every year. In other season grain soybean prices Nrs. 80 per kg in Surkhet market. Traders supply locally produced soybean, in the chain of: Producer-Collector-Traders-Broker (middlemen) –Factory.

Data of Nepal shows the opportunities of the export of the soybean crude oils. Most of the soybean crude oil and its other semi-processed products are importing in huge volume. About 137 pallet production factory are in operation in Nepal. They produce 755278 mt animal/poultry feed in 2012/013 and 783701 mt in 2013/014. Most of the animal feed/pallet factory uses, imported soybean flakes for feed production. It shows the great opportunities to establish a soybean processing unit in Surkhet.

In the initial period, production unit have to plan for producing flakes and crude oil only after few years they can go for refined oil and food item from flakes also.

For all this, it is estimated NRs. 150 million initial investment requirements for establishing 1-2 tones per hour capacity processing plant with storage and packaging facilities development.

This can be done by public private partnership approach, in which co-investment can be done or certain percent grant to the eligible private sector investor can be provided by the Province government for establishment of the facility.

**Table 3.16: Soybean Crude Oil Export Status of Nepal- F/Y 2017/018,**

| Product             | Country | Unit | Quantity | Amount NRs. ('000) |
|---------------------|---------|------|----------|--------------------|
| Crude soya-bean oil | India   | KG   | 1471410  | 162051.86          |

*Source: Department of Customs, Nepal*

#### Steps in Soybean Processing Techniques

- Cleaning** – at the start of the soybean processing, it is important to remove stones with a destoner, metal parts with a magnet and small grit & fines with a vibrating sieve.
- Crushing** – a crusher will crush the bean in 4-8 particles, leaving the skin and crushed soybean. The hulls are removed from the crushed pieces through a wind sifter..
- Temperature** – the crushed soybeans are brought up to temperature by adding steam in a conditioner. A toaster is used to keep the crushed soybeans at temperature for a longer period of time.
- Expansion** – we use the expander for the expansion of the crushed and conditioned soybean into full-fat soy.
- Steam** – the application of steam on the conditioner, toaster and expander is used to heat up and keep the product warm in order to improve gelatinization.
- Cooling** – after expansion the product will be cooled to bring the product back to an ambient temperature.



#### d. Investment constraints

Some constraints and risks associated with this are; scattered production areas makes difficulties to collect in a place, purchasing raw material (soybean) is a seasonal tasks requires higher investment for raw materials, challenges to store raw materials, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, poor linkages with urban market for local product, lack of business development services, unavailability of market information system etc. This can be overcome by joint efforts of all stakeholders with the support of the Province government.

### 3.1.1. Feed industry

#### a. Overview

To feed commercial livestock, 7, 83,701 tones commercial feed (92% poultry, 5% cattle and 3% /pig feed) were produced by registered feed companies in Nepal<sup>22</sup>. Around 90% of the total feed produced in Nepal comprise of poultry feed.

Poultry industry is agriculture based emerging economic sector of Nepal with flourishing impact to provide sustainable and cheapest protein as source of human food in Nepal.

#### b. Raw materials and market

Maize and oilseed (soybean) flakes are the major raw materials for feed industry. The province has 214,626 mt of Maize and 6510 mt of oilseed production in 2017/18.



Table 3.17: Production of Oil seeds in Metric tons

| District     | 2015/16     | 2016/17     | 2017/18      |
|--------------|-------------|-------------|--------------|
| Dolpa        | 8           | 7           | 8            |
| Mugu         | 41          | 23          | 26           |
| Humla        | 124         | 37          | 42           |
| Jumla        | 99          | 45          | 52           |
| Kalikot      | 26          | 27          | 31           |
| Rukum West   | 808         | 491         | 281          |
| Salyan       | 1454        | 1039        | 1,181        |
| Jajarkot     | 237         | 166         | 190          |
| Dailekh      | 744         | 737         | 845          |
| Surkhet      | 3609        | 3361        | 3,853        |
| <b>Total</b> | <b>7150</b> | <b>5933</b> | <b>6,510</b> |

In most of the districts of the Karnali, maize and soybean are growing. In the province, Salyan has highest and Dolpa has the lowest production of soybean in F/Y2017/018. Similarly, in the same year, Dailekh, Surkhet, Salyan, Jajarkot and Rukum are the major maize producing districts in the province. This shows the availability of the raw materials in the province for pallet industries.

In the province, minimum of about 25,000 mt annually raw materials can be collected for industrial use. At present, poultry/animal feed comes from the out of the Province, but the trend of commercial poultry farming and cow/buffalo farming for dairy purpose is increasing. So, market for the locally produced pallets will be beneficiaries for the local farming community and excess can

22 Netra P Osti. "Animal Feed Resources and their Management in Nepal". Acta Scientific Agriculture 4.1 (2020): 02-14.

be supplied to the other parts of the country. Thus, there is good potentiality of market for pallet produced in Province.

### c. Investment opportunities

During the field interaction, most of the livestock related officials and farming community told about the more and more farmers are involving in poultry especially in Surkhet, Dailekh, Kalikot, Mugu, Jumla, and Jajarkot districts<sup>23</sup>.

The increasing size of market for poultry feed in Nepal makes for a strong case for investment in feed Industry in Karnali Province. The poultry business is increasing at a rate of 2.04% per year in Nepal, which remains true for Karnali Province as well.

| District     | 2015/16       | 2016/17       | 2017/18        |
|--------------|---------------|---------------|----------------|
| Dolpa        | 256           | 2800          | 3,167          |
| Mugu         | 928           | 825           | 933            |
| Humla        | 94            | 215           | 243            |
| Jumla        | 6307          | 6307          | 7,134          |
| Kalikot      | 4445          | 5736          | 6,488          |
| Rukum West   | 32274         | 35539         | 20,101         |
| Salyan       | 39759         | 41598         | 47,055         |
| Jajarkot     | 15540         | 31734         | 35,897         |
| Dailekh      | 35292         | 44268         | 50,075         |
| Surkhet      | 33464         | 38483         | 43,531         |
| <b>Total</b> | <b>168359</b> | <b>207505</b> | <b>214,626</b> |

The availability of maize in competitive prices, potential for increasing production areas of maize and oil seeds, and increasing number of agro-vets supplying poultry (Broilers) to farmers of the Province hint the good opportunity for investment in Feed industry. Feed Industry can be established in Rakam area, where basic requirement for industrial development is available like; accessible market, electricity, water supply and transportation etc.

For all this, it is estimated NRs. 100 million initial investment requirements for establishing 1-2 tones per hour capacity processing plant with storage and packaging facilities development. Investment can be done by public private partnership approach, in which co-investment can be done or certain percent grant to the eligible private sector investor can be provided by the Province government for establishment of the facility.

### d. Investment constraint

Risks and constraints are associated with establishment of feed industry in Karnali which are; scattered production areas for raw materials could makes difficulties to collect in a place, purchasing of raw materials in a season based on crop calendar requires higher investment makes difficulties, challenges to store raw materials, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, challenging to develop linkages with urban market for local product, lack of business development services, unavailability of market information system etc.

Required investment can be pooled by joint efforts of all stakeholders with the support of the Province government.

## 3.12. Dairy industry

### a. Overview

Dairy sector is the leading sector to monetize rural Income. This sector still appeals to a large population in the rural areas as a viable income sources.

<sup>23</sup> An interaction with five agro-vets in two districts (Dailekh and Jumla ) revealed that on an average a agro-vet sells around 800- 1200 chickens per week. There are 3-5 agrovets in Kalikot, Jumla and Dailekh while in Surkhet there are more than nine agro-vets.

There is increasing demand for modern as well as traditional dairy products especially in the urban areas of Karnali province. Further, in places such as Surkhet, Dailekh and Jumla, most of processed dairy products are imported.

