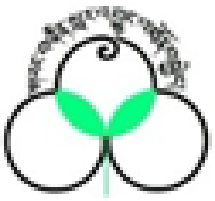

DEPARTMENT OF AGRICULTURE MARKETING AND COOPERATIVES
MINISTRY OF AGRICULTURE AND FORESTS
ROYAL GOVERNMENT OF BHUTAN
THIMPHU : BHUTAN

BUCKWHEAT VALUE CHAIN ANALYSIS

Submitted by:

Bhutan Consulting Associates
Thimphu
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Cover Pictures:

Buckwheat cultivated area (fields) from Bumthang Dzongkhag.

ACRONYMS, GLOSSARY AND ABBREVIATIONS

Acronyms

AMC	Agriculture Machinery Centre
ARDCs	Agriculture Research and Development Centres
BAFRA	Bhutan Food Agriculture and Regulatory Authority
BAIL	Bhutan Agro Industries Limited
BCA	Bhutan Consulting Associates
BCCI	Bhutan Chamber of Commerce and Industry
BDBL	Bhutan Development Bank Limited
CA	Competent Authority
CSMI	Cottage, Small and Medium Industry
DAMC	Department of Agriculture Marketing and Cooperatives
DANIDA	Danish International Development Agency
DoA	Department of Agriculture
DoL	Department of Livestock
DoRC	Department of Revenue and Customs
FCBL	Food Corporation of Bhutan Limited
FTA	Free Trade Agreement
GMOs	Genetically Modified Organisms
ITC	International Trade Centre
LMOs	Living Modified Organisms
MoAF	Ministry of Agriculture and Forests
MoF	Ministry of Finance
NPHC	National Post Harvest Centre
NPPC	National Plant Protection Centre
NSC	National Seed Centre
RAMCO	Regional Agriculture Marketing and Cooperative Office
RDTC	Rural Development Training Centre
REDCL	Rural Enterprise Development Corporation Limited
RGoB	Royal Government of Bhutan
RNR	Renewable Natural Resources
ToR	Terms of Reference

Glossary

Ara / Bangchang: Local beverages

Chiwog	A cluster of Villages
Choydam	Hhard dough
Drango	Flour paste)
Dzongkhag	District
Gewog	A block in a district (consisting of several villages)
Hentey	Dumplings
Keptang	Unleavened circular bread
Khuli	Cooked soft Roti type
Kontong	Cooked small balls
La zey	Flour baked with distilled alcohol
Puda	Noodles
Teyzey	Pancake
Tshangjay	Flour paste with fermented wine

Abbreviations

HHs	Households
Kgs.	Kilograms
MT	Metric Ton
Nu.	Ngultrum (Bhutanese currency)

EXECUTIVE SUMMARY

Introduction

Bhutan, a small Himalayan country with a total area of 38,394 KM^2 is located between the subtropical Indian plain in south and Tibetan plateau in the north. It has a total population of 681,720 persons (341,881 males: 339,839 females)[1]. Sweet buckwheat *(Fagopyrum esculentum)* and Bitter buckwheat *(F. tataricum)* are sub-subsistence crop particularly grown in non-rice growing area and other highland where people have limited access to growing other cereals due to diverse agro-climate of the country. In Bhutan, buckwheat is mainly grown for grains, used for making flour. The Department of Agriculture Marketing and Cooperatives with fund from Food Security and Agriculture Productivity Project (funded by World Bank) outsourced Buckwheat value chain study to Bhutan Consulting Associates in August 2019, focussed on production and marketing so as to improve and explore opportunities across value chain actors. The main objective of this assignment is *to conduct thorough analysis of the buckwheat value chain to further strengthen the production and marketing of buckwheat and its value added products through identification of constraints and new opportunities*.

To undertake buckwheat value chain study in accordance to the objectives, five different stepwise phases of study was undertaken as follows: 1) Desk work and design of Survey (including tools); 2) Planning Phase; 3) Field Research (Survey and Consultations) in September 2019; 4) Data analysis & Report writing; 5) Submission and finalisation of Report.

As list of households growing Buckwheat was not available, a purposive sampling was used targeting three Gewogs each from four selected Dzongkhags, wherein 383 producers (68.9% females: 31.1% male respondents) were interviewed as against initial target of 360 numbers. In addition, focus group discussion were undertaken, 29 retailers interviewed, 3 processors and one exporter were also interviewed.

Value Chain Functions and Actors

The ***functions*** across Buckwheat value chain in Bhutan are input supply, production, harvesting, processing, retailing and exporting. The actors are input supplier (farmers themselves), the producers (farmers), the processors (including the producers themselves), the retailers, exporters and the end consumers. As the ***input supplier***, farmers themselves retain seeds and the crop is cultivated traditionally i.e. farmers using their own locally available seeds, using farm yard manure and human labour. Bitter buckwheat is sowed in the month of April-May and harvested in the month of July - August. Sweet Buckwheat is sowed in June-July and harvested in the month of October-November. Land preparation for both Sweet and Bitter Buckwheat is either done manually with oxen or by power tiller / tractor depending upon the landscape. Looking at the ***varieties of Buckwheat cultivated*** by the producers, 44.9% HHs cultivates both Bitter and Sweet Buckwheat; another 22.2% cultivate only Bitter Buckwheat and 32.9% cultivate Sweet Buckwheat. With regards to agricultural assets owned by the Buckwheat producing households, as high as 42.1% HHs indicated not owning any of the main agricultural equipment / machineries. Majority (90.3%) have mud and stone wall houses with CGI roof.

Considering the ***potential producers*** in country, the agriculture statistics (2017) reflects that except for farmer-producers from Samtse Dzongkhag, all other 19 Dzongkhags have Buckwheat producers. Amongst the 19 Dzongkhags that produces Buckwheat, higher quantities are produced by farmers from Bumthang, Trongsa, Chhukha, Haa, Samdrupjongkhag, Zhemgang and Dagana Dzongkhags. The total ***production*** was 3480 MT with average yield of 598 Kg/acre in the year 2017.

Both ***male and female*** equally take part in the buckwheat farming. While ploughing is led by males, land preparation, sowing, harvesting, thrashing is done by both males and females. It is mostly males in grinding using water mills and for stone grinder, it is mostly females. As high as 44.4% households (HHs) engage two persons regularly in agriculture; as high as 44.9% HHs engage ***two persons regularly*** during season in Buckwheat farming; majority of the households (59.5%) engage one woman regularly for Buckwheat farming; and as high as 88.5% HHs does not have youths (15 to 24 years) in Buckwheat farming.

The ***trends*** in harvested area of Buckwheat for the last eight years showed a sharp increase in the year 2011 from 2010; then gradual decrease till the year 2014; again gradual increase till the year

[1] Population and Housing Census of Bhutan, National Statistics Bureau, Royal Government of Bhutan (2017)

2016 and decrease in the year 2017 The production trend is also in the similar manner as that of harvested area[2].

There are no differences in ***harvesting techniques*** between sweet and bitter buckwheat. Bitter buckwheat takes only one day for drying before threshing whereas sweet buckwheat takes 2-3 days for drying. As for the threshing, sweet buckwheat is more labour intensive as compared to bitter buckwheat. Harvesting is mostly done by women members whereas threshing is done by the males. Grains are dried for 1-2 days prior to threshing. After threshing, stones particles and other unnecessary particles like leaves and stems are segregated manually. After that the grains are stored in wooden box, drums and gunny bags. After harvesting and threshing, bitter buckwheat plant is used for making cattle's beds which is later used as manure. On other hand, sweet buckwheat hay is fed to cattle after threshing. Similarly, the hull from the grounded flour is also used as feed for the cattle. Pest and insects infestation rate are very minimum. Water mill and wherever available the ***grinding*** mills and also the traditional stone grinder is used for making flour from both types of Buckwheat. Segregation of husk is done using traditional sieving bamboo tray. The husk is used to make pillows.

As ***products made and consumed***, from Buckwheat Choydam (hard dough), Puda (noodles), Kontong (cooked small balls), Teyzey (pancake), Khuli (cooked soft Roti type), Keptang (unleavened circular bread) and La zey (flour baked with distilled alcohol); Drango (flour paste); Tshangjay (flour paste with fermented wine); and Hentey (dumplings) are the items that are usually prepared from Buckwheat. Interviewed HHs mostly indicated having made Khuli, Puda, Keptang, Drango, Tshangjay, Hentey and Ara / Bangchang (local beverages).

In the entire surveyed Gewogs, ***no middlemen or whole sellers*** that collect Buckwheat flour or any other products and further markets to ***retailers*** were reported. There were no retail shops in Haa town dealing with any of the buckwheat produce. As the survey area had very less numbers of retailers, some were interviewed from Thimphu as well. From a total of 29 retailers interviewed that deal in selling flour, 20.7% were males and 79.3% were females. Majority of retailers (86.2%) engaged one woman for buckwheat flour business; and 69.7% retailers have not engaged any youths.

As ***processors***, in the survey area including Thimphu, there were only three processors. One is the Soenam Chithuen Rangshing Tshogpa from Chamkhar, Bumthang (registered farmers group) that makes cakes, donuts, cookies, and flour from Bitter Buckwheat; and only flour from Sweet Buckwheat. The markets for products from processor in Bumthang are mainly Thimphu retail shops. Another processor is Sonam Dema Processing unit at Lhayulkha, Haa town that makes Khuli and liquor from Bitter Buckwheat; and Khuli and Hentey from Sweet Buckwheat. This processing unit markets produce in hotels and restaurants in Haa. The third processor unit is Chuniding Food in Thimphu town, which makes flour and noodles from Bitter Buckwheat and only flour from Sweet Buckwheat. Apart from above processors, most of the tourist based hotels reported serving Khuli (pancake), Puda and soup to their guests. Langpa Nobgang Sanam Detshen (registered farmer group) in Samar Gewog, Haa was established in the year of 2017-2018, comprising of 8 males and 12 females. The group members are losing their interest on buckwheat farming owing to lack of market as Haa is located slightly at distance from Thimphu which has good population of end consumers.

In agriculture statistics, there are no data available for Buckwheat sold. The list of ***exporters for Buckwheat*** (grain) for last 8 years was obtained from Department of Revenue and Customs and there were only two exporters. The export scale is extremely small. One exporter (Thongphu Enterprise exported in the year 2011 only. For remaining years till 2016 Tarayana foundation marketed buckwheat grain to Japan. A total of 13284 Kgs of Buckwheat grain was exported in 6 years (2011 to 2016) generating a total amount of Nu. 657331. There were no exports recorded in Bhutan Trade Statistics for the year 2017 and 2018. Looking at the export trends, the volume of Buckwheat exported increased gradually from 2011 to 2016. Bussi-En Bhutan Office in collaboration with Tarayana Foundation reported having exported 20000 Kgs of Sweet Buckwheat Grain last year to Japan. Using support from Regional Agriculture Marketing and Cooperative Office (RAMCO) at Mongar, National Post Harvest Unit at Lingmithang, the Gewog agriculture extension officers, the exporter collects grains directly from the producers from Trashigang and Samdrupjongkhar. To Japan it is transported through shipping from India. Owing to high moisture content, at times the grain starts to sprout. Additionally, the exporter also makes noodles and cookies from flour and are served in restaurant. The husk is used to make pillows.

[2] Agriculture Statistics, Department of Agriculture, MoAF

Value Chain Costs Analysis for Sweet Buckwheat

The cost information collected from field survey includes different factor cost incurred by the farmers which are for land preparations, manuring, mulching, weeding and self-employment cost in terms of time spent and its opportunity cost calculated at nominal local rate of labour availability. The cost of production does not vary significantly as the methods are same all over Bhutan. The ***cost of production*** per kilogram of Sweet Buckwheat is calculated at Nu. 53 per Kg. The cost of labour (71%) followed by seed cost (18%) is significant compared to other overhead costs. The production of sweet buckwheat was used mainly for self-consumption (Khuli, Puda, Keptang and beverages) and partly used as animal feed. ***Buckwheat seeds*** are sold directly to the buyers. The ***whole grains*** are also sold by farmers to local buyers. The seed and whole grains are sold at an average price of 58.53 per kg. From total Sweet Buckwheat production, 10% was used for making beverages; 88% for making flour; 1% for religious purposes and another 1% feed to cattle. About 97% of the sweet buckwheat produced is used for self-consumption and only 3% is processed and sold as flour.

At ***retailer's level***, the sweet buckwheat was bought at an average price of Nu.98 per kg. After incurring other overhead cost and damages, the cost per kg amounts to Nu.110 per kg of sweet buckwheat to the retailers. The main cost for retailers is the labour cost, both hired and self-employment. Out of total buckwheat purchased and sold 71% constitutes sweet variety and 29% of bitter variety. The retailer sold sweet buckwheat at Nu. 129 per Kg fetching the net profit percentage of 14%.

At ***processor level***, the processor purchased at Nu.52 per kg last year. The processor incurred additional cost on labour, transportation and over heads which amounts to Nu. 58 per kg. The processor selling different products such as Khuli, flour and hentey, makes net profit of 19.77%.