### b. Raw materials and market

Milk is produced in all districts of Karnali Province. There is higher number of buffalo than the number of cows. The dairy industry in Karnali Province is at nascent stage.

The number of cow are 5,63,594 and buffalo are 3,35,098 of which only 14% of cow and 28.30% buffaloes are milking which collectively produced 1,13,384 metric tons litres of milk<sup>24</sup>.

In Karnali Province, dairy processing works are done by either private entrepreneur or cooperatives with small investment. Recently, some cooperatives in



| District     | Cattle         | Buffaloes      | No. of milking cows | No. of milking buffaloes | Cow milk      | Buff milk     | Total milk production |
|--------------|----------------|----------------|---------------------|--------------------------|---------------|---------------|-----------------------|
| Surkhet      | 109,642        | 41,888         | 2,892               | 613                      | 1,151         | 524           | 1,675                 |
| Dailekh      | 112,877        | 90,693         | 5,121               | 3,858                    | 2,579         | 1,514         | 4,093                 |
| Jajarkot     | 40,449         | 35,052         | 3,849               | 554                      | 1,021         | 542           | 1,563                 |
| Salyan       | 134,538        | 72,723         | 7,625               | 741                      | 3,587         | 846           | 4,433                 |
| Rukum        | 25,506         | 42,306         | 3,150               | 8,457                    | 1,328         | 3,215         | 4,543                 |
| Jumla        | 56,348         | 3,290          | 1,754               | 8,651                    | 2,410         | 9,250         | 11,660                |
| Humla        | 3,413          | 3,407          | 22,150              | 20,230                   | 8,527         | 16,931        | 25,458                |
| Mugu         | 37,794         | 12,594         | 5,418               | 9,526                    | 3,001         | 11,285        | 14,286                |
| Dolpa        | 20,514         | 2,536          | 9,537               | 28,140                   | 7,126         | 14,872        | 21,998                |
| Kalikot      | 22,513         | 30,572         | 18,920              | 14,824                   | 13,640        | 10,025        | 23,665                |
| <b>Total</b> | <b>563,594</b> | <b>335,061</b> | <b>80,416</b>       | <b>95,594</b>            | <b>44,370</b> | <b>69,004</b> | <b>113,374</b>        |

Kalikot, Jajarkot, and Mugu districts has initiated to established dairy processing units with installing 1000 liters or lower capacity chilling vat.

### c. Investment opportunities

It is reported by the stakeholders during field interaction that the demand for liquid processed milk is increasing at the range of 8 -14% based on population status and increasing income, which explore the opportunities of the dairy sub-sector investment. Investment in small-scale dairy processing units in Karnali Province can survive at present and have growth potentiality in future.

Investment in dairy business with the objective of product diversification would be profitable at present. It would be feasible to establish dairy processing unit in the Province with capacity of 500 liter per day to 2000 liters per day processing capacity. Following are the proposed locations and estimated initial investment required for the dairy processing unit establishment.

The business can be initiated by public private partnership approach, in which co-investment can be done or partial grant can be provided by the Province government to the eligible private sector for establishment of the facility.

<sup>24</sup> Tatyanka ma Karnali Pradesh, Office of chief minister and cabinet Karnali Pradesh 2075/76

According to the provincial data, milk productivity of cow is 1.48 liter /day and that of buffalo is 2.05 liter per day.

| Potential Places                    | Proposed Capacity         | Proposed District/ Location | Estimated Initial Investment Requirement (NRs.) |
|-------------------------------------|---------------------------|-----------------------------|---|
| Birendranagar municipality          | 2000 liters- chilling Vat | Surkhet                     | 6 million                                       |
| Bheriganga municipality             | 2000 liters- chilling Vat | Surkhet                     | 6 million                                       |
| Gurbhakot rural municipality        | 1000 Liters capacity      | Surkhet                     | 4 million                                       |
| Narayan Municipality                | 2000 liters capacity      | Dailekh                     | 6 million                                       |
| Lainchaur (Chamunda Bindabasini)    | 2000 liters capacity      | Dailekh                     | 6 million                                       |
| Satal (Aatbiskot )                  | 2000 liters capacity      | Dailekh                     | 6 million                                       |
| Khadacharka urban municipality      | 500 liters                | Kalikot                     | 3 million                                       |
| Sharda urban municipality           | 2000 liters               | Salyan                      | 6 million                                       |
| Luham (Kapurkot) rural municipality | 2000 liters               | Salyan                      | 6 million                                       |
| Chedagaad urban municipality        | 1000 liters               | Jajarkot                    | 4 Million                                       |
| Nalgaad Urban Municipality          | 1000 liters               | Jajarkot                    | Million   |

#### d. Investment constraints

Risks and constraints are associated with establishment of dairy processing unit in different location of the Karnali which are; Scattered production areas may makes problem to collect milk at processing unit, purchasing of milk daily needs daily investment requires higher working capital for business, cold room facility for storage of dairy item needs additional cost during investment period, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production and sanitary measures, develop linkages with market, lack of business development services, unavailability of market information system etc.

Required finance for dairy industry can be done by joint efforts of all stakeholders with the support of the Province government.

### 3.13. Hatchery industry

#### a. Overview

Poultry sector alone contributes to 4% of Gross Domestic Product and 8% to Agriculture Gross Domestic Product, its development remains critically dependent upon the quality of chicks for the farmers.

The Karnali Province has diversity in topography and climates, poultry have a potentiality of flourishing. There were 194930 improved varieties of chickens in Karnali Province, where 89% of the improved varieties like; broilers, layers and giriraj, remaining are other25.



#### b. Raw materials and market

The Karnali Province does not have a hatchery until now; all of its poultry (broilers and layers) are brought from out of the province. The trade of broilers is increasing every year and farmers are

increasing their poultry population. According to the estimates of one of the largest agro-vets<sup>26</sup> in Dailekh around 1400 chicks are being sold every week and there are five other agro-vets which supply similar number of chickens. Encouraged by this fact, the agro-vet suggested for good potentiality of the hatchery business in the province. For hatchery, parents are available in Nepal.

### c. Investment opportunities

Interaction with the government offices related to livestock Services (District VHLSO) of different five districts; indicate the growing population of the poultry in the Province shows the opportunities to invest in hatchery business in the Province. At present, Poultry entrepreneur are facing problem to acquire chicks, mostly supplied from different parts of the country in high prices. This shows the potentiality of investing in small scale hatchery in Surkhet of Karnali Province. A small sized hatchery with production capacity of 20000 chicks per week. Surkhet will be the best location for hatchery in Karnali Province due to connected transportation network with all the districts of the Province and availability of regular supply of good voltage electricity which requires running incubators.

The initial investment for the proposed hatchery would be NRs. 150 million estimated. The industry can be initiated by public private partnership approach, in which co-investment can be done or partial grant can be provided by the Province government to the eligible private sector for establishment of the facility.

### d. Investment constraints

Despite the above opportunities, there are also several constraints relating to poultry in general and hatchery in particular. Initiation and operation of hatchery business needs large investment amount with higher working capital which is difficult to manage by entrepreneur without any support from government, establishing supply chains of produced chicks needs additional investment for transportation, lack of availability of skilled human resources for operation of the machines and business, challenges to develop linkages with market, lack of business development services, unavailability of market information system etc.