At ***exporters level*** there was only one exporter. The exporter purchased grain at the rate of Nu. 55 per kg and exported at the rate of Nu. 140 per Kg, making profit percentage of 36% after deducting all exporting costs.

Value Chain Costs Analysis for Bitter Buckwheat

The ***cost of production*** per kilogram of bitter buckwheat produced by producers is Nu. 51/Kg. The cost of production is dominated by cost of seed (15%) and labour cost (73%) for cultivation, processing and harvest. Bitter Buckwheat is used for ***various purposes***, wherein 77.8% was used to make flour; 19.9% for beverages and 2.3% for religious purpose. The portion of produce sold in the form of seed and whole grain showed that 2.6% is sold as seeds; 7% as whole grain to other buyers; and 90.3% as flour to retailers / processors. The ***producer gets a profit*** of Nu. 3.64 Per Kg of Sweet Buckwheat making a profit percentage of 6.67.

Similar to sweet buckwheat, bitter buckwheat is also purchased, value added and sold by ***retailers***. The other processing cost includes labour cost, self-employment wages, transportation and local conveyance. Labour cost for self-employment cost is the most significant. With value addition, the retailer incurs Nu. 119.72 per Kg and sold at an average price of Nu. 130 per Kg making a profit percentage of 4.1. At ***processor's level***, net profit generated from sales of all varieties of products gives the processor a value addition of 29%. There is only one exporter of Sweet Buckwheat and Bitter buckwheat is not exported.

Common Issues

Buckwheat are cultivated by farmers for their self-consumption and little of surplus are sold in the market. Large scale commercial cultivation is not carried out due to small and fragmented land holding of individual farmers. As ***learning and spell over***, the best practices and better techniques are shared informally within the industry. The knowledge and technique sharing happened informally but have no additional associated cost.

As ***locational advantage***, since buckwheat are grown in different Dzongkhags, transportation form a part of important component cost. Processors of buckwheat are located in Bumthang and Thimphu where growers are spread in different Dzongkhags. There are some locational disadvantages due to which all the value chain actors have to bear additional cost on transportations and storage of their produce, especially for processor at Thimphu as compared to Bumthang. Buckwheat is produced and sold at ***informal market*** and there is no organised system of sales and purchase like auctions. Farmers grow in small quantity and sell directly to local dealers, who then process and sell in the market. Since buckwheat are produced primarily for self-consumption, the volume is not very attractive for large scale linkages across the actors and does not have established ***institutional linkages***.

Looking at the ***sources of cash income*** to the buckwheat producing households, for majority (86.2% HHs), it is from agriculture, followed by livestock for 61.1% HHs; off-farm activities for 27.7% HHs; remittances for 26.1% HHs; and others with smaller percentage of HHs. As high as 28.7% households reported annual income of Nu. 50,0001 to Nu. 100,000 from all sources; followed by income between Nu. 100,001 to Nu. 200,000; and other ranges of income for other percentages of HHs.

The ***trends in Buckwheat cultivation*** over the last five years showed that as high as 48.6% HHs indicated the area under cultivation has been decreasing over the years; 25.6% said it is constant; and 24.8% HHs mentioned it to be increasing. The decreasing area under cultivation was indicated for bitter buckwheat by 21.7% HHs; for sweet buckwheat by 29.5% HHs and for both variety by 47.8% HHs. Looking at the ***reasons for decreasing area under cultivation***, it was mentioned to be wild animals destroying crops by 39.4% HHs; manpower shortage for 26.9% households; changing food habit as staple food by 17% HHs; changing cropping pattern by 15.1% HHs and other reasons for other smaller percentages of households. Gathered from focus group discussion, the ***demand for Buckwheat*** is increasing over the years as mentioned by producers from Bumthang and Trongsa but producers from Haa and Samdrupjongkhar said it is constant over the years. The retailers mentioned that the demand for Buckwheat flour has been increasing as more people from all walk of life (high grade officials to normal people and hoteliers) buying Buckwheat flour has been increasing over the years. The processor group in Bumthang mentioned that demands are annually increasing. For hoteliers the demand is constant. The tourists do not order for buckwheat products like khuli and puda but the hoteliers keep it in their menu. For example, hoteliers serve khuli in the breakfast and puda in either lunch or dinner.

Enabling Policies, Public and Private Service Providers for Business Environment

Several Acts, Policies and Regulations provide enabling ***business environment*** for Buckwheat producers and vendors in terms of quality production, marketing supports, entrepreneurship establishment, farmers groups and cooperatives formation, food safety and for market linkages. These are: 1) Food and Nutrition Security Policy of the Kingdom of Bhutan (2014); 2) Food Act of Bhutan (2005); 3) Food Rules and Regulations of Bhutan (2017); 4) Renewable Natural Resources Policy; 5) Trade Agreements; 6) Cottage, Small and Medium Industry Policy (2012); 7) The Cooperative (Amended) Act of Bhutan (2009); 8) The National Youth Policy (2011); and 9) The RNR Marketing Policy (2017).

The list of available ***Public and Private Service providers*** with brief mandates are:

1) The Dzongkhags and Gewogs (blocks) agriculture extension officers provide free extension services to the producers.
2) The Department of Agriculture (DoA) with its several division and central programs is core to agriculture development in the country.
3) The Department of Agricultural Marketing and Cooperatives (DAMC) provides supports towards marketing and cooperative development and registration.
4) The National Post Harvest Centre (NPHC) supports appropriate post-harvest techniques and techniques for product diversification.
5) The Bhutan Agriculture and Food Regulatory Authority (BAFRA) facilitate development of agro-based industries, monitor food safety and regulate quarantine amongst others.
6) The National Seed Centre (NSC) produces quality seeds and supports planting materials but is not producing Buckwheat seeds as yet.
7) The Agriculture Research and Development Centres (ARDCs) undertakes research and research know-how on variety production and management, are transmitted to producers (farmers).
8) The Agriculture Machinery Centre (AMC) makes indigenous agricultural tools; and procures and supply other agricultural equipment and machineries.
9) The National Plant Protection Centre (NPPC) generates and disseminates pest management technologies and regulates the use of chemical fertilizers and pesticides.
10) The Rural Development Trainings Centre (RDTC) trains farmers in agriculture production, farm business and community leadership.
11) The Food Corporation of Bhutan Limited (FCBL) facilities the auction for the cash crops and vegetables. The FCBL farm shops in the Gewogs sell agricultural tools and seeds including the retail household edibles.
12) The Bhutan Chamber of Commerce and Industry (BCCI) with alliances with local and foreign business organisations, organizes trade fairs and exhibitions that can link producers, vendors and traders.

13) Bhutan Development Bank Limited (BDBL) provides credits to rural farmers for agriculture and rural development.
14) The Rural Enterprise Development Corporation Limited (REDCL) provides fund for the non-formal rural activities on a low interest rate of 4% per annum and without any collateral requirement.
15) The Bhutan Agro Industries Limited (BAIL) is a fruit and vegetables processing a unit which manufactures canned fruits, vegetables and juice; and pickles in oil but not any Buckwheat products as yet.
16) The B-COOP Shop is a place where local products from cooperatives (includes farmer groups and individual farmers) are displayed and retailed. Presently these B-Coop shops mostly sale dairy products and eggs and also buckwheat flour.
17) The Centenary farmers Market in Thimphu amongst weekend markets is by far the largest domestic market for the farmers in Bhutan.

Several Challenges were mentioned by the producers in Buckwheat farming. Amongst all, crop destruction by wild animals remain significant for 78.5% households; labour shortage for 47.1% HHs; no markets for produce as mentioned by 31.1% HHs; and other problems by smaller percentages of HHs (such as marginal land holdings; pest, diseases and weeds; insufficient seeds amongst others. Retailers has no challenges but processors mentioned insufficient knowledge in product diversification, lack of storage facilities and insufficient value addition know-how.

As an ***opportunity***, from producer's perspectives, ensuring proper markets with linkages between the retailers and processors and also exporters can help enhance the scale of production for the Buckwheat. Need to form farmers groups on Buckwheat production and support on product diversification with exposure to other countries in the region where Buckwheat is cultivated. The processors expressed the need for exposure trips to neighbouring countries to see different products made out of both sweet and bitter buckwheat to take up products diversification by the processors.

Conclusion and Recommendations

- While both varieties of Buckwheat are cultivated by the producers (though Sweet Buckwheat is cultivated by majority of producers from Samdrupjongkhar Dzongkhag), the scale of production is small in the country (3,480 MT in 2017). There has been gradual decrease in production volume as well as the cultivated area over the years. For large scale cultivation of buckwheat, the general recommendation is to support producers with electric fencing, supply of high yield seeds, exposure and training on product diversification, support establishment of organised farmers groups / processing unit and making formal linkages to the end markets (both domestic and exports).
- A large quantity of Buckwheat is mostly consumed by the households by making various products and very less quantity is marketed as 86.7% of the households did not market any Buckwheat last year. For those market, the formal marketing channel does not exist. On the other hand, though only one exporter exists, the export quantity (to Japan) has been increasing over the years. There is a strong need to study marketing bottleneck, market options and make strong linkages with the producers.
- Despite the harvested area and production quantity gradually decreasing over the years, there is increasing demand for the flour from the consumers, especially the hoteliers and even educated health conscious consumers.
- At present, there are only two registered farmers group in Buckwheat (one in Samar Gewog, Haa and another as processor in Chokhor, Bumthang). While significant activity to boost Buckwheat production has not picked up by the farmers group in Haa, owing to lack of formal market linkages, the farmer group in Chokhor as processors are on the other hand a significant supplier of Buckwheat flour to many of the retailers including those in Thimphu. It is suggested to support the organisation or more numbers of farmers groups and processors.
- As the producers lack entrepreneurial skills and business knowledge, there is a need to train farmers and producer groups on business planning and entrepreneurship development, so that they are able to understand market dynamics and develop business perspective. To this, some of the challenges faced by the processors such as manual segregation of stones from grains; lack of proper storage facilities; insufficient knowledge on product diversification and accordingly packaging are issues to be addressed.

1. INTRODUCTION

Buckwheat is a sub-subsistence crop which is indispensable food for the Bhutanese people particularly in non-rice growing area and other highland where people have limited access to growing other cereals due to diverse agro-climate of the country. Sweet buckwheat *(Fagopyrum esculentum)* and bitter buckwheat *(F. tataricum)* are two buckwheat species grown in Bhutan. Buckwheat was considered simply the poor man's food. However, within a few decades buckwheat in the form of pancakes and noodles has acquired the status of restaurant food. In Bhutan, buckwheat is mainly grown for grains. The grains are used in the form of processed products, mainly flour. Buckwheat is a versatile food grain and can be used in several culinary preparations. The most popular buckwheat dishes are *khuli,* a pancake-like preparation, and *puda,* noodle-like preparation. The popularity of these *puda* and *khuli* preparations can be seen even among the staunchest rice eaters. Other forms of traditional recipes include *teyzey, kongtong,* cooked dough, *choydam, keptang, La zey.* About 70 percent of our marginal farmers depend on this crop which has vast potential to be exploited for various purposes such as food, feed, fodder and medicines. The crop possesses an exceptionally high nutrition value and important ingredient of food in form of semi or processed products in the market.

Thus, the need for diversification of the future agriculture and marketing, buckwheat deserves special value chain analysis for improvement and exploration of opportunities within the chain of actors in the system. To conduct the value chain analysis study, the Department of Agricultural Marketing and Cooperatives (DAMC) have appraised Ministry (MoAF) for fund support basically to outsource the technical expertise whereby FSAPP in support of RNR sector, short-term consultancy services for a period of 60 days was outsourced to Bhutan Consulting Associates (BCA) in August 2019 to undertake value chain assessment of buckwheat.

The value chain study on buckwheat will be focused to strengthen the production and market and intend to provide recommendations that will address the existing constraints and identify new opportunities to boost the industry to cater the demand and supply both domestic and exports.

The main objective of this assignment is *to conduct thorough analysis of the buckwheat value chain to further strengthen the production and marketing of buckwheat and its value added products through identification of constraints and new opportunities.*

The specific objectives are as follows:

- Value chain mapping that depicts the chain actors and their functions & inter relationships,
- Identify the challenges and constraints of the existing value chains and provide recommendations and interventions to mitigate them.