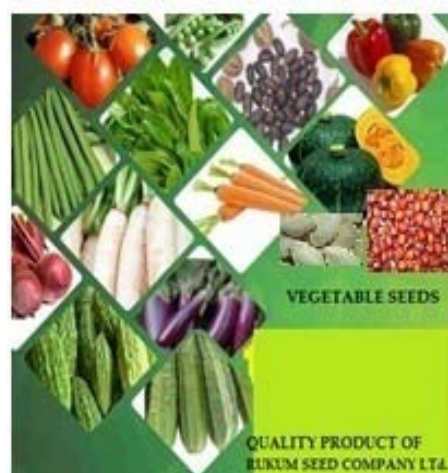
Require finance for hatchery industry can be done by joint efforts of all stakeholders with the support of the Province government.

## 3.14. Seed processing industry in Rukum

### a. Overview

Data on 2016/17 showed that Nepal has been experienced acute shortage of vegetable seeds. Only about 16 % (308.6 mt) of the total seed requirement (1873.2 mt) in the country is fulfilled by country seed production and rest is managed through import of vegetable seed.

Diverse agro climatic variation ranging from warm sub-tropical climate at foothills, river basin to cool temperate high elevation areas which offer tremendous opportunities for growing various types of vegetable seeds in the Karnali Province which is potential sub sector for growth of rural



26 Interview with Jwala agrovet, Dailekh 2020

farmers. With appropriate support from the government, seed sector can be boosted up the production.

Among the all districts of Karnali Province, Rukum West is one of the pioneer districts in vegetable seed production since long back in spite of many difficulties like; quality source seed, technology access, input availability, assured marketing system. Rukum west alone produced almost 22% of the national vegetable seed production in the year 2017/18.

## b. Raw materials and market

Rukum west has high potential of vegetable seed production. The district is gifted for quality vegetable seed production due to diverse agro climate from warm sub-tropical to cool temperate. The district have good network of seed producer farmers groups and cooperative member and grow seed based on pre-production

| Crop           | Variety            | Prod (mt)   |
|----------------|--------------------|-------------|
| Bean           | Chaumase           | 4.2         |
| Pea            | Sikkime            | 19.7        |
| Onion          | Red Creol          | 8.2         |
| Rayo(BLM)      | Khupal Chaudapat   | 9.8         |
| Radish         | Mino early,40 days | 24.2        |
| Cress(Chamsur) | Local              | 0.6         |
| Cauliflower    | Kathmandu local    | 0.5         |
| <b>Total</b>   |                    | <b>67.2</b> |

contracts (buyback agreement) with seed purchasing companies (KUBK 2018).The famers have good access to inputs like source seed, fertilizer, insecticides, fungicides, and micro nutrients. They have access to source seed from their own district from Sub tropical Vegetable Seed Production Farm (Chapa Farm) and also have linkage with NARC Station Malepatan and Dailekh Farm for foundation seed.

Private seed Companies like Rukmeli Agro Seeds Center,Lumbini Seed Company and SEAN has established purchase contract with the farmers of the district and thus ensured marketing of seeds.

Rukum west produced vegetable seed with KUBK support.

| Description           | 2015/16 | 2016/17 | 2017/18 | 2018/19 |
|-----------------------|---------|---------|---------|---------|
| Production(mt)        | 27.13   | 40.9    | 58.49   | 67.2    |
| Percent increase over | -       | 50.7    | 115.6   | 147.7   |

The seed produced in

Rukum is marketed in raw form. Hence, to increase the farmer's income and marketing of quality truthful level seed (i) quality source seed from trusted sources (ii) processing and storage of produced seeds and (iii) access to technology is vital.

## c. Investment opportunities

Increasing demand of vegetable seeds within and outside the country has created opportunity for its production. A huge gap is observed between production and requirement of seeds in Nepal. In 2017/18, only 22% of the national demand is fulfilled by in country vegetable seed production and rest is dependent on import from different countries for which large amount of foreign currency is expended and trade balance of the country is always negative. Every year the import of vegetable seed is increasing. In 2017/18 alone the country imported vegetable seed of worth NRs 393.4 million for importing 131 mt of vegetable seeds. Even though, large amount of vegetable seed is demanded but the availability is limited. Hence, there is urgent need to increase the seed production and improve marketing situation of the Province as well as of the country. During 1990 decades Nepal had exported more than thousand metric ton of seed to Bangladesh, Pakistan, and Arabian countries

but not the demand is shriveled due to quality matters. Hence, considering the internal demand and export potential felt utmost importance to establish a seed processing industry in Rukum.

The Processing plant should have the facilities for seed processing, grading and packaging. About 30-40 million Nrs is required to establish the processing facilities with capacity of one tons per hour. The expenditure modality can be through cooperatives or private investor co sharing basis.

#### d. Investment constraints

Despite the above opportunities, there are constraints identified for the business. Initiation and operation of seed processing unit establishment requires high level technical input for producers, to produce quality seeds needs large investment and special technical skill, is challenges associated with this business, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, challenges to establish linkages with market, lack of business development services, unavailability of market information system etc.

Financial resources for Seed Company can be gathered by joint efforts of all stakeholders with the support of the Provincial government.

### 3.15. Seed processing industry in Surkhet

#### a. Overview

Seed production has been identified as high value low volume cash crop in mid hill district Dailekh, Surkhet and Salyan of Karnali Province. Among the other, Surkhet, Salyan and other districts are famous and potential for vegetable as well as cereal seed production.

The agro climatic condition is also favorable with a diverse agro climatic variation ranging from warm sub-tropical climate at foothills, river basin of Surkhet and Salyan to high elevation areas in Dailekh which offer tremendous opportunities for growing various types of seeds. With appropriate support from the Provincial government these district can be boosted up for vegetable seed production.

These three districts alone in Karnali Province has produced as much as 105.16 mt of vegetable seed<sup>27</sup>. Some cooperatives are involving in production, processing and marketing of seed in Surkhet and Dailekh.

| Crop         | Varieties          | Dailekh     | Surkhet     | Salyan       | Total         |
|--------------|--------------------|-------------|-------------|--------------|---------------|
| Bean         | Chaumase, Trishuli | 1.3         | 0.6         | 25.5         | 27.4          |
| Okra         | Arka Anamika       | 1           | 1           | 0            | 2             |
| Radish       | Minoearly, 40 days | 0.4         | 22          | 13.7         | 36.1          |
| Cowpea       | Malepatan-1        | 4           | 0.5         | 0            | 4.5           |
| Pea          | Sikkime/Arkel      | 1.2         | 5           | 20.1         | 26.3          |
| Rayo(BLM)    | Khumal Chaudapat   | 0           | 0           | 6.75         | 6.75          |
| Onion        | Fed creol          | 0.1         | 0.6         | 0            | 0.7           |
| Tomato       | Srijana            | 0.01        | 0           | 0            | 0.01          |
| Bitter guard |                    | 0           | 0           | 0.6          | 0.6           |
| Cucumber     | Bhaktapur local    | 0           | 0           | 0.8          | 0.8           |
| <b>Total</b> |                    | <b>8.01</b> | <b>29.7</b> | <b>67.45</b> | <b>105.16</b> |

<sup>27</sup> Vegetable Seed Production in Salyan: 67.45 mt, Surkhet: 29.7 mt and Dailekh: 8.01 mt in the year 2017/18

## **b. Raw materials and market**

Surkhet, Salyan and Dailekh have high potential of vegetable as well as cereal seed production due to wider agro climatic suitability. The cereal seeds and Vegetable seeds like bean, pea, okra, bitter melon, can be produced in the lower plain of Surkhet and Salyan district while Onion, tomato, Rayo, radish can be produced in some high elevation.

These all three districts have road connectivity for the easy supply of inputs. These districts have good network of seed producers farmers producing different seeds based on pre-production contracts with Kathmandu based Seed dealer. The province has 4 NARC Research Centers that is; Horticulture Research Center, Dailekh, Agriculture Research Station, Jumla and Surkhet, National Ginger Research Program, Kapurkot Salyan and one DOA Farm Sub-tropical vegetable seed production center (Chapa Farm) Rukum. These all are serving for source seed production. The seed produced in these districts is marketed within and outside the district as raw seeds. Hence, to increase the farmer's income and marketing of quality truthful level seed (i) quality source seed from trusted sources (ii) processing and storage of produced seeds and (iii) access to technology is vital.

## **c. Investment opportunities**

Increasing demand of seeds created opportunity for its seed processing and marketing business. A huge gap is observed between production and requirement of seeds in Nepal. In 2017/18, only 22% of the national demand is fulfilled by domestic seed production and rest is imported from different countries, for which large amount of foreign currency is expended and trade balance of the country is always deficit. Every year the import of seed is increasing. In 2017/18 alone the country imported vegetable seed of worth NRs 393.4 million for 131 mt of vegetable seeds. Even though, large amount of vegetable seed is demanded but the availability is limited.

Hence, there is need to increase the seed production and improve marketing situation of the country and Province. During 1990s, Nepal had exported more than thousand metric ton of seed to Bangladesh, Pakistan, and Arab countries but now the demand is shriveled due to quality matters. Hence, considering the internal demand and export potential felt utmost importance to establish a seed processing industry in Surkhet where seed from Dailekh and Salyan districts can easily be collected, processed, packaged and tagged and marketed. So, it would be recommended that to establish a seed processing industry in Surkhet along with storage, and cold chain facilities would be profitable.

Processing plant with capacity of 2 mt per hour will be suitable for processing, grading and packaging costing about 30-40 million NRs. It is estimated to establish the industry. The expenditure modality can be through cooperatives or private investor co-sharing basis.

## **d. Investment constraints**

Despite the above opportunities, there are constraints identified for the business. Initiation and operation of seed processing unit establishment requires high level technical input for producers, to produce quality seeds needs large investment and special technical skill, is challenges associated with this business, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production, challenges to establish linkages with market, lack of business development services, unavailability of market information system etc. Required resources for Seed Company can be gathered by joint efforts of all stakeholders with the support of the Province government.



### 3.16. Honey processing industry

#### a. Overview

Processing of fresh honey improves quality and preserves for extended time and supply during shortage period makes value addition. It creates an opportunities for additional income generation for a long time. In Nepal variety of specialized honey can be produced which have high in quality and medicinal value.

Feeding for honey bee is easy in those places where ample flowering spices of plants like; chiuri, mustard, buckwheat, rudilo, sunflower and litchi are available. In Nepalese honey have peculiar flavor due to its unique flora and diverse climate.

Karnali Province especially Surkhet, Jajarkot, Dailekh, Kalikot, and Salyan districts have good potentiality of Serena honey bee keeping and it has

long tradition of bee keeping now converted in commercial bee farming. Recently, Honey produced in Kalpat areas of Nalgad municipality of Jajarkot has exported to Australia, America and Korea<sup>28</sup>.



#### b. Raw materials and markets

In Karnali, 2100 Mt honey was produced in 2017/18. In the province, Jajarkot and Kalikot districts produced large volume of honey. National data shows the increment of 18.4% of honey Production in Nepal with increment of 5.6% area used for honey production. The increment is seen in Karnali Province also. Honey bee farming trend is increasing now days which increase the production of honey in province. Honey produced by Serena honey bee has high demand in the Province and have higher price than other. The price of raw honey of Serena varies ranged from Nrs 500 to 700 per kg at farm gate. Thus, it is estimated that about 1000 mt. raw honey can be collect for further processing and branding in the Province. Based on the availability of the raw honey, Narayan Municipality of Dailekh and Nalgad municipality in Jajarkot district are most potential location for the honey processing business establishment.

#### c. Investment opportunities

Cleaning, filtering, sorting, branding and packaging activities improve the quality of raw honey which adds value. However, there is some innovative cooperatives have already started value addition practice, but value addition activities and standardization of the products is in limited and small scale. To make competitive in market, it is compulsory to process the raw honey and supply it for the consumer. It creates opportunities for investment in honey sector in Province. Karnali Province, which is known for organic farming have high demand of its agricultural products by conscious consumer throughout the nation, creates good market opportunities helps to promote investment in honey sector also.

<sup>28</sup><http://www.therisingnepal.org.np/news/28869>

Thus, it would be better to establish small sized of one ton per day capacity honey processing units of targeting Sarena honey in Nalgad of Jajarkot and Narayan Municipality of Dailekh which estimated initial investment would be Nrs. 10 million and medium sized with capacity of two tons per day capacity honey processing units targeting melifera and Serena honey in Surkhet which estimated initial investment would be Nrs. 20 million proposed for value addition in honey sector.

The business can be initiated by public private partnership approach, in which co-investment can be done or partial grant can be provided by the Province government to the eligible private sector for establishment of the facility.

#### **d. Investment constraints**

Despite the above opportunities, there are also several constraints relating to honey processing. Scattered production areas makes difficulties to collect in a processing location, unavailability of quality testing facilities in province for honey, lack of business development services, lack of availability of skilled human resources for operation of the machines and business, limited knowledge and skill of farming community for quality production and sanitary measures, not proper linkages with market, unavailability of market information system etc. Required financial resources can be pooled by the public private approach.

## CHAPTERS 4: CONCLUSION AND RECOMMENDATION

### 4.1 Conclusion

Natural resources, in particular cultivable land, forest, water and human resources are basis for economic development in Karnali province, where a large proportion of rural population remains dependent for subsistence. The agriculture, forestry and fishing sector comprises more than 35% of the contribution to the provincial gross domestic products. Thus, transformation of the present agricultural production system to the commercial agribusiness is critical to attain provincial food security and eradication of poverty.

This study has been accomplished considering five fundamental values: (i) review of the existing agricultural production status of the selected crops; (ii) examination and identification of potential opportunities in agribusinesses towards value addition and processing of the local primary agriculture products, and (iii) assessment of the existing system of trade and distribution channels with respect to market disposal of the surplus production of the selected commodity and potentiality for up-scaling its production (raw materials), and (v) examination of the appropriate production technology, constraints and prospects of the products for regional, national and international export market.

Rapid market appraisal including other participatory tools as well as iterative review process was adopted during the prefeasibility survey. This report was the outcome of the information that were provided by the various stakeholders related to the sector, rapid appraisal of the major market places and the secondary information collected through the iterative review process.

The high-value crops such as fruits, fresh vegetable, spices, goat, dairy, vegetable seed, poultry, MAPs and honey are the performing value chains in the territory of the Karnali. Therefore, future of the commercialized agriculture in the province largely depends on the growth of small, medium and large enterprises that goes beyond employing only family members. The major constraints that are related to the growth of the corporate agribusiness are access to suitable land, access to capital/credit, technology, marketing and other infrastructure. Existing nature of the land holding is also the major constraints that realized for low scale of economy and competitiveness. Unnecessary over-regulation of land use zoning is contributing factors that substantially add to the cost of financing and accumulating a sufficiently large parcel of land for the processing business.

It is believed that outcomes of the survey could be very helpful and it will act as foundation to the investors and other related stakeholders for the promotion of the agriculture based industries in the province. This assessment provides only glimpse of the opportunities in the identified potential industries. Therefore, preparation of detail project report is recommended to know the financial viability and rate of returns on investment.

### 4.2 Recommendations

The Karnali province should consider the following strategic approach to boost the agribusiness in the province.