2. METHODOLOGY

2.1 Technical Approach

To undertake buckwheat value chain study in accordance to the objectives, five different stepwise phases of study was undertaken as follows:

1. Desk work and design of Survey (including tools)
2. Planning Phase
3. Field Research (Survey and Consultations)
4. Data analysis & Report writing
5. Submission and finalisation of Report

Accordingly, the technical approach applied were a series of stepwise tasks as elaborated below:

1. **Step 1: Desk Review and Design of Survey:** The review of the available secondary data for identifying the data needs for making a comprehensive value chain study (required to be collected during field survey) was undertaken. The following tools were designed:
   - Structured closed ended questionnaire for producers
   - Structured closed ended questionnaire for whole sellers
   - Structured close ended questionnaire for retailers
   - Structured close ended questionnaire for processor
   - Structured closed ended questionnaire for exporters
   - Focus group discussion checklist for producers
   - Discussion checklist for whole sellers
   - Discussion checklist for retailers
   - Discussion checklist for processors
   - Discussion checklist for exporters
   - Discussion checklist for farmers group
2. **Step 2: Planning Phase:** During planning phase, suggestions and comments received from the Department officials were incorporated into the sample framework, the tools (questionnaires) for survey, and field work itineraries. BCA recruited and trained field work team leader and the enumerators.
3. **Step 3: Field Research (Survey)** to collect both qualitative as well quantitative data was undertaken in the month of September 2019 to collect data from all actors: producers, processors, whole sellers, retailers and exporters.
4. **Step 4: Data analysis** was revisiting the transcribed qualitative information to look for significant and concurrent information. The quantitative data gathered through field survey were computed, assimilated and processed using SPSS. The analysis triangulated from various sources including the secondary sources were combined to generate **a comprehensive baseline report**.
5. **Step 5: Submission and finalisation:** The **draft report** was submitted and presentation on the same was made to the stakeholders, to collect further comments to the reports. With incorporation of necessary changes to the reports, this comprehensive report was finalised.

2.2 Sample Framework

Given that the list of households cultivating Buckwheat is not available, a purposive sample was applied to make fair representation. Therefore, three Gewogs each from the four indicated Dzongkhags for survey (as in ToR) where Buckwheat is predominantly cultivated were selected and a purposive sample of 30 producers from each Gewog were targeted. In addition, the survey team interviewed retailers, processors, and exporters. There were no whole sellers that collect products from producers and undertake onward marketing.

3. DESCRIPTION OF BUCKWHEAT

The buckwheat plant is a fast growing, spindly, broad leaf plant with small heart-shaped leaves and hollow stems. The plant produces many small white or pink flowers which, when pollinated, quickly produce seeds. The seeds are triangular in shape and change from light green in colour, to red-brown. The seed consists of a true seed which is surrounded by a thick hull. Buckwheat plants can grow between 40 and 120 cm (15.7-47.2 in) in height and survive for just one growing season. Due to Government policy on

ban of shifting cultivation, Buckwheat area and production levels have decreased. In Bhutan, buckwheat is mainly grown for grains (S. Norbu and W. Roder).

In addition to making of Khuli, Puda and other products as already mention, Buckwheat is also used for making A*ra* (distilled alcohol). A special *ara* called *menchang* or medicinal alcohol distilled from a mixture of sweet and bitter buckwheat is made (Choden, 2001). The Bhutanese people in the south take buckwheat during fasting days in the form of flour and husked kernels. Husked kernels are cooked as rice (Norbu, 1995). The uses of buckwheat vary from region to region. In one region (Tang), cooked sweet buckwheat dough is traditionally served on the twenty first day of death anniversary to all the people who have come to mourn and sympathize with the bereaved family. A roll of buckwheat dough sprinkled over with a spoon of chilli powder is followed by a drink called *roth chang* which literally means the chasing away demon (Choden, 2001). In another region (Chumey), a very special fried buckwheat biscuit called *phob* is commonly prepared and offered at the altar during rituals. According to Norbu, 1995, while the uses of grain are indispensable, other parts of the plant have their share of contribution in the Bhutanese dietary pattern. In fact, no part of the buckwheat plant can be left out. Tender leaves are used as leafy vegetables (Gurung and Roder, 1988). Just before flowering when the buckwheat plants are still tender, the leaves can be collected and cooked in a broth of buckwheat flour and bone marrow seasoned with chilli, garlic and salt, and eaten as a thick soup. Straw is fed to cattle as fresh as well as dried, but mainly used as bedding materials. Bitter buckwheat served the purpose of veterinary medicine. In the past, Bhutanese people used bitter buckwheat for the treatment of livestock cattle suffering from foot and mouth disease (Norbu, 1995).

4. DEMOGRAPHY

While 360 numbers of producers from twelve Gewogs were targeted for the field survey, in actual 383 numbers of producers were interviewed as presented in table 1. A focus group discussion (one each in each Gewog) were also undertaken to collect qualitative data. In addition, 29 numbers of retailers, three processors and one exporter were also interviewed. There were no whole sellers in the surveyed Gewogs and in Dzongkhag towns.

Table 1: Count and Percent of the Respondents distributed by the Gewogs and the Dzongkhags

Gewogs	Count and	Dzongkhags				Total
	%	Haa	Bumthang	Trongsa	S/jongkhar	
Samar	Count	31	0	0	0	31
	% of Total	8.1%	0.0%	0.0%	0.0%	8.1%
Gakiling	Count	26	0	0	0	26
	% of Total	6.8%	0.0%	0.0%	0.0%	6.8%
Sombay	Count	48	0	0	0	48
	% of Total	12.5%	0.0%	0.0%	0.0%	12.5%
Tang	Count	0	30	0	0	30
	% of Total	0.0%	7.8%	0.0%	0.0%	7.8%
Chhoekhor	Count	0	30	0	0	30
	% of Total	0.0%	7.8%	0.0%	0.0%	7.8%
Chume	Count	0	30	0	0	30
	% of Total	0.0%	7.8%	0.0%	0.0%	7.8%
Nubi	Count	0	0	30	0	30
	% of Total	0.0%	0.0%	7.8%	0.0%	7.8%
Dragteng	Count	0	0	31	0	31
	% of Total	0.0%	0.0%	8.1%	0.0%	8.1%

Korphu	Count	0	0	29	0	29
	% of Total	0.0%	0.0%	7.6%	0.0%	7.6%
Serthi	Count	0	0	0	34	34
	% of Total	0.0%	0.0%	0.0%	8.9%	8.9%
Lauri	Count	0	0	0	30	30
	% of Total	0.0%	0.0%	0.0%	7.8%	7.8%
Gomdar	Count	0	0	0	34	34
	% of Total	0.0%	0.0%	0.0%	8.9%	8.9%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Out of 383 producers, 68.9% (264 numbers) were female respondents and 31.1% (119 numbers) were male respondents. For these 383 households, 55.1% (211 numbers) were female headed households and 44.9% (172) were male headed households (table 2). Out of 383 producers, 14.1% (54 households) were single mother headed households (table 3). With regards to agricultural assets owned by the Buckwheat producing households, as high as 42.1% HHs indicated not owning any of the listed agricultural assets as shown in figure 1. Amongst the significant percentage, 17.95 own Power Chain Saw, 15.9% have power tiller and smaller percentage of HHs with other agricultural assets (Figure 1).

Table 2: Gender of the Respondent and Gender of the Household Head

Gender	Gender of the Respondents		Gender of HH Head	
	Frequency	Percent	Frequency	Percent
Male	119	31.1	172	44.9
Female	264	68.9	211	55.1
Total	383	100	383	100

Table 3: Count and Percentage of Single mother headed households by Dzongkhags

	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Yes	Count	15	11	18	10	54
	% of Total	3.9%	2.9%	4.7%	2.6%	14.1%
No	Count	90	79	72	88	329
	% of Total	23.5%	20.6%	18.8%	23.0%	85.9%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

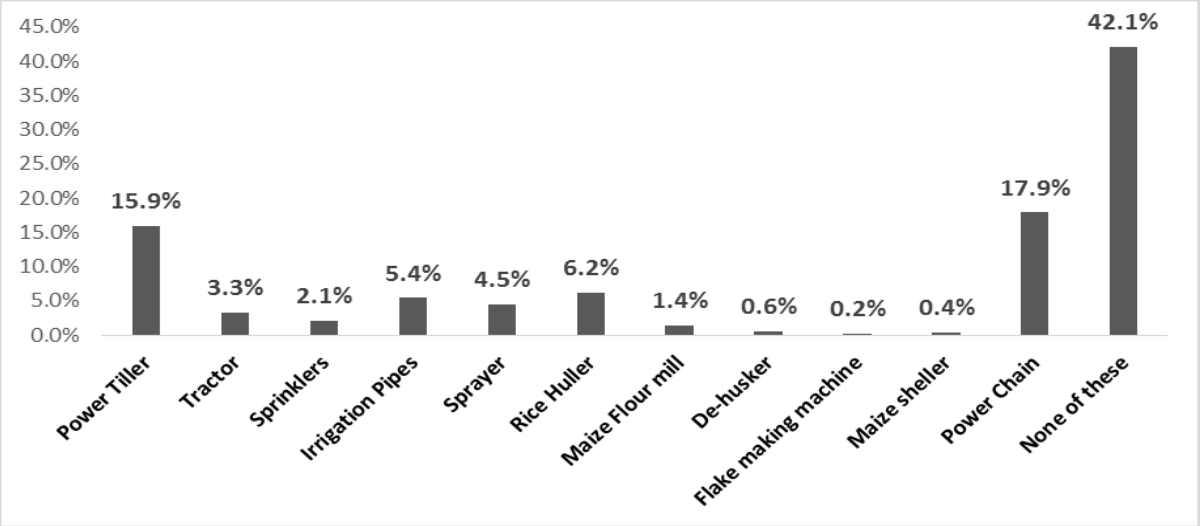

Figure 1: Percentage of Buckwheat Producing Households with Agricultural Assets Owned

The types of houses owned by Buckwheat cultivating households are reflected in figure 2, wherein majority (90.3%) have mud and stone wall houses with CGI roof.

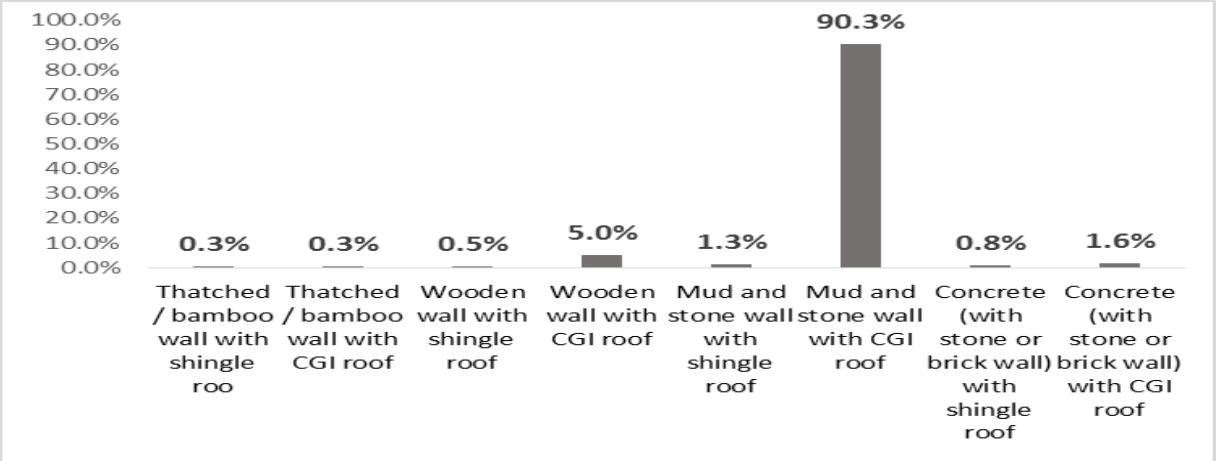

Figure 2: Percentage of Buckwheat Producing Households with types of Houses Owned

5. VALUE CHAIN FUNCTIONS AND ACTORS

The functions across Buckwheat value chain in Bhutan are input supply, production, harvesting, processing, retailing and exporting. The actors are input supplier (farmers themselves), the producers (farmers), the processors (including the producers themselves), the retailers, exporters and the consumers.

5.1 Input Supply and Land Preparation

As the input supplier, farmers themselves retain seeds. Those that do not retain seeds, buy from their peer farmers or neighbours. These crops are cultivated traditionally i.e. farmers using their own locally available seeds, using farm yard manure and human labour. Land preparation for both Sweet and Bitter Buckwheat is either done manually with oxen or by power tiller / tractor depending upon the landscape. However, it is labour intensive for bitter buckwheat and it has to be redone for at least 2-3 times and weeds are collected and burned which act as natural manure for the fields. Bitter buckwheat is sowed in the month of April-May and harvested in the month of July - August. Similarly, for sweet buckwheat, it is sowed in June-July and harvested in the month of October-November. Some also use power tiller for ploughing such as in case of Thangbi Chiwog under Chumey Gewog in Bumthang where hiring charges are Nu. 1500 per day and Tractor at the rate of Nu. 50 per minute. Some households not having own oxen hire it from neighbours at the rate of Nu. 1300 to 1500 per day. In some areas manure is also used. Sweet buckwheat ripens before bitter buckwheat by almost 1-2 weeks. In Nimshong Chiwog, Korphu Gewog double cropping is practiced (once in summer and then in winter) for both sweet and bitter buckwheat. Here, in summer, sweet and bitter buckwheat is sowed in February and harvested in May. In winter it is sowed in August and harvested in December. In Samdrupjongkhar Dzongkhag majority of the households cultivate sweet buckwheat, which is sowed in September and harvested in December.