- i. Focus on the value chain development approach as maximization of the benefits (or value added) from the agribusiness activity entirely depends on the production of niche products

- for sale rather than on-farm. Therefore Mobilization of the government and non-governmental service providers as well as competent private service providers is critical.
- ii. **Ensure business incubation services with the partnership of competent private sector to attract private investment creating enabling investment environment for agribusiness. This will help to ensure business development and marketing services, credit services and insurance services.**
  - iii. Establishment and Operation of effective Market Information service is required. For this it would be better to make partnership with the capable service provider.
  - iv. Promote cooperatives for agribusiness activities and contractual farming with assured technical backstopping and input supply. It would be better to capacitate or strengthen the local first hand private service providers for quality input supply for example agrovets and paravets.
  - v. Develop suitable agricultural programs to local bodies that can enhance food security and processing agribusiness through the adequate supply of the raw materials with the coordination of the provincial and local government.
  - vi. Strengthen agricultural research stations as resource centers.

### Future infrastructure requirement

In Karnali province, Infrastructure development is left behind than the other parts of the country, hampers the economic development of the province. Till date, two districts-Humla and Dolpa have not access of road network which is top bottle neck for the two potential districts for agriculture sector. Due to the unavailability of the road access, local produces are costly to transport by air transport or manual transport. Similarly, fifty percent districts of the province are not connected with the national electricity grid due to which processing facility for agriculture commodity cannot be imagined. Similarly, local level storage facilities for the agricultural product are not available in the most of the province, makes difficulties to manage agricultural commodities. Thus, following future infrastructure would be necessary for the promotion of the agribusiness of the province.

1. Road connectivity: All district head quarter should be connected by road. Also, within the district, agricultural road should be developed to link with the production areas with the market centers
2. Cold storage :

| Proposed Location | Capacity | Focused crop for            | Estimated Tentative Initial Investment Requirement |
|-------------------|----------|-----------------------------|--|
| Humla, Simikot    | 100 mt   | Apple and Potato            | NRs. 200 million                                   |
| Dolpa, Dunai      | 100 Mt   | Apple and Potato            | NRs. 200 million                                   |
| Mugu              | 100 mt   | Apple and Potato            | NRs. 200 million                                   |
| Jumla (Khalanga)  | 500 mt   | Apple and Potato            | NRs. 500 million                                   |
| Kalikot (Manma)   | 200 mt   | Apple and Potato            | NRs. 300 million                                   |
| Dailekh Bazar     | 500 mt   | Potato/ Fruits / Vegetables | NRs. 400 million                                   |
| Salyan (Khalanga) | 500 mt   | Potato/ Fruits /Vegetables  | NRs. 400 million                                   |
| Jajrkot           | 200 mt   | Potato/ Fruits /Vegetables  | NRs. 300 million.                                  |
| Rukum             | 200 mt   | Potato/ Fruits /Vegetables  | NRs. 300 million.                                  |

3. Wholesale Market Infrastructure in Rukum, Jajrkot, Dailekh, Salyan, Jumla. Also, a terminal market infrastructure for the import and export of the agriculture commodity for regulation of the in and out from the province should be developed in Surkhet.

4. Gravity Ropeway: Thus should be developed in most of the mountain and hill district's local areas where agriculture production is good and potentiality of up-scaling of the particular agricultural products but due to transportation of the production feels difficulties in marketing should be linked with gravity ropeway to the market centers. Like; Gravity ropeway will be good in Mahawai rural municipality w/n 2 where more than 50/60 Q apple and huge amount of Potato and Beans produced and marketed. But there is a problem of transportation, resulted low price to farmers for their produces.
5. Good quality electricity should be provided to those areas where potentiality of the processing unit of the particular agricultural produces.
6. Needs to improve and expand the Irrigation facilities in province.

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## ANNEXES

## Annex 1: Estimated Market Supply of the Agriculture Products (Rapid Market Appraisal)

| 1  | Fruit juice processing Industry in Surkhet                     | Unit | Production     | Home Consumption & loss | Market Availability | Fresh Consumption | Available for processing |
|----|--|------|----------------|-------------------------|---------------------|-------------------|--------------------------|
|    | Total Fruit Production   | Mt.  | 57,213         | 15,448                  | 41,765              | 20,883            | 20,883                   |
|    | Appal and Citrus   | Mt.  | 37,216         | 7,212                   | 30,004              | 16,385            | 13,619                   |
|    | Apple  | Mt.  | 14,888         | 2,809                   | 12,079              | 6,885             | 5,194                    |
|    | Citrus   | Mt.  | 22,328         | 4,403                   | 17,925              | 9,500             | 8,425                    |
| 2  | <b>Potato Chips</b>  | Mt.  | <b>193,080</b> | <b>63,716</b>           | <b>129,364</b>      | <b>90,555</b>     | <b>38,809</b>            |
|    | Potato   | Mt.  | 141,168        | 46,585                  | 94,582              | 66,208            | 28,375                   |
|    | High hill potato   | Mt.  | 51,912         | 17,131                  | 34,781              | 24,347            | 10,434                   |
| 3  | <b>Vegetable and tomato sauce/ketchup industry</b>             | Mt.  | 18,838         | 5,767                   | 13,071              | 6,902             | 6,169                    |
|    | Tomato   | Mt.  | 10,767         | 3,661                   | 7,106               | 4,264             | 2,842                    |
|    | Pumpkin  | Mt.  | 4,918          | 1,475                   | 3,443               | 1,377             | 2,066                    |
|    | Chilli   | Mt.  | 3,153          | 631                     | 2,522               | 1,261             | 1,261                    |
| 4  | <b>Spices Industry</b>   | Mt.  | <b>36,936</b>  | <b>6,444</b>            | <b>30,492</b>       | <b>8,763</b>      | <b>21,729</b>            |
|    | Garlic   | Mt.  | 3,652          | 1,074                   | 2,578               | 1,289             | 1,289                    |
|    | Turmeric   | Mt.  | 4,364          | 607                     | 3,757               | 188               | 3,569                    |
|    | Chilli   | Mt.  | 823            | 43                      | 780                 | 273               | 507                      |
|    | Ginger   | Mt.  | 28,097         | 4,720                   | 23,377              | 7,013             | 16,364                   |
| 5  | <b>Bakery Industry</b>   | Mt.  | 195,155        | 131,824                 | 63,331              | 1,900             | 61,431                   |
|    | Wheat  | Mt.  | 160,213        | 112,149                 | 48,064              | 1,442             | 46,622                   |
|    | Millet   | Mt.  | 19,483         | 8,767                   | 10,716              | 321               | 10,394                   |
|    | Barley   | Mt.  | 13,244         | 9,933                   | 3,311               | 99                | 3,212                    |
|    | Buck wheat   | Mt.  | 2,215          | 975                     | 1,240               | 37                | 1,203                    |
| 6  | <b>Local Fruit based brewery Industry</b>                      | Mt.  | <b>17,381</b>  | <b>3,152</b>            | <b>14,229</b>       | <b>8,111</b>      | <b>6,119</b>             |
|    | Apple  | Mt.  | 14,888         | 2,809                   | 12,079              | 6,885             | 5,194                    |
|    | Pear   | Mt.  | 1,179          | 196                     | 983                 | 560               | 423                      |
|    | Plum   | Mt.  | 1,314          | 146                     | 1,168               | 666               | 502                      |
| 7  | <b>Grading and packaging of indigenous agriculture product</b> | Mt.  | <b>20,672</b>  | <b>4,775</b>            | <b>15,897</b>       | -                 | <b>15,897</b>            |
|    | Dry Fruit  | Mt.  | 1,184          | 201                     | 983                 | -                 | 983                      |
|    | Apple  | Mt.  | 14,888         | 2,531                   | 12,357              | -                 | 12,357                   |
|    | Local Bean   | Mt.  | 4,600          | 2,042                   | 2,558               | -                 | 2,558                    |
| 8  | <b>Flour mill for millet, buckwheat and other grains</b>       | Mt.  | <b>41,032</b>  | <b>22,111</b>           | <b>18,921</b>       | <b>568</b>        | <b>18,353</b>            |
|    | Millet   | Mt.  | 19,483         | 8,767                   | 10,716              | 321               | 10,394                   |
|    | Barley   | Mt.  | 13,244         | 9,933                   | 3,311               | 99                | 3,212                    |
|    | Buck wheat   | Mt.  | 2,215          | 975                     | 1,240               | 37                | 1,203                    |
| 9  | Marshi rice processing industry in Jumla                       | Mt.  | 6,090          | 2,436                   | 3,654               | 110               | 3,544                    |
| 10 | <b>Corn &amp; millet flakes production industry</b>            | Mt.  | <b>234,107</b> | <b>133,249</b>          | <b>100,858</b>      | <b>22,857</b>     | <b>78,001</b>            |
|    | Millet   | Mt.  | 19,483         | 8,767                   | 10,716              | 321               | 10,394                   |
|    | Maize  | Mt.  | 214,624        | 124,482                 | 90,142              | 22,536            | 67,607                   |
| 11 | <b>Soybean processing industry</b>                             | Mt.  | <b>2,730</b>   | <b>573</b>              | <b>2,157</b>        | <b>539</b>        | <b>1,618</b>             |

| 1  | Fruit juice processing Industry in Surkhet | Unit | Production     | Home Consumption & loss | Market Availability | Fresh Consumption | Available for processing |
|----|--|------|----------------|-------------------------|---------------------|-------------------|--------------------------|
| 12 | <b>Feed industry</b>                       | Mt.  | <b>223,866</b> | <b>128,572</b>          | <b>95,294</b>       | <b>23,078</b>     | <b>72,216</b>            |
|    | Maize                                      | Mt.  | 214,626        | 124,483                 | 90,143              | 22,536            | 67,607                   |
|    | Oil Seed                                   | Mt.  | 6,510          | 3,515                   | 2,995               | 3                 | 2,992                    |
|    | Soybean                                    | Mt.  | 2,730          | 573                     | 2,157               | 539               | 1,618                    |
|    | Estimated cake                             | Mt.  | -              | -                       | -                   | -                 | 191,236                  |
| 13 | <b>Dairy industry</b>                      | Mt.  | <b>113,374</b> | <b>51,018</b>           | <b>62,356</b>       | <b>9,353</b>      | <b>53,002</b>            |
| 14 | <b>Seed processing industry in Rukum</b>   | Mt.  | <b>89</b>      | <b>11</b>               | <b>78</b>           | <b>11</b>         | <b>67</b>                |
| 15 | <b>Seed processing industry in Surkhet</b> | Mt.  | <b>139</b>     | <b>17</b>               | <b>122</b>          | <b>17</b>         | <b>105</b>               |
| 16 | <b>Honey processing industry</b>           | Mt.  | <b>2,100</b>   | <b>315</b>              | <b>1,785</b>        | <b>446</b>        | <b>1,339</b>             |
| 17 | <b>Hatchery industry</b>                   |      |                | -                       |                     |                   | <b>150,000</b>           |



## Annex 2: Road Length with category and Pavement in Karnali province (Kilometer)

| Road Type        | District   | Blacktop | Gravelled Road | Earthen Road | Total    | Under Construction | Planned Road |
|------------------|------------|----------|----------------|--------------|----------|--------------------|--------------|
| National Highway | Jumla      | 30.90    | -              | 0.10         | 31.00    | -                  | -            |
|                  | Kalikot    | 65.00    | 5.00           | -            | 70.00    | -                  | -            |
|                  | Dailekh    | 83.44    | -              | 2.56         | 86.00    | -                  | -            |
|                  | Jajarkot   | -        | -              | -            | -        | -                  | -            |
|                  | Rukum West | 31.40    | -              | -            | 31.40    | -                  | -            |
|                  | Salyan     | 91.66    | -              | -            | 91.66    | -                  | -            |
|                  | Surkhet    | 90.14    | -              | -            | 90.14    | -                  | -            |
|                  | Sub-Total  | 392.54   | 5.00           | 2.66         | 400.20   | -                  | -            |
| Feeder Road      | Dolpa      | -        | -              | -            | -        | 56.00              | -            |
|                  | Mugu       | -        | -              | 28.00        | 28.00    | -                  | 85.00        |
|                  | Humla      | -        | -              | 90.00        | 90.00    | -                  | 90.00        |
|                  | Jumla      | -        | -              | 120.00       | 120.00   | -                  | -            |
|                  | Kalikot    | -        | -              | 36.00        | 36.00    | -                  | -            |
|                  | Dailekh    | 69.23    | 2.00           | -            | 71.23    | -                  | -            |
|                  | Jajarkot   | 37.00    | -              | 36.00        | 73.00    | 61.00              | -            |
|                  | Rukum West | -        | -              | 2.00         | 2.00     | -                  | -            |
|                  | Salyan     | 25.00    | 4.00           | 55.00        | 84.00    | -                  | -            |
|                  | Surkhet    | 78.00    | 17.00          | 79.00        | 174.00   | -                  | 31.00        |
|                  | Sub-Total  | 209.23   | 23.00          | 446.00       | 678.23   | 117.00             | 206.00       |
| Mid-Hill Road    | Dailekh    | -        | 74.00          | 45.00        | 119.00   | -                  | -            |
|                  | Jajarkot   | -        | 13.00          | 72.00        | 85.00    | -                  | -            |
|                  | Rukum West | -        | 61.00          | -            | 61.00    | -                  | -            |
|                  | Sub-Total  | -        | 148.00         | 117.00       | 265.00   | -                  | -            |
| Grand Total      |            | 601.77   | 176.00         | 565.66       | 1,343.43 | 117.00             | 206.00       |