Analysis from individual interview with the producers showed that as high as 65.8% HHs used oxen for ploughing, followed by 43.9% using spades as well; 28.5% using power tiller and another 5.5% using tractor (table 4 on next page).

Table 4: Types of Technique Used for Ploughing by Households for Buckwheat Farming

Technique	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Oxen ploughing	Count	89	18	84	61	252
	% of Total	23.2%	4.7%	21.9%	15.9%	65.8%
Power Tiller	Count	34	70	4	1	109
	% of Total	8.9%	18.3%	1.0%	0.3%	28.5%
Spades	Count	87	17	10	54	168
	% of Total	22.7%	4.4%	2.6%	14.1%	43.9%
Others (Tractor)	Count	0	21	0	0	21
	% of Total	0.0%	5.5%	0.0%	0.0%	5.5%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Looking at the varieties of Buckwheat cultivated by the producers, 44.9% HHs cultivates both Bitter and Sweet Buckwheat; another 22.2% cultivated only Bitter Buckwheat and 32.9% cultivated Sweet Buckwheat (table 5).

Table 5: Types of Buckwheat Cultivated by the Households

Buckwheat Type	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Sweet Buckwheat	Count	15	8	6	97	126
	% of Total	3.9%	2.1%	1.6%	25.3%	32.9%
Bitter Buckwheat	Count	16	7	62	0	85
	% of Total	4.2%	1.8%	16.2%	0.0%	22.2%
Both Varieties	Count	74	75	22	1	172
	% of Total	19.3%	19.6%	5.7%	0.3%	44.9%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

5.2 Producers and Production

Considering the potential producers in the country, the agriculture statistics (2017) reflects that except for farmer-producers from Samtse Dzongkhag, all other 19 Dzongkhags have Buckwheat producers. Amongst the 19 Dzongkhags that produces Buckwheat, higher quantities are produced by farmers from Bumthang, Trongsa, Chhukha, Haa, Samdrupjongkhag, Zhemgang and Dagana Dzongkhags. The total production was 3480 MT with average yield of 598 Kg/acre in the year 2017 (table 6). It was reported that generally bitter buckwheat production is more than sweet buckwheat over the same cultivated area.

Table 6: Buckwheat Harvested Area, Production and Yield for the year 2017

Sl. No		Dzongkhag	Harvested Area (Acres)	Production (MT)	Yield (Kg/acre)
1		Bumthang	1,160	843	726
2		Chhukha	529	251	475
3		Dagana	310	250	807
4		Haa	423	193	455
5		Lhuentse	10	5	506
6		Mongar	266	73	276
7		Paro	106	50	474
8		Pemagatshel	265	62	233
9		Punakha	99	73	739
10		Samdrupjongkhar	304	465	1527

11		Samtse	216	91	420
12		Sarpang	166	66	396
13		Thimphu	1	0.1	161
14		Trashigang	270	99	366
15		Trashiyangtse	150	79	527
16		Trongsa	671	415	618
17		Tsirang	114	33	291
18		Wangdue	349	207	594
19		Zhemgang	406	225	554
		Total	**5,817**	**3,480**	**598.23**

Source: Agriculture Statistics (2017), Department of Agriculture, MoAF

Both male and female equally take part in the buckwheat farming. While ploughing is led by males, land preparation, sowing, harvesting, thrashing is done by both males and females. It is mostly males in grinding using water mills and for stone grinder, it is mostly females. As high as 44.4% households (HHs) engage two persons regularly in agriculture, followed by three persons for 24.8% HHs; one person for 14.4% HHs; and four persons for 12.8% HHs (table 7). As high as 44.9% engaged two persons regularly during season for Buckwheat farming (table 8).

Table 7: Persons Regularly Involved in Agriculture by the Dzongkhags

Persons Involved	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
One person	Count	19	3	8	25	55
	% of Total	5.0%	0.8%	2.1%	6.5%	14.4%
Two persons	Count	64	34	32	40	170
	% of Total	16.7%	8.9%	8.4%	10.4%	44.4%
Three persons	Count	16	30	27	22	95
	% of Total	4.2%	7.8%	7.0%	5.7%	24.8%
Four persons	Count	5	16	17	11	49
	% of Total	1.3%	4.2%	4.4%	2.9%	12.8%
Five persons	Count	1	4	3	0	8
	% of Total	0.3%	1.0%	0.8%	0.0%	2.1%
> five persons	Count	0	3	3	0	6
	% of Total	0.0%	0.8%	0.8%	0.0%	1.6%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Table 8: Persons Regularly Involved in Agriculture by the Dzongkhags

Persons Involved	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
One person	Count	19	4	9	30	62
	% of Total	5.0%	1.0%	2.3%	7.8%	16.2%
Two persons	Count	63	34	35	40	172
	% of Total	16.4%	8.9%	9.1%	10.4%	44.9%
Three persons	Count	17	31	26	19	93
	% of Total	4.4%	8.1%	6.8%	5.0%	24.3%
Four persons	Count	5	16	16	9	46
	% of Total	1.3%	4.2%	4.2%	2.3%	12.0%
Five persons	Count	1	3	2	0	6
	% of Total	0.3%	0.8%	0.5%	0.0%	1.6%
> five persons	Count	0	2	2	0	4
	% of Total	0.0%	0.5%	0.5%	0.0%	1.0%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Similarly, majority of the households (59.5%) engage one woman regularly for Buckwheat farming; followed by 32.4% HHs engage two persons and very few HHs with higher numbers of women in buckwheat farming (table 9).

Table 9: Women regularly involved in Buckwheat Farming by the Dzongkhags

Women Involved	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
One person	Count	75	43	43	67	228
	% of Total	19.6%	11.2%	11.2%	17.5%	59.5%
Two persons	Count	23	42	33	26	124
	% of Total	6.0%	11.0%	8.6%	6.8%	32.4%
Three persons	Count	2	5	12	2	21
	% of Total	0.5%	1.3%	3.1%	0.5%	5.5%
Four persons	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	0.3%	0.3%
None	Count	5	0	2	2	9
	% of Total	1.3%	0.0%	0.5%	0.5%	2.3%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Looking at youths involved in Buckwheat farming, as high as 88.5% HHs does not have youths (15 to 24 years) in Buckwheat farming, and only 8.4% HHs engage one youth and 3.1% HHs engage two youths in Buckwheat farming (table 10).

Table 10: Youths Regularly Involved in Buckwheat Farming

Youths Involved	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
One person	Count	11	9	5	7	32
	% of Total	2.9%	2.3%	1.3%	1.8%	8.4%
Two persons	Count	7	1	3	1	12
	% of Total	1.8%	0.3%	0.8%	0.3%	3.1%
None	Count	87	80	82	90	339
	% of Total	22.7%	20.9%	21.4%	23.5%	88.5%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

The trends in harvested area of Buckwheat for the last eight years shows a sharp increase in the year 2011 from 2010; then gradual decrease till the year 2014; again gradual increase till year 2016 and decrease in the year 2017 as shown in figure 3. The production trend is also in the similar manner as that of harvested area.

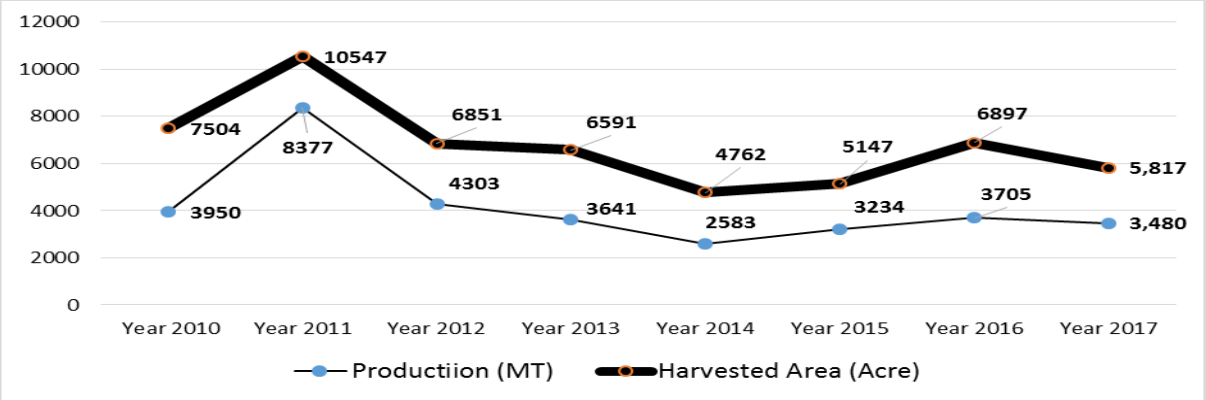

Figure 3: Trends in Harvested Area (Acres) and Production Volume (Metric Tons) for Buckwheat in Bhutan. *Source: Agriculture Statistics, Department of Agriculture, MoAF*

5.3 Harvesting and Processing

There are no differences in harvesting techniques between sweet and bitter buckwheat. Bitter buckwheat takes only one day for drying before threshing whereas sweet buckwheat takes 2-3 days for drying. As for the threshing, sweet buckwheat is more labour intensive as compared to bitter buckwheat. Harvesting is mostly done by women members whereas threshing is done by the male. Grains are dried for 1-2 days prior to threshing. After threshing, stones particles and other unnecessary particles like leaves and stems are segregated manually. After that the grains are stored in wooden box, drums and gunny bags. After harvesting and threshing, bitter buckwheat plant is used for making cattle's beds which is later used as manure. On other hand, sweet buckwheat hay is fed to cattle after threshing. Similarly, the hull from the grounded flour is also used as feed for the cattle. Pest and insects infestation rate are very minimum. Water mill and wherever available the grinding mills and also the traditional stone grinder are used for making flour from both types of Buckwheat. Segregation of husk is done using traditional sieving bamboo tray. The husk is used to make pillows.

From Buckwheat Choydam, Puda, Kontong, Teyzey, Khuli, Keptang and La zey are the items that are usually prepared after processing as explained below (S. Norbu and Walter Roder).

Choydam: Buckwheat flour is mixed with some fermented grains and cold water and made into a hard dough. Traditionally, the dough is kneaded in a leather pouch. The pouches are passed around and each person knead a lump of dough and take a piece of it. Basketful of *rna* (a strong tasting and pungent smelling plant of the onion family) and radish leaves are eaten fresh. Chili sauce seasoned with *dozey* (a strong well aged cheese), Szechwan pepper and salt are served.

Puda: Dough is kneaded and pressed in a noodle pressing tool. The noodles are put into a boiling water and cooked until they float on the surface. They are then immersed in a bowl of cold water with the help of strainer and then rinsed. After the dough has been made into noodles, they are mixed thoroughly with a mixture made from heated mustard oil, partially crushed garlic and red chilli, and salt. Beaten fried eggs and cut into small pieces and tossed in with noodles and finally garnished with a handful of finely chopped fresh onion leaves. The noodles are then ladled out into the individual bowls and served. Either *singchang* (an alcoholic drink extracted from the fermenting grains) or butter milk is served with this preparation. Sometimes butter milk is poured over the entire preparation so that noodles are in a sauce of butter milk. The flat type of same products is called Jangbali, which also have a mix of maida flour.

Kontong: After dough is kneaded, small balls are made and depressions are made by pressing with fingers in such a way that it becomes triangular in shape. They are put in a boiling water and cooked for some time until they become firm. Traditionally, *Kontongs* are prepared and served along with other edible items during religious festivals, especially in the eastern Bhutan.

Teyzey: After dough is kneaded, circular thick pancakes are prepared and roasted either on a frying pan or directly on fire. They are served with *Azey* (pounded mixture of chilli, garlic)

Khuli: After adding water into flour a batter is made. The batter is then poured onto the griddle toasted with butter. Batter for *khuli* is usually prepared at least an hour in advance mainly to give the pancakes a spongy consistence.

Cooked dough: After the cooked dough has become hard, it is eaten with a lump of butter placed in hole in the lump of hot dough. Pieces of dough are also broken off and dipped in the melting butter and eaten.

Keptang: It is made either with plain water or mixed with fermented grains. The addition of fermented grains to flour enhances its taste. *Keptang* is literally an unleavened circular bread.

La zey: The flour is mixed with ara (distilled alcohol) and sugar and baked in the hot ash in the hearth. It is similar to keptang but is smaller in size. *La zey* is traditionally food for the mountain passes.

Phob: A palpable dough is prepared and then hand rolled into endless lengths of noodles.
Drango is flour paste in water, ready to eat.
Tshangjay is flour paste with fermented wine and ready to eat.

The analysis from individual interview with producers showed that 95.2% HHs makes Khuli from Bitter Buckwheat flour; followed by 61.2% HHs with Puda; 53.6% makes Keptang; 39.6% makes Ara / Bangchang and another 15.2% makes other products such as Drangro, Tshangjay and Hentey (table 11).

Table 11: Types of Buckwheat Produce made and Consumed by the Households from Bitter Buckwheat

Products	Count and %	Dzongkhags			Total
		Haa	Bumthang	Trongsa	
Khuli	Count	91	82	65	238
	% of Total	36.4%	32.8%	26.0%	95.2%
Puda	Count	15	81	57	153
	% of Total	6.0%	32.4%	22.8%	61.2%
Keptang	Count	4	76	54	134
	% of Total	1.6%	30.4%	21.6%	53.6%
Ara / Bangchang	Count	42	24	33	99
	% of Total	16.8%	9.6%	13.2%	39.6%
Others	Count	6	9	23	38
	% of Total	2.4%	3.6%	9.2%	15.2%
Total	Count	92	82	76	250
	% of Total	36.8%	32.8%	30.4%	100.0%

Similarly, a higher percentage amongst all (73.2%) makes Puda from Sweet Buckwheat; followed by 70.7% that makes Keptang; and others as reflected in table 12.

Table 12: Types of Buckwheat Produce made and Consumed by the Households from Sweet Buckwheat

Products	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Khuli	Count	70	78	14	4	166
	% of Total	25.4%	28.3%	5.1%	1.4%	60.1%
Puda	Count	29	76	16	81	202
	% of Total	10.5%	27.5%	5.8%	29.3%	73.2%
Keptang	Count	12	69	16	98	195
	% of Total	4.3%	25.0%	5.8%	35.5%	70.7%
Ara / Bangchang	Count	8	19	9	15	51
	% of Total	2.9%	6.9%	3.3%	5.4%	18.5%
Others	Count	75	5	5	3	88
	% of Total	27.2%	1.8%	1.8%	1.1%	31.9%
Total	Count	78	78	22	98	276
	% of Total	28.3%	28.3%	8.0%	35.5%	100.0%

5.4 Wholesalers and retailers

In entire survey Gewogs, no middlemen or whole sellers that collect Buckwheat flour or any other products and further markets to retailers were reported. There were no retail shops in Haa town dealing with any of the buckwheat produce. As the survey area had

very less numbers of retailers, some additional were interviewed from Thimphu as well. From a total of 29 retailers interviewed that deal in selling flour, 20.7% were males and 79.3% were females (table 13).

Table 13: Retailers of Buckwheat Flour distributed by the Gender

Gender	Count and %	Dzongkhag				Total
		Bumthang	Trongsa	S/jongkhar	Thimphu	
Male	Count	3	0	1	2	6
	% of Total	10.3%	0.0%	3.4%	6.9%	20.7%
Female	Count	10	1	4	8	23
	% of Total	34.5%	3.4%	13.8%	27.6%	79.3%
Total	Count	13	1	5	10	29
	% of Total	44.8%	3.4%	17.2%	34.5%	100.0%

Looking at the numbers of persons regularly engaged in retail business, for majority it was only one person (58.6%); two persons (37.9%) and four persons for 3.4% retailers (table 14).

Table 14: Number of Persons regularly engaged in Buckwheat retail Business

Persons	Count and %	Dzongkhag				Total
		Bumthang	Trongsa	S/jongkhar	Thimphu	
One person	Count	4	1	4	8	17
	% of Total	13.8%	3.4%	13.8%	27.6%	58.6%
Two persons	Count	9	0	1	1	11
	% of Total	31.0%	0.0%	3.4%	3.4%	37.9%
Four persons	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	3.4%	3.4%
Total	Count	13	1	5	10	29
	% of Total	44.8%	3.4%	17.2%	34.5%	100.0%

In another analysis to look at numbers of women regularly involved in buckwheat retail business, it was one woman for 86.2% retailers; followed by two persons for 10.3%; and none for 3.4% retailers (table 15).

Table 15: Number of Women regularly engaged in Buckwheat retail Business

Women	Count and %	Dzongkhag				Total
		Bumthang	Trongsa	S/jongkhar	Thimphu	
One person	Count	11	1	5	8	25
	% of Total	37.9%	3.4%	17.2%	27.6%	86.2%
Two persons	Count	2	0	0	1	3
	% of Total	6.9%	0.0%	0.0%	3.4%	10.3%
None	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	3.4%	3.4%
Total	Count	13	1	5	10	29
	% of Total	44.8%	3.4%	17.2%	34.5%	100.0%

Similarly, majority of the retailers (69.7%) does not have youths (between 15 to 25 years of age) in retail business and few have one or two youths as reflected in table 16 on next page.

Table 16: Number of Youths regularly engaged in Buckwheat retail Business

Youth	Count and %	Dzongkhag				Total
		Bumthang	Trongsa	S/jongkhar	Thimphu	
One person	Count	1	0	0	1	2
	% of Total	3.4%	0.0%	0.0%	3.4%	6.9%
Two persons	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	3.4%	3.4%
None	Count	12	1	5	8	26
	% of Total	41.4%	3.4%	17.2%	27.6%	89.7%
Total	Count	13	1	5	10	29
	% of Total	44.8%	3.4%	17.2%	34.5%	100.0%

5.5 Processors

In the survey area including Thimphu, there were only three processors. One is the Soenam Chithuen Rangshing Tshogpa from Chamkhar, Bumthang (registered farmers group) that makes cakes, donuts, cookies, and flour from Bitter Buckwheat; and only flour from Sweet Buckwheat. It was established in the year 2010 with the main objective to revive the old age cropping pattern of buckwheat. With increasing non-communicable diseases cases especially diabetics, both buckwheat flour demands are high in the market. Potential to make income and more importantly, to contribute towards minimizing import of other cereals crops the group was formed. The markets for products from processor in Bumthang are mainly Thimphu retail shops. There is no gender differentiated roles as most of the group activities are carried out by women members (7 numbers). The lone male who is also group chairman facilitates the timely procurements of raw materials, processing and marketing of products.

Another processor is Sonam Dema Processing unit at Lhayulkha, Haa town that makes Khuli and liquor from Bitter Buckwheat; and Khuli and Hentey from Sweet Buckwheat. This processing unit markets produce in hotels and restaurants in Haa. The third processor unit is Chuniding Food in Thimphu town, which makes flour and noodles from Bitter Buckwheat and only flour from Sweet Buckwheat. Apart from above processors, most of the tourist based hotels reported of serving Khuli (pancake), Puda and soup to their guests.

Langpa Nobgang Sanam Detshen (registered farmer group) in Samar Gewog, Haa was established in the year of 2017-2018, comprising of 8 males and 12 females. The main reason for group formation was to develop the economy of farmers and the activities individually. But the membership is decreasing because there is no available of market and the group member are losing their interest on buckwheat farming.

5.6 Exporters and Exports

In agriculture statistics, there are no data available for Buckwheat sold. The list of exporters for Buckwheat (grain) for last 8 years was obtained from Department of Revenue and Customs and there were only two exporters. The export scale is extremely small. One exporter (Thongphu Enterprise) exported in the year 2011 only. For remaining years till 2016 Bussi-Em Bhutan in collaboration with Tarayana foundation marketed buckwheat grain to Japan. A total of 13284 Kgs of Buckwheat grain was exported in 6 years (2011 to 2016) generating a total amount of Nu. 657331. There were no exports recorded in Bhutan Trade Statistics for the year 2017 and 2018. Looking at the export trends, the volume of Buckwheat exported increased gradually from 2011 to 2016 as shown in the figure 4 on next page. Accordingly, the amount generated every year from export and its trends is reflected in figure 5 on next page.

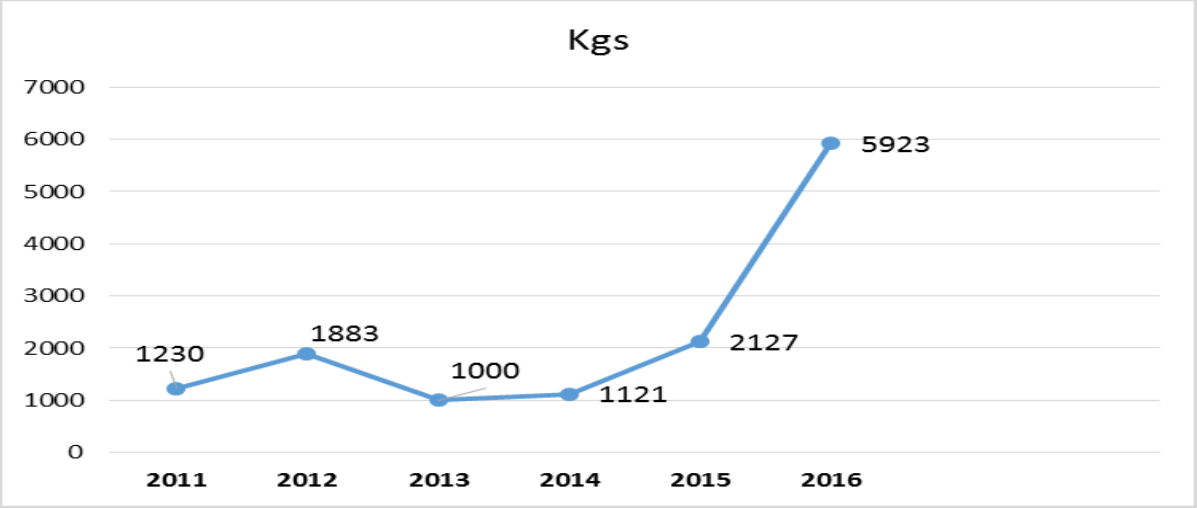

Figure 4: Trends in quantity of Buckwheat Grain (in Kgs) exported from Bhutan
Source: *Bhutan Trade Statistics (2011 to 2018), Department of Revenue and Customs (DoRC), Ministry of Finance (MoF), RGoB*

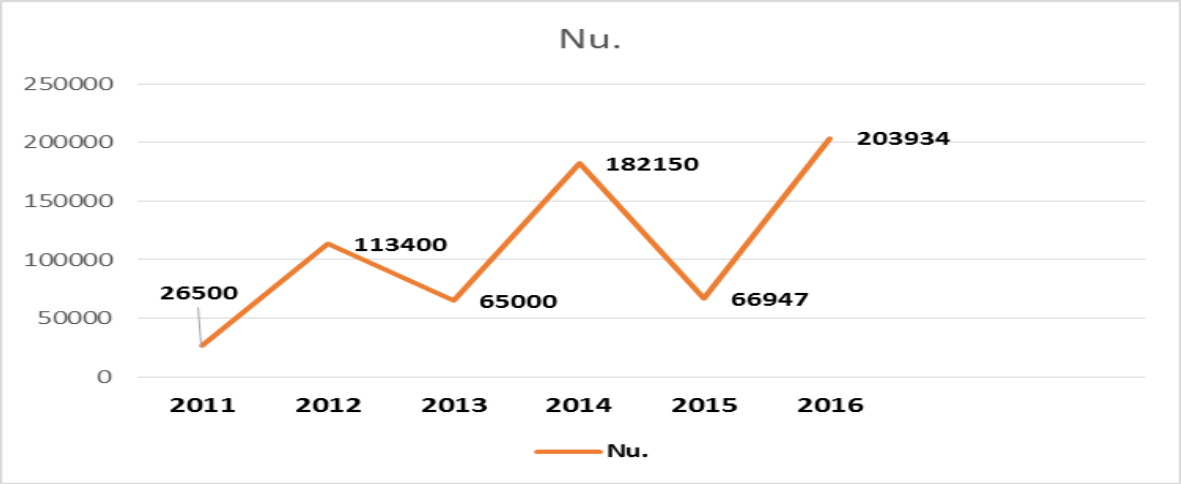

Figure 5: Trends in Revenue Generated (in Nu.) from export of Buckwheat Grain
Source: *Bhutan Trade Statistics (2011 to 2018), Department of Revenue and Customs (DoRC), Ministry of Finance (MoF), RGoB*

Bussi-En Bhutan Office in collaboration with Tarayana Foundation reported having exported 20000 Kgs of Sweet Buckwheat Grain last year to Japan. Using support from Regional Agriculture Marketing and Cooperative Office (RAMCO) at Mongar, National Post Harvest Unit at Lingmithang, the Gewog agriculture extension officers, the exporter collects grains directly from the producers from Trashigang and Samdrupjongkhar. To Japan it is transported through shipping from India. Owing to high moisture content, at times the grain starts to sprout. Additionally, the exporter also makes noodles and cookies from flour and are served in restaurant. The husk is used to make pillows.

6. VALUE CHAIN COSTS ANALYSIS FOR SWEET BUCKWHEAT

6.1 Scale of Production

The area under harvest of Sweet Buckwheat from surveyed households stood at 10307 decimals from cultivated area of 13636 with total production at 50820 Kgs as shown in table 17.

Table 17: Area under Production of sweet buckwheat by the surveyed respondent

Particulars	**Unit**	**QTY**
Area under cultivation	Decimal	13636
Area under harvest	Decimal	10307
Cost to farmers before harvest		3329
Production	Kg	50820

6.2 Economics on Scale of Production of sweet buckwheat

The production process of buckwheat involves traditional method. The most predominant cost is the labour cost, followed by the cost of seed. Though the cost of seed is preserved from last years' harvest, still its monetary value has been computed same as paid cost of seed. All the cost is directly associated with input, cultivation, harvest and processing cost. The volume of production is not very large due to small and scattered land holding. The total production from a sample population was 50840 kg of buckwheat last year (2018). The cost of production does not vary significantly as the methods are same all over Bhutan. The cost of production per kilogram is calculated in table 18 which is Nu. 53 per Kg. The cost of production of sweet buckwheat are computed on the basis of per kg of buckwheat production and compiled to compute total cost of production at producer's level. The average cost of seed amounts to Nu. 60.21. Since there is no scientific technique used for cultivation, harvest and processing and damage is inevitable. The value of damage is computed at cost and treated as a part of the cost of sales

Table 18: Cost of production per kg of sweet buckwheat

Cost information			
Particulars	QTY	RATE	AMOUNT
Cost of seed owned	7794	60.21	469,239.82
Cost of seed purchased	128	60.21	7,706.37
Total cost of seed used for cultivation			476,946.19
Labor cost			1,913,365.03
Other direct cost			
Power tiller hire charges			156,086.45
Chemical fertilizer			31,020.18
Pesticides			362.64
Grinding cost (machine)			29,225.19
Labor cost of traditional grinding			78,134.92
Total direct cost			2,208,194.41
Selling and distribution cost			
Transportation			2,839.49
Marketing cost			3,543.61
Total other cost			6,383.10
Total cost	50820		2,691,523.71
Cost of production per kg			**52.96**

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6.3 Allocation of common cost of productions incurred for both varieties

The proportionate production is taken as basis for common cost allocation in table 19. The cost incurred are for both sweet and bitter buckwheat which shows that the proportion of sweet buckwheat is 46% and bitter buckwheat is 54% of the total combined production of buckwheat. Mostly same producer produces both varieties of buckwheat and incurred common overhead cost. The cost allocation is done based on the proportion of quantity produced. All costs such as labour, machinery hire charges and other overheads are compiled and allocated based on the quantity produced.

Table 18: Cost Allocation between production of sweet and bitter buckwheat

Particulars	Allocation	Sweet	Bitter
Productions	110428	50820	59608
Allocation by quantity produced	100%	0.46	0.54
Cost allocation			
Labor cost	4,157,597	1,913,365	2,244,232
Other direct cost			
Power tiller hire charges	339,164	156,086	183,078
Chemical fertilizer	67,405	31,020	36,384
Pesticides	788	363	425
Grinding cost (machine)	63,504	29,225	34,279
Labor cost of traditional grinding	169,781	78,135	91,646
Total direct cost	**4,798,239**	**2,208,194**	**2,590,044**
Selling and distribution cost			
Transportation	6,170	2,839	3,331
Marketing cost	7,700	3,544	4,156
Total other cost	13,870	6,383	7,487
Total cost allocation	4,812,109	2,214,578	2,597,531

The cost per unit of production and weightage of each cost component is provided in table 20 which shows that 18% of the cost constitute cost of seed, where 71% of the cost is incurred for labour. The marketing cost stood at 0.24% which is not very significant cost compared to the cost of processing and seed, which reflects that very little of the Buckwheat is marketed.

Table 20: Percentage of the component of cost

Particulars	Amount (Nu.)	cost/kg	% of cost
Total cost of seed used for cultivation	476,946	9.4	17.72%
Labor cost	1,913,365	37.6	71.09%
Other direct cost			
Power tiller hire charges	156,086	3.1	5.80%
Chemical fertilizer	31,020	0.6	1.15%
Pesticides	363	0.0	0.01%
Grinding cost (machine)	29,225	0.6	1.09%
Labor cost of traditional grinding	78,135	1.5	2.90%
Total direct cost	2,208,194	43.5	10.95%
Selling and distribution cost			
Transportation	2,839	0.1	0.11%
Marketing cost	3,544	0.1	0.13%
Total other cost	6,383	0.1	0.24%
Total cost	2,691,524	52.96	100.00%
Quantity produced	50,820		
Cost per kg	52.53		

6.4 Value addition and sales

The production of sweet buckwheat was used mainly for self-consumption, production of drinks and partly used as animal feed.

Direct sales of seed

Buckwheat seeds are sold directly to the buyers. The whole grains are also sold by farmers to local buyers. 2694 kg of seeds and 3860 kg was sold as whole grains to other growers and 4900 kg was sold to retailers and processor. The sales information collected is tabulated in table 21. The seed and whole grains are sold at an average price of 58.53 per kg to the buyer.

Table 20: Direct Sales of seed and whole grains

Particulars	Quantity (Kgs)	Rate (Nu.)	Amount (Nu.)
Sales of seed	2,694.17	58.53	157,696.61
Sales of whole grain	3,860.00	58.53	225,935.59
Sold to Processor/retailers	4935.76	58.53	288,902.56
Total quantity sold	11,489.93		672,534.76

Usage of sweet buckwheat

Sweet buckwheat is used for various purpose by the households. 2939 kg of the produce (10%) was used for production of beverages producing 1596 bottles of beverages which was used for self-consumption. Another 24884 kg of buckwheat (88%) was used for flour production, from which 13625 kg of flour was produced. Around 390 kg of sweet buckwheat (1%) was used for various religious purposes and the balance quantity (1 %) was used as feed to domestic animals (table 22).

Table 22: Usage of Buckwheat

Balance quantity in kg	Buckwheat Used	% of Buckwheat Used	Products produced
Used for beverages production	2,939	10	1,596 bottles
Used for flour productions	24,885	88	13,625 (flour in Kgs)
Used for religious purpose	391	1	391 Kgs
Total	28215		

6.5 Benefits from usage of sweet buckwheat

The production and sales of sweet buckwheat if taken at commercial scale can give the farmers a stable cash income. However, the study found that the buckwheat is produced for self-consumption and has been losing importance to as cash crop. The table 23 shows economics benefits in monetary value. It has been observed that 97% of the sweet buckwheat produced is used for self-consumption and only 3% is processed and sold as flour. If the products are sold it will fetch higher price giving the producer a positive value addition. The study shows that sweet buckwheat on commercial purpose will be profitable if the producer reduces their self-consumption and sell it in the market.

Table 23: Economic benefits of sweet buckwheat in monetary value

Benefits (revenue)	Quantity	Rate	Amount
Total quantity used for flour making	24885		
Conversion into flour in kg	13625		
Consumed amount of flour (if sold)	12945	100	1,294,471
Sales of flour (3%)	681	100	68,050
Revenue from flour			1,362,521

Quantity usage			
Conversion into flour	24884.95		1,362,521
Stock preserved for next season	9509.4	52.96	503,636
Used for making beverages for consumption	2,939.40	52.96	155,676
Used religious purpose	390.50	52.96	20,682
Damage during harvest	1610.75	52.96	85,308
Sales of grains	4,935.76	53.70	265,050
Total probable revenue (bitter buckwheat)	44,270.76		2,392,873
Total revenue per kg			54.05
Profit per kg of buckwheat produced			1.09
Profit percentage			2.01

6.6 Economics of sweet buckwheat at Retailers Level

There is no wholesaler of sweet buckwheat but few retailers were available. The retailers deal both varieties of buckwheat. The retailer buys directly from producer and processor at Bumthang and farmers drop as they come for shopping to the town. The sweet buckwheat was bought at an average price Nu.98 per kg by the retailer. After incurring other overhead cost and damage, the cost per kg amounts to Nu.110 per kg. The main cost for retailers is the labour cost, both hired and self-employment. Other cost such as transportation and local conveyance takes a small share of total cost attributable to processing of final products by the retailers (table 24).

Table 24 Quantity of sweet buckwheat bought and processed

Sweet buckwheat purchase from producer			
Particulars	Quantity	Rate	Amount
Purchase of sweet buckwheat	11,060.00	97.58	1,079,271.67
Damage	277.00	97.58	27,030.58
Labor cost			15,669.67
Self-employment cost			76,811.50
Total labor cost			1,198,783.43
Transportation cost			6,620.30
Local conveyance			10,778.06
Total cost			1,216,181.78
Cost per kg			109.96

The cost incurred at retailers are for both varieties. The costs are allocated based on the quantity of buckwheat variety purchased and sold by retailer. Out of total buckwheat purchased and sold, 71% constitutes sweet variety and 29% of bitter variety. The cost allocation is presented in table 25.

Table 25: Cost allocation for Retailers between sweet and bitter

Cost allocation	Total cost	Sweet	Bitter
Allocation percentage	100%	71%	29%
Labor cost	21,953.13	15,669.67	6,283.45
Self-employment cost	107,612.50	76,811.50	30,801.00
Total labor cost	129,565.63	92,481.18	37,084.45
Transportation cost	9,275.00	6,620.30	2,654.70
Local conveyance	15,100.00	10,778.06	4,321.94
Total cost at retailers level	24,375.00	17,398.35	6,976.65

6.7 Sales revenue to retailers from sales of sweet buckwheat

The retailer sold sweet buckwheat at Nu. 129 per Kg fetching the net profit percentage of 14% as shown in table 26.

Table 26: Quantity of sweet buckwheat sold by retailers

Particulars	Quantity	Rate	Amount
Sales	10,951	129	1,411,766
Net profit			195,585
Profit percentage			14%

6.8 Economics of sweet buckwheat at processors level

Processor purchase both varieties of buckwheat, process into different products and sell to buyers. The total quantity of buckwheat purchased by three processors is provided in table 27, where in 45% of total was bitter buckwheat and 55% as sweet buckwheat.

Table 27: 2Purchase of Buckwheat by Processor both sweet and bitter

Total purchase quantity	quantity	weightage
Bitter buckwheat	13,000.0	45%
Sweet buckwheat	16,000.00	55%
Total quantity processed	29,000.00	100%

6.9 Common cost allocation at processor level

Since the cost are incurred by processor for processing both varieties of products, the cost incurred are compiled and allocated between sweet and bitter variety, based on the volume of buckwheat purchased from producer/retailer. The cost allocation is tabulated in table 28.

Table 28: Common cost allocation at processors level between sweet and bitter

Cost of processing	total	sweet	bitter
Labor cost	40,240.0	22,201.4	18,038.62
Input cost	11,580.0	6,389.0	5,191.03
Transportation	77,980.0	43,023.4	34,956.55
Rental expenses	6,000.0	3,310.3	2,689.66
Taxes	3,000.0	1,655.2	1,344.83
Interest cost	5,833.0	3,218.2	2,614.79
Total processing cost	144,633.0	79,797.5	64,835.5

6.10 Detailed cost analysis of sweet buckwheat processing

At processor level, the processor purchased around 16000 kg of sweet buckwheat at Nu.52 per kg last year. The processor incurred additional cost on labour, transportation another over heads which amounts to Nu. 58 per kg as shown in table 29.

Table 29: Detailed cost analysis at processors level

Value chain analysis of processor	Quantity	Rate	Amount
Purchase cost	16,000.00	52.00	832,000.00
Damage	300.00	52.00	15,600.00
Total cost of purchase			847,600.00
Processed	15,700.00		
Flour obtained	9,360.00		
Cost of processing			Amount

Labor cost			22,201.4
Input cost			6,389.0
Transportation			43,023.4
Rental expenses			3,310.3
Taxes			1,655.2
Interest cost			3,218.2
Total processing cost			79,797.5
Total cost of processing			927,397.52
Cost per kg of processing cost			57.96

The processed products are sold individually at different price per unit. The products processed and sold are provided in table 30.

Table 30: Products produced from sweet buckwheat

Products	Qty	Rate	Amount
Khuli (pcs)	2,000.00	20.00	40,000.00
Flour for khuli/keptang	7,860.00	115.00	903,900.00
Buckwheat flour (pkts)	1,300.00	140.00	182,000.00
Hentey	500.00	60.00	30,000.00
Total revenue generated			1,155,900.00
Net profit			228,502.48
Net profit on sales at processor level			19.77

6.11 Economic value additions at Exporters Level

At exporters level there was only one exporter. The exporter purchased around 20000 kg of buckwheat and exported to Japan. The cost incurred for procurement and processing cost for export is tabulated in table 31.

Table 31: Cost of purchase at exported level

Particulars	**Qty**	**Rate**	**Amount**
Purchase	20,000	55	1,100,000
other cost			407,077
export cost			290,271
total cost			1,797,348

The exporter exported at Nu.140 per kilogram of processed buckwheat to Japan fetching the average profit of 36% as shown in table 32.

Table 32: Export of Sweet Buckwheat by exported

Particulars	**Qty**	**Rate**	**Amount**
sales	20,000	140	2,800,000
Profit margin			1,002,652
Profit percentage			36

7. VALUE CHAIN COSTS ANALYSIS FOR BITTER BUCKWHEAT

7.1 Scale of Production

The production of bitter buckwheat by sampled population last year (2018) was 59608 kilograms within a harvested area of 14906 kg, giving per decimal productivity of 4 kg. Out of total production, 3098 kg was reported as post-harvest loss / damaged (table 33).

Table 33: Area under cultivation and harvested area for bitter buckwheat

Particulars	**Unit**	**QTY**
Area under cultivation	Decimal	17314
Area under harvest	Decimal	14906
Cost to farmers before harvest		2408
Production	Kg	59608

7.2 Economics on Scale of Production at producer's level

The cost information collected from field survey includes different factor cost incurred by the farmers which are for land preparations, manuring, mulching, weeding and self-employment cost in terms of time spent and its opportunity cost calculated at nominal local rate of labour availability. The cost of production per kilogram of bitter buckwheat is provided in table 34, which is Nu. 51/Kg. The cost of production is dominated by cost of seed and labour cost for cultivation, processing and harvest. 73% of the cost attributes to labour cost followed by cost of seed carrying 15% of weightage.

Table 34: Cost of Production of bitter buckwheat by producer

Particulars	AMOUNT	Cost/Kg	%
Cost of seed owned	433,783		
Cost of seed purchased	7,261		
Total cost of for cultivation	441,044	7.40	14.51%
Labor cost	2,244,232	37.65	73.86%
Other direct cost			
Power tiller hire charges	183,078	3.07	6.03%
Chemical fertilizer	36,384	0.61	1.20%
Pesticides	425	0.01	0.01%
Grinding cost (machine)	34,279	0.58	1.13%
Labor cost of traditional grinding	91,646	1.54	3.02%
Total direct cost	2,590,044	43.45	11.38%
Selling and distribution cost			
Transportation	3,331	0.06	0.11%
Marketing cost	4,156	0.07	0.14%
Total other cost	7,487	0.13	0.25%
Total cost	3,038,575		
Cost per kg	50.98	50.98	

7.3 Value additions and Sales revenue from bitter buckwheat

Bitter buckwheat is used for various purpose. The portion of produce sold in the form of seed and whole grain showed that 2.6% is sold as seeds; 7% as whole grain to other buyers; and 90.3% as flour to retailers / processors. However major portion is used for self-consumption and processed into beverages and used for religious purpose (table 35 on next page).

Table 35: Bitter Buckwheat Sold

Particulars	Quantity (Kgs)	% of Sale
Sales of seed	277	2.6
Sales of whole grain	745	7.0
Sold to retailer/processor	9,548.40	90.3
Total quantity sold	10,570.40	

Bitter Buckwheat is used for various purposes by the households as shown in table 36, wherein 77.8% was used to make flour; 19.9% for beverages and 2.3% for religious purpose.

Table 36: Quantity used for self-consumption for various purposes

Particulars	Grain Kg	% used for product
Balance quantity in kg	37,203.70	
Used for beverages production	7,399.82	19.9
Used for floor productions	28,958.98	77.8
Used for religious purpose	844.9	2.3

The table 37 shows the probable revenue that can be generated from production of bitter buckwheat if taken as cash crop. Though most of the produce is used for self-consumption, if the producer wishes to increase cash income from buckwheat value chain, it can be a viable option. The producer gets a profit of Nu. 3.64 per Kg of Bitter Buckwheat making a profit percentage of 6.67.

Table 37: Probable benefits from bitter buckwheat

Benefits (revenue)	QTY	RATE	AMOUNT
Total quantity used for flour making	28959		
Conversion into flour in kg	16855		
Consumed amount of flour	16122	100	1,612,197
Sale of flour in the local market	733	100	73,300
Revenue from flour			1,685,497
Quantity usage			
Conversion into flour	28,959		1,685,497
Stock preserved for next season	8,736	50.98	445,346
Used for making beverages for consumption	7,400	50.98	377,213
Used religious purpose	845	50.98	43,070
Sold to retailers	9,548	50.98	486,739
Damage during harvest	3,098	50.98	157,898
Sales of grains	745	58.53	43,607
Sales of seed	277	58.53	16,214
Total probable revenue from bitter buckwheat	59,608		3,255,583
Total revenue per kg			54.62
Profit per kg of buckwheat produced			3.64
Profit percentage			6.67

7.4 Economics at Retailers Level for bitter buckwheat

Similar to sweet buckwheat, bitter buckwheat is also purchased, value added and sold by retailers. The other processing cost includes labour cost, self-employment wages, transportation and local conveyance. Labour cost for self-employment cost is the most significant. Retailers purchase at the rate of Nu. 105 / Kg and with overhead costs, it amounts to Nu. 119.5 / Kg (table 37 on next page).

Table 37: Cost analysis of bitter buckwheat at retailer's level

Particulars	Quantity	Rate	Amount
Purchase of bitter buckwheat	4,435.00	105.00	465,675.00
Damage	202.00	105.00	21,210.00
Labor cost			6,283.45
Self-employment cost			30,801.00
Total labor cost			523,969.45
Transportation cost			2,654.70
Local conveyance			4,321.94
Total cost			**530,946.10**
Cost per kg			119.72

7.5 Sale revenue generated from bitter buckwheat at Retailers level

The retailer sold at Nu.130 per kg which is same as the cost for sweet buckwheat. The quantity sold was 4233 kg last year. The profit percentage of bitter buckwheat to retailers is just 4.1% due to lower volume of sales. The sales volume and revenue are provided in table 38.

Table 38: Quantity of bitter buckwheat sold

Sales of bitter buckwheat			
Bitter buckwheat sold	Quantity	Rate	Amount
Sales of bitter buckwheat	4,233.00	130.79	553,641.13
Profit per kg of bitter buckwheat			22,695.03
Profit Percentage			4.10%

7.6 Economics at Processors Level

The purchase, processing and sales of bitter buckwheat at processor level is computed considering all relevant cost including purchase, overheads and labour cost associated with processing of different varieties of products made from bitter buckwheat. The total quantity purchased was 13000 kg where 550 kg is reported to have been damaged. Out of 12450 kg processed, 7850 kg of flour was obtained (table 39).

Table 39: Cost analysis of sweet buckwheat at processor level

Value chain analysis of processor	Quantity	Rate	Amount
Purchase cost	13,000.0	53.7	697,666.7
Damage	100.0	53.7	5,366.7
Pilferages	450.0	53.7	24,150.0
Total cost of purchase			727,183.3
Processed	12,450.0	53.7	668,150.0
Flour obtained	7,850.0		-
Cost of processing			-
Labor cost			18,038.6
Input cost			5,191.0
Transportation			34,956.6
Rental expenses			2,689.7
Taxes			1,344.8
Interest cost			2,614.8
Total processing cost			64,835.5
Grand total cost of processing			792,018.8
Cost per kg of processing cost			60.9

7.7. Sales of bitter buckwheat products at processor level

Varieties of products are prepared from bitter buckwheat flour. The products are sold at different price based on the cost of production, quantity of raw material used and market value of such products. The net profit generated from sales of all varieties of products gives the processor a value addition of 29%. The detailed list of products processed from buckwheat is in table 40.

Table 40: Sales of Bitter Buckwheat products

Processed products bitter buckwheat			
Products	Quantity	Rate	Amount
Khuli (pcs)	3,500	20	70,000
Cake (kg)	25	250	6,250
Buckwheat flour (Pkts)	1,300	140	182,000
Liquor (bottles)	1,500	50	75,000
Donuts (kg)	25	250	6,250
Buckwheat noodles	1,300	80	104,000
Cookies (kg)	25	250	6,250
Flour khuli/Puda (pkt of one kg)	5,850	115	672,750
Total revenue generated from sales of buckwheat products			1,122,500
Net profit			330,481
Net Profit on sales at processor level			29

7.6 Economics of Bitter buckwheat at exporter level

There is only one exporter of Sweet Buckwheat and Bitter buckwheat is not exported.

8. COMMON ISSUES

8.1 Learning and Spill Over

Productions, sales and processing of buckwheat in Bhutan is traditional in nature. Buckwheat are cultivated by farmers for their self-consumption and very little surplus are sold in the market. Large scale commercial cultivation is not carried out due to small and fragmented land holding of individual farmers. The best practices and better techniques are shared informally within the industry. The study witnessed that there is no additional cost incurred for training, development and enhanced productivity. The knowledge and technique sharing happened informally but have no additional associated cost. The appropriate learning platform for knowledge sharing has not taken as yet.

Learning better techniques of cultivation, production, harvesting, processing, packaging and sales helps the value chain partners to reduce cost significantly. Learning and spill over includes cost factors like improvement of labour efficiency, procedure that increase the use of farm tools and equipment, more efficient labour productivity through better scheduling. This can happen by hiring employees from other Dzongkhags cultivating same products. The process of learning spill overs come from Dzongkhag Agriculture office in the form of formal technical guidance and no other spill over effect were identified.

Though Buckwheat are grown in different Dzongkhags, the techniques followed are still traditional where products are harvested, grinded, packaged and sold. It has improved the labour efficiency. However, till now both manual and mechanical methods are used by the producer. Further, the processor of buckwheat used machines for processing, grinding and packaging. A slight improvement through spilled over learning has been happening gradually over the years though it is not documented.

8.2 Location with Advantages and Disadvantages

Since buckwheat are grown in different Dzongkhags, transportation form a part of the important component cost. Processors of buckwheat are located in Bumthang and Thimphu and growers are spread in different Dzongkhags. There are some locational disadvantages due to which all the value chain actors have to bear additional cost on transportations and storage of their produce, especially for processor at Thimphu as compared to Bumthang.

8.3 Institutional Linkages

Buckwheat is produced and sold at informal market and there is no organised system of sales and purchase like auctions. Farmers grow in small quantity and sell directly to local dealers, who then process and sell in the market. Since buckwheat are produced primarily for self-consumption, the volume is not very attractive for large scale linkages across the value chain actors.

The regulatory authority in Bhutan have not imposed any cost to the value chain actors. The processors of agribusiness are given tax holidays. Tax has been exempted for procurement of plants and equipment for food processing. The cost of regulation is insignificant for producer and processor. There is no restriction for growing, processing, harvesting, processing and sales of buckwheat products

8.4 Timing of Production

Buckwheat are produced and harvested once a year. It is a type of seasonal production. However, unlike other agricultural farm produce buckwheat is found to have longer durability as it is not highly perishable. Farmers preserve seed for next cultivation and process the balance or sell fresh or convert to flour and sell to the processor/retailer. As mentioned, Bitter buckwheat is sowed in the month of April-May and harvested in the month of July - August. Similarly, for sweet buckwheat, it is sowed in June-July and harvested in the month of October-November.

8.5 Market Linkages

Market for buckwheat in Bhutan are mostly informal. However excess productions are sold to retailer either at farm gate. As per the focussed group discussion, in 2018, buyers directly took the grains from Gewog centre. Due to the low scale of production at producers' level, the buckwheat is exported at a very small scale. During last year only 20000 kg of buckwheat grain was exported to Japan. It is mostly used for home consumptions and caters to the domestic market. From individual interview of the producers, it was found that 86.7% of the producers do not market Buckwheat (table 41 on next page). Few that market indicated mostly selling locally in the village itself, where buyers come and pick it.

Learnt from the retailers in Bumthang and Samdrupjongkhar, it is mostly the producers that bring Buckwheat flour to the retailers when they visit market for the shopping. For retailers in Thimphu, they get from Bumthang, Trongsa, Dawakha (Paro), Wangdu Sha, Dagana. The producers from these areas bring the flour along with other agricultural goods for sale in Thimphu Centenary market. The retailers mentioned that it is not easily available as and when required because the producers and vendors are not properly linked in terms of demand and supply. As end consumers for retailers shop like 8 Eleven and Lhatshog Shop, the buyers are high end hotels like Hotel Taj, Le Meriden, Six Sense and high grade officials and business people. But for the vendors in Centenary markets, the customers are from all walk of life.

Table 41: Usual Markets for Selling Buckwheat Grain and Produce by the Producers

Markets	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Local buyers in villages	Count	0	6	0	29	35
	% of Total	0.0%	1.6%	0.0%	7.6%	9.1%
Middlemen	Count	0	0	0	12	12
	% of Total	0.0%	0.0%	0.0%	3.1%	3.1%
Shops / Markets in Gewog itself	Count	0	0	0	1	1
	% of Total	0.0%	0.0%	0.0%	0.3%	0.3%
Shops /markets in Dzongkhag area	Count	3	2	0	0	5
	% of Total	0.8%	0.5%	0.0%	0.0%	1.3%
Vegetable Vendors in the markets	Count	0	1	0	0	1
	% of Total	0.0%	0.3%	0.0%	0.0%	0.3%
Farmers groups / processors	Count	0	1	0	0	1
	% of Total	0.0%	0.3%	0.0%	0.0%	0.3%
Did not market any	Count	102	82	90	58	332
	% of Total	26.6%	21.4%	23.5%	15.1%	86.7%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0

The Soenam Chithuen Rangshing Tshogpa from Chamkar, Bumthang (registered farmers group) procures Buckwheat from within the neighbouring Gewogs like Chumey and Chokhor. The Group Chairman orders and pick up the produce directly from the farmers in these Gewog. As of now demand are met from these Gewogs for Bitter Buckwheat. For Sweet Buckwheat, they procure from Gomdar Gewog under Samdrupjongkhar Dzongkhag and Trongsa Dzongkhag. From both Dzongkhag, Group Chairman pick up the produces himself.

For hoteliers, some hotels have regular sellers in different Gewogs. For example, Village Lodge in Bumthang gets from one producer. Rinchenling Lodge gets flour from one fixed producer. Wandicholing Resort brings from Tang and Dekyil Guesthouse buy from Jalikhar processing unit. The farmers also on their own bring to their hotels and for some hotels, they personally visit the Gewogs in Bumthang and processing grain into flour. For hotels, tourists are major consumers for buckwheat products followed by officials from various ministries and departments during their official tour, meeting and workshops. For few HHs that sell Buckwheat, the cash income is retained by mostly females as compared to males in the households (table 42).

Table 42: Gender of the Persons that Retain Cash Income from Sale of Buckwheat Grains and Produce

Gender of Person	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Male in the HH	Count	0	0	0	8	8
	% of Total	0.0%	0.0%	0.0%	2.1%	2.1%
Female in the HH	Count	0	4	0	20	24
	% of Total	0.0%	1.0%	0.0%	5.2%	6.3%
Both	Count	3	4	0	12	19
	% of Total	0.8%	1.0%	0.0%	3.1%	5.0%
No Cash Income from Buckwheat	Count	102	82	90	58	332
	% of Total	26.6%	21.4%	23.5%	15.1%	86.7%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0

The cash income obtained from sale of Buckwheat flour is mostly retailed by female in the households for 55.2% of retailers and by both (male and female) for another 44.8% retailers (table 43).

Table 43: Person in the household for retailerthat retain cash from sale of Buckwheat flour

Cash retained by	Count and %	Dzongkhag				Total
		Bumthang	Trongsa	S/jongkhar	Thimphu	
Female in the HH	Count	5	0	4	7	16
	% of Total	17.2%	0.0%	13.8%	24.1%	55.2%
Both	Count	8	1	1	3	13
	% of Total	27.6%	3.4%	3.4%	10.3%	44.8%
Total	Count	13	1	5	10	29
	% of Total	44.8%	3.4%	17.2%	34.5%	100.0%

8.6 Cash Income to the Producers

Looking at the sources of cash income to the buckwheat producing households, for majority (86.2% HHs), it is from agriculture, followed by livestock for 61.1% HHs; off-farm activities for 27.7% HHs; remittances for 26.1% HHs; and others with smaller percentage of HHs (table 44).

Table 44: Sources of Cash Income for the Buckwheat Producers

Income Sources	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Agriculture	Count	104	79	64	83	330
	% of Total	27.2%	20.6%	16.7%	21.7%	86.2%
Livestock	Count	80	69	57	28	234
	% of Total	20.9%	18.0%	14.9%	7.3%	61.1%
Non-wood forest products	Count	13	33	11	2	59
	% of Total	3.4%	8.6%	2.9%	0.5%	15.4%
Off farm activities	Count	6	19	28	53	106
	% of Total	1.6%	5.0%	7.3%	13.8%	27.7%
Business	Count	14	3	1	5	23
	% of Total	3.7%	0.8%	0.3%	1.3%	6.0%
Potter / Pony	Count	0	0	1	0	1
	% of Total	0.0%	0.0%	0.3%	0.0%	0.3%
Vehicle hiring out	Count	10	3	0	0	13
	% of Total	2.6%	0.8%	0.0%	0.0%	3.4%
Remittances	Count	37	11	31	21	100
	% of Total	9.7%	2.9%	8.1%	5.5%	26.1%
Salary / Pension	Count	5	4	6	3	18
	% of Total	1.3%	1.0%	1.6%	0.8%	4.7%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

As high as 28.7% households reported annual income of Nu. 50,0001 to Nu. 100,000 from all sources; followed by income between Nu. 100,001 to Nu. 200,000; and other ranges of income for other percentages of HHs as shown in table 45 on next page.

Table 45: Annual Cash Income to Buckwheat Producers from all sources.

Income Ranges	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Less than Nu. 5000	Count	5	0	5	1	11
	% of Total	1.3%	0.0%	1.3%	0.3%	2.9%
Between 5001 to 15,000	Count	0	0	18	11	29
	% of Total	0.0%	0.0%	4.7%	2.9%	7.6%
Between 15,001 to 30,000	Count	5	2	18	20	45
	% of Total	1.3%	0.5%	4.7%	5.2%	11.7%
Between 30,001 to 50,000	Count	16	7	13	25	61
	% of Total	4.2%	1.8%	3.4%	6.5%	15.9%
Between 50,001 to 100,000	Count	40	23	22	25	110
	% of Total	10.4%	6.0%	5.7%	6.5%	28.7%
Between 100,001 to 200,000	Count	30	31	13	15	89
	% of Total	7.8%	8.1%	3.4%	3.9%	23.2%
Above Nu. 200,000	Count	8	27	0	1	36
	% of Total	2.1%	7.0%	0.0%	0.3%	9.4%
No cash income but do bartering	Count	1	0	0	0	1
	% of Total	0.3%	0.0%	0.0%	0.0%	0.3%
No cash income at all	Count	0	0	1	0	1
	% of Total	0.0%	0.0%	0.3%	0.0%	0.3%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0

8.7 Trends in Buckwheat Cultivation and Demand

The trends in Buckwheat cultivation over the last five years showed that as high as 48.6% HHs expressed the area under cultivation has been decreasing over the years; 25.6% said it is constant; and 24.8% HHs mentioned it to be increasing (table 46).

Table 46: Trends in Cultivation Area of Buckwheat in last five years

Trends	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Increased	Count	14	16	7	58	95
	% of Total	3.7%	4.2%	1.8%	15.1%	24.8%
Decreased	Count	62	55	58	11	186
	% of Total	16.2%	14.4%	15.1%	2.9%	48.6%
Constant	Count	26	19	24	29	98
	% of Total	6.8%	5.0%	6.3%	7.6%	25.6%
Don't know	Count	3	0	1	0	4
	% of Total	0.8%	0.0%	0.3%	0.0%	1.0%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

The decreasing area under cultivation was indicated for bitter buckwheat by 21.7% HHs; for sweet buckwheat by 29.5% HHs and for both variety by 47.8% HHs (table 47 on next page).

Table 47: Buckwheat type for which cultivation area decreased over last five was indicated by the households

Buckwheat Type	Count and %	Dzongkhags				Total
		Haa	Bumthang	Trongsa	S/jongkhar	
Bitter Buckwheat	Count	13	7	63	0	83
	% of Total	3.4%	1.8%	16.4%	0.0%	21.7%
Sweet Buckwheat	Count	7	5	4	97	113
	% of Total	1.8%	1.3%	1.0%	25.3%	29.5%
Both type	Count	82	78	22	1	183
	% of Total	21.4%	20.4%	5.7%	0.3%	47.8%
Don't know	Count	3	0	1	0	4
	% of Total	0.8%	0.0%	0.3%	0.0%	1.0%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Looking at the reasons for decreasing area under cultivation, it was mentioned to be wild animals destroying crops by 39.4% HHs; manpower shortage for 26.9% households; changing food habit as staple food by 17% HHs; changing cropping pattern by 15.1% HHs and other reasons for other smaller percentages of households (48).

Table 48: Reasons for Area Decreased over the Years for Buckwheat Cultivation

Reasons	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Changing cropping pattern	Count	45	4	7	2	58
	% of Total	11.7%	1.0%	1.8%	0.5%	15.1%
Changing food habit	Count	23	21	17	4	65
	% of Total	6.0%	5.5%	4.4%	1.0%	17.0%
Manpower shortage	Count	40	20	36	7	103
	% of Total	10.4%	5.2%	9.4%	1.8%	26.9%
No markets for Buckwheat	Count	61	3	4	3	71
	% of Total	15.9%	0.8%	1.0%	0.8%	18.5%
Marginal land holdings	Count	1	12	14	1	28
	% of Total	0.3%	3.1%	3.7%	0.3%	7.3%
Pest and diseases	Count	19	2	2	0	23
	% of Total	5.0%	0.5%	0.5%	0.0%	6.0%
Wild animals problem	Count	44	50	52	5	151
	% of Total	11.5%	13.1%	13.6%	1.3%	39.4%
Not applicable	Count	19	18	17	69	123
	% of Total	5.0%	4.7%	4.4%	18.0%	32.1%
Don't know	Count	15	17	12	18	62
	% of Total	3.9%	4.4%	3.1%	4.7%	16.2%
Total	Count	105	90	90	98	383
	% of Total	27.4%	23.5%	23.5%	25.6%	100.0%

Gathered from focus group discussion, the demand for Buckwheat is increasing over the years as mentioned by producers from Bumthang and Trongsa but producers from Haa and Samdrupjongkhar said it is constant over the years.

The retailers mentioned that the demand for Buckwheat flour has been increasing as more people from all walk of life (high grade officials to normal people and hoteliers) buying Buckwheat flour has been increasing over the years. The processor group in Bumthang mentioned that demands are annually increasing. One reason could be changing eating habits of people who are now more health conscious. Secondly, more

demands are also opening up from hoteliers and retailers for both sweet and bitter buckwheat at equal pace. For hoteliers the demand is constant. The tourists do not order for buckwheat products like khuli and Puda but the hoteliers keep it in their menu. For example, hoteliers serve khuli in the breakfast and Puda in either lunch or dinner.

9. ENABLING POLICIES FOR BUSINESS ENVIRONMENT

Several Acts, Policies and Regulations provide enabling business environment for Buckwheat producers and vendors in terms of quality production, marketing supports, entrepreneurship establishment, farmers groups and cooperatives formation, food safety and for market linkages. The Buckwheat producers and other actors across the value chain needs to be aware of these acts and rules.

9.1 Food and Nutrition Security Policy of the Kingdom of Bhutan (2014)

The Ministry of Agriculture and Forests leads and coordinates the overall implementation of food security policy and strategic action plans while the Ministry of Health leads and coordinates the implementation of nutrition security programs. The policy goals are to ensure availability of safe and adequate varieties of food to meet food requirements of the population at all times; enhance physical, economic and social access to safe, affordable and adequate food; promote appropriate consumption practices and enable optimum utilization of food by all; and sustain conducive and stable environment for availability, accessibility and utilization of food. Some of the objectives that support Buckwheat farming are: 1) Increase investment in agriculture, livestock and forestry program to increase food production, 2) Encourage private sector involvement to enhance commercialization of agricultural, livestock and fishery products and efficiency in input delivery, 3) Promote formation of farmers group and cooperatives for enhancing production, value addition and efficient marketing of food and agriculture products, 4) Develop and put in place post-harvest storage, processing facilities and distribution systems with appropriate technologies at national, regional and local levels, 5) Invest and institutionalize the management of market infrastructure (collection centres, storages, cold chains, weekend markets, city markets road and transport).

9.2 Food Act of Bhutan (2005) and Food Rules and Regulations of Bhutan (2017)

As per the Food Act of Bhutan (2005), amongst the various functionalities of National Food Quality and Safety Commission, it exercises 1) formulation of policy to maximise industry development, protect consumers, foster trade and improve food control in the Kingdom, by proposing goals, strategies and structures, and by developing annual work plans and programmes for all relevant actors in the food control system; 2) discuss any matter connected with the enhancement of food control in the Kingdom, with regard to production for the national market, import and export; 3) in the case of a food emergency, identify the organizations or units responsible for taking action, specify the actions to be taken, coordinate a national response and keep records of any such food emergencies; and 4) recommend educational activities to inform food businesses and the people of Bhutan of the importance of food safety and how they can improve the safety and quality of food in the Kingdom.

The Food Rules and Regulations of Bhutan (2017) spell clauses on 1) labelling, pre-packaging food and food advertisement; 2) responsibilities of food inspectors and analysis; 3) food and food business; 4) import and export guidelines; and 5) the enforcement and penalties.

9.3 Renewable Natural Resources (RNR) policies

The RNR policies of Ministry of Agriculture and Forests, is aimed at poverty alleviation; strengthening market access and production; enhancing food security amongst others. The MoAF's vision emphasizes that commercialization of farming, integration of farm enterprise into market through enhanced connectivity, upstream improvement of farm products, product specialization, improvement of trading of farm products, professional management of farm enterprises, and application of information and communication technology to integrate farm enterprise into the market are critical elements of enhancing sustainable rural livelihood. Knowledge of this policy will help growers and vendors to seek favourable support from Ministry of Agriculture and Forests.

9.4 Trade agreements

Bhutan's trade structure is dominated by its close relationship with India. A highly liberal bilateral Free Trade Agreement (FTA) with India was renewed in November 2017. Bhutan and Bangladesh have enjoyed a preferential trading arrangement since the late 1980s, within which both countries have now moved towards total removal of tariffs