Source: Government of Nepal, Department of Road

## Annex 3: Road Length with category and pavement by districts (Kilometre)

| Districts | Name of Road                             | Class | Ref No | Link Code | BT            | GR           | ER            | Total         | UC           | PL           |
|-----------|--|-------|--------|-----------|---------------|--------------|---------------|---------------|--------------|--------------|
| Dolpa     | Tribeni-Dunai                            | FRN   | F047   | F04706    | 0.00          | 0.00         | 0.00          | 0.00          | 56.00        | 0.00         |
|           | <b>Total</b>                             |       |        |           | <b>0.00</b>   | <b>0.00</b>  | <b>0.00</b>   | <b>0.00</b>   | <b>56.00</b> | <b>0.00</b>  |
| MUGU      | Bulbule-Gamgadhi                         | FRN   | F154   | F15402    | -             | -            | 28.00         | 28.00         | -            | -            |
|           | Boldhik(District Border)-Sukhadhik-Dulya | FRN   | F172   | F17204    | -             | -            | -             | -             | -            | 20.00        |
|           | Gamgadhi-Sukadik                         | FRN   | F173   | F17301    | -             | -            | -             | -             | -            | 65.00        |
|           | <b>Total</b>                             |       |        |           | <b>0.00</b>   | <b>0.00</b>  | <b>28.00</b>  | <b>28.00</b>  | <b>0.00</b>  | <b>85.00</b> |
| HUMLA     | Hilsa (IB)-Simikot                       | FRN   | F145   | F14501    | -             | -            | 90.00         | 90.00         | -            | 5.00         |
|           | Dulya-Simikot                            | FRN   | F172   | F17205    | -             | -            | -             | -             | -            | 85.00        |
|           | <b>Total</b>                             |       |        |           | <b>0.00</b>   | <b>0.00</b>  | <b>90.00</b>  | <b>90.00</b>  | <b>0.00</b>  | <b>90.00</b> |
| JUMLA     | Nagma-Jumla Khalanga                     | NH    | H13    | H1306     | 30.90         | -            | 0.10          | 31.00         | -            | -            |
|           | Nagma-Bulbule                            | FRN   | F154   | F15401    | -             | -            | 65.00         | 65.00         | -            | -            |
|           | Jumla Khalanga-Gamgadhi                  | FRN   | F177   | F17701    | -             | -            | 55.00         | 55.00         | -            | -            |
|           | <b>Total</b>                             |       |        |           | <b>30.90</b>  | <b>0.00</b>  | <b>120.10</b> | <b>151.00</b> | <b>0.00</b>  | <b>0.00</b>  |
| KALIKOT   | Siradi-Sherighat-Manma                   | NH    | H13    | H1304     | 22.00         | -            | -             | 22.00         | -            | -            |
|           | Manma-Nagma                              | NH    | H13    | H1305     | 43.00         | 5.00         | -             | 48.00         | -            | -            |
|           | Khulalu (KARM)-Patlibadi(Gadwali)        | FRN   | F172   | F17201    | -             | -            | 36.00         | 36.00         | -            | -            |
|           | <b>Total</b>                             |       |        |           | <b>65.00</b>  | <b>5.00</b>  | <b>36.00</b>  | <b>106.00</b> | <b>0.00</b>  | <b>0.00</b>  |
| DAILEKH   | Upallo Syaule-Sain                       | NH    | H13    | H1302     | 68.00         | -            | -             | 68.00         | -            | -            |
|           | Sain-Siradi                              | NH    | H13    | H1303     | 15.44         | -            | 2.56          | 18.00         | -            | -            |
|           | Dailekh district border-Siyakot-Dailekh  | FRN   | F048   | F04802    | 45.01         | -            | -             | 45.01         | -            | -            |
|           | Tallo Dhungeshwor - Mathillo Dhungeshwor | FRN   | F144   | F14401    | 6.22          | 2.00         | -             | 8.22          | -            | -            |
|           | Talodungeshwor-Dullu                     | FRN   | F182   | F18201    | 18.00         | -            | -             | 18.00         | -            | -            |
|           | Suyada-Mangad (Midhill)                  | MH    | H18    | H1852     | -             | 10.00        | -             | 10.00         | -            | -            |
|           | Mangad-Bestada (Midhill)                 | MH    | H18    | H1853     | -             | 9.00         | -             | 9.00          | -            | -            |
|           | Bestada-Lohare (Midhill)                 | MH    | H18    | H1854     | -             | 14.00        | -             | 14.00         | -            | -            |
|           | Lohare-Dailekh (Midhill)                 | MH    | H18    | H1855     | -             | 9.00         | -             | 9.00          | -            | -            |
|           | Dailekh-Rawatkot (Midhill)               | MH    | H18    | H1856     | -             | 9.00         | 5.00          | 14.00         | -            | -            |
|           | Rawatkot-Lainchaur (Midhill)             | MH    | H18    | H1857     | -             | -            | 6.00          | 6.00          | -            | -            |
|           | Lainchaur - Ramgad (Midhill)             | MH    | H18    | H1858     | -             | 23.00        | -             | 23.00         | -            | -            |
|           | Ramghat - Sahijyula (Midhill)            | MH    | H18    | H1859     | -             | -            | 33.00         | 33.00         | -            | -            |
|           | Sahijyula - Belkhet (Midhill)            | MH    | H18    | H1860     | -             | -            | 1.00          | 1.00          | -            | -            |
|           | <b>Total</b>                             |       |        |           | <b>152.67</b> | <b>76.00</b> | <b>47.56</b>  | <b>276.23</b> | <b>0.00</b>  | <b>0.00</b>  |
| JAJARKOT  | Chhedagad Khola-Jajarkot                 | FRN   | F047   | F04704    | 37.00         | -            | -             | 37.00         | -            | -            |
|           | Jajarkot-Tribeni                         | FRN   | F047   | F04705    | -             | -            | 36.00         | 36.00         | 61.00        | -            |
|           | Chaurjahari-Kudu (Midhill)               | MH    | H18    | H1848     | -             | -            | 2.00          | 2.00          | -            | -            |
|           | Kudu(District Border)-Thalah (Midhill)   | MH    | H18    | H1849     | -             | -            | 53.00         | 53.00         | -            | -            |
|           | Thalaha-Badaban (Midhill)                | MH    | H18    | H1850     | -             | -            | 6.00          | 6.00          | -            | -            |
|           | Badaban-Suyada (Midhill)                 | MH    | H18    | H1851     | -             | 13.00        | 11.00         | 24.00         | -            | -            |
|           | <b>Total</b>                             |       |        |           | <b>37.00</b>  | <b>13.00</b> | <b>108.00</b> | <b>158.00</b> | <b>61.00</b> | <b>0.00</b>  |

| Districts          | Name of Road                                     | Class | Ref No | Link Code     | BT            | GR            | ER              | Total         | UC            | PL           |
|--------------------|--|-------|--------|---------------|---------------|---------------|-----------------|---------------|---------------|--------------|
| RUKUM WEST         | Chaurjahari - Bas khola                          | FRN   | F193   | F19301        | -             | -             | 2.00            | 2.00          | -             | -            |
|                    | Khaula Pass-Salyan district border-Musikot       | NH    | H11    | H1108         | 31.40         | -             | -               | 31.40         | -             | -            |
|                    | Syalpakha - Musikot (Midhill)                    | MH    | H18    | H1846B        | -             | 16.00         | -               | 16.00         | -             | -            |
|                    | Musikot-Chaurjahari (Midhill)                    | MH    | H18    | H1847         | -             | 45.00         | -               | 45.00         | -             | -            |
|                    | <b>Total</b>                                     |       |        |               | <b>31.40</b>  | <b>61.00</b>  | <b>2.00</b>     | <b>94.40</b>  | <b>0.00</b>   | <b>0.00</b>  |
| SALYAN             | Choroadanda-Dang district border-Junction Salyan | NH    | H11    | H1105         | 37.16         | -             | -               | 37.16         | -             | -            |
|                    | Junction Salyan road Sitalpati-Patalechaur       | NH    | H11    | H1106         | 46.66         | -             | -               | 46.66         | -             | -            |
|                    | Patalechaur-Khaua Pass, Salyan district border   | NH    | H11    | H1107         | 7.84          | -             | -               | 7.84          | -             | -            |
|                    | Raikaar-Devasthal                                | FRN   | F047   | F04702        | 14.00         | -             | -               | 14.00         | -             | -            |
|                    | Sitalpati (Rapti Rajmarga)-Salyan                | FRN   | F140   | F14001        | 9.00          | -             | -               | 9.00          | -             | -            |
|                    | Bijeneta-Kalche                                  | FRN   | F141   | F14102        | -             | -             | 21.00           | 21.00         | -             | -            |
|                    | Bas khola – Devisthal                            | FRN   | F193   | F19302        | 2.00          | 4.00          | 34.00           | 40.00         | -             | -            |
|                    | <b>Total</b>                                     |       |        |               | <b>116.66</b> | <b>4.00</b>   | <b>55.00</b>    | <b>175.66</b> | <b>0.00</b>   | <b>0.00</b>  |
| SURKHET            | Harre-Chhinchu                                   | NH    | H12    | H1207         | 11.75         | -             | -               | 11.75         | -             | -            |
|                    | Chhinchu-Neware Khola                            | NH    | H12    | H1208         | 25.40         | -             | -               | 25.40         | -             | -            |
|                    | Newari Khola-Bangesimal                          | NH    | H12    | H1209         | 6.99          | -             | -               | 6.99          | -             | -            |
|                    | Bangesimal-Baddichaur-Upallo Syaule              | NH    | H13    | H1301         | 46.00         | -             | -               | 46.00         | -             | -            |
|                    | Chinchu-Raikaar                                  | FRN   | F047   | F04701        | 31.00         | -             | -               | 31.00         | -             | -            |
|                    | Devasthal-Chedaghad Khola                        | FRN   | F047   | F04703        | 25.00         | -             | -               | 25.00         | -             | -            |
|                    | Surkhet-Dailekh district border                  | FRN   | F048   | F04801        | 22.00         | -             | -               | 22.00         | -             | -            |
|                    | Kalche-Botechaur                                 | FRN   | F141   | F14103        | -             | 3.00          | 18.00           | 21.00         | -             | -            |
|                    | Baddichour-Gutu                                  | FRN   | F170   | F17001        | -             | 14.00         | 16.00           | 30.00         | -             | -            |
|                    | Telpani-Bangesimal(Surkhet)                      | FRN   | F171   | F17102        | -             | -             | -               | -             | -             | 31.00        |
|                    | Shivanagar-Gumi-Patihalnachaur                   | FRN   | F183   | F18301        | -             | -             | 45.00           | 45.00         | -             | -            |
|                    | <b>Total</b>                                     |       |        |               | <b>168.14</b> | <b>17.00</b>  | <b>79.00</b>    | <b>264.14</b> | <b>0.00</b>   | <b>31.00</b> |
| <b>Grand Total</b> |  |       |        | <b>601.77</b> | <b>176.00</b> | <b>565.66</b> | <b>1,343.43</b> | <b>117.00</b> | <b>206.00</b> |              |

Source: Government of Nepal, Department of Road

**Annex 4: List of persons consulted**

| S.N | Name & Designation of Person   | Organization/Address   | Contract no. |
|-----|--|--|--------------|
| 1   | Mr, Dhan B. Dangi  | Lek Besi Cooperative, Jufal Dangibada, Dolpa                           |              |
| 2   | Mr. Bhim B. Dharala  | Agriculture Development Office, Dolpa                                  |              |
| 3   | Mr. Sharad Lama, Officer   | Veterinary Hospital and Livestock Service Office, Dolpa                |              |
| 4   | Mr. Lalmani Buda, Chairperson  | DCCI, Dolpa  | 9851112816   |
| 5   | Mr. D.B., Dangi, Chairperson   | Lek Besi Cooperative, Thulibheri Municipality-8                        |              |
| 6   | Mr. Prakash Marasani, Officer  | Agriculture Development Office, West Rukum                             |              |
| 7   | Mr. Yagya Bahadur Khadka, Agriculture Technician   | Musikot Municipality, Agriculture Section                              | 9844970279   |
| 8   | Mr. Gyan Kumar Sharma, Officer   | Veterinary Hospital and Livestock Service Office, West Rukum           | 9857820607   |
| 9   | Mr. Pahal Bahadur Khadka, Coordinator  | DCCI, Rukum  | 9844915245   |
| 10  | Mr . Bindu Hamal, Horticulture Development Officer   | Agriculture Development Office, Salyan                                 | 9822801033   |
| 11  | Mr. Bir Bahadur Chalaune, Chairperson  | DCCI, Salyan   | 9857844440   |
| 12  | Mr. Prakash Rawat  | Apple Firm, Simikot, Humla   |              |
| 13  | Mr. Dan Raut   | Simikot, Humla   |              |
| 14  | Mr. Birendra Budhathapa  | Agriculture Development Office, Humla                                  |              |
| 15  | Mr. Namgyal Tamang, Chairperson  | DCCI, Humla  | 9848260269   |
| 16  | Mrs. Lamu Lama, Chairperson  | Buddha Cooperative, Simikot, Humla                                     |              |
| 17  | Mr. Shiva Bikram Hamal (DCCI VC), Mr. Mukunda Prasad Sharma ( DCCI Member), Mr. Ishwori Khatri ( DCCI Member), Mr. Mohan Khadka (DCCI Member, Treasurer), Mr. Ganesh B.K, DCCI Member, Mr. Durga Bahadur Shrestha , DCCI Member, | DCCI, Jajarkot   |              |
| 18  | Mrs. Kamal Budha,  | Local Trader, Jajarkot   |              |
| 19  | Mr. Keshar Raskoti   | Surkhet, wholesale and retail Market                                   |              |
| 20  | Mr. Dhamendra Nepali, Anjal Fruit Centre<br>Mr. Lal Prasad Bhandari  | Dang Agri Market,  |              |
| 21  | Mr. Top Bahadur Nepali, JT   | DADO Jajarkot  |              |
| 22  | Mr. Rana   | Veterinary Hospital and Livestock Development Service Office, Jajarkot |              |
| 23  | Mr. Chhabila Bhattarai, Market Manager ,<br>Mr. Ganesh Sapkota, Mr. Ganga Ram Bhat,<br>Mr. Gandhi Kandel, Mr. D. B. Rawat, Mr. Bal Bd. Basnet, Mr.Jadish Gupta   | Banke, Kohalpur Agri-Market  |              |
| 24  | Agri Wholesale Market, Attariya  |  |              |
| 25  | Mr. Pachanda Khadka , Chief  | Veterinary Hospital and Livestock Development Service Office, Kalikot  | 9858322523   |
| 26  | Mr. Nawaraj Bhandari, Chief  | PMAMP Apple Super zone, Jumla  |              |
| 27  | Mr. Govind Mahat, Chief  | Veterinary Hospital and Livestock Development Service Office, Jumla    | 9858023558   |
| 28  | Mr. Bhim bdr Bista, Planning officer   | Veterinary Hospital and Livestock Development Service Office, Dailekh  |              |
| 29  | Mr. Prakash Thapa  | Jwala Agrovet, Dailekh   |              |
| 30  | Mr. Bhakti Ram Sharma, Horticulture Development Officer,   | Province Agriculture Development Directorate , Surkhet                 | 9848051392   |
| 31  | Mr. Ganesh Kumar Karki, Executive Officer, 9858024858, Mr. Prakash Timilsina, Fruit  | DCCI, Surkhet  |              |

|    |  |   |            |
|----|--|---|------------|
|    | market committee, Chairman, Mob. 9858052515, Mr. Tika Oli, Proprietor Tika oli store and suppliers, Surkhet<br>Mr. Basu Dev Sharma, Proprietor, Durgabhawani Enterprise & Ex- DCCI Vice-Chairperson, Mob. 9858050297 |   |            |
| 32 | Mr. Bharat Basnet, Chief, Mob. 98 58051995 & Mrs. Sabitri Ghimire, Horticulture Officer  | Agriculture Development Office, Kalikot       |            |
| 33 | Mr. Binod B Shahi, Dekhali Agriculture firm, Mob. 9847636862 & Lok Jung Shahi, Laxmi Agriculture Firm, Mob. 9848307108 (Worked as "Agriculture Technician" in partner NGO of HVAP –RDN Kalikot)                      | Local Entrepreneur, Manma Bazar, Kalikot      |            |
| 34 | Person Met: Mr. Balak Ram Devkota, Chief   | Agriculture Development Office, Jumla         | 087-520027 |
| 35 | Mr. Ram Bahadur Thapa, Agriculture Officer,  | Agriculture Development Office, Dailekh       | 9846363080 |
| 36 | Mr. Kul B BK, Chairperson,   | DCCI, Dailekh                                 | 9858050621 |
| 37 | Mr. Janak Malla, Proprietor,   | Jwala Masala Udhyog, Dailekh                  | 9867755566 |
| 38 | Mr. Khagendra Prasad Regmi, Proprietor,  | Regmi Tarkari tatha Falful Byabsaya , Dailekh | 9844806835 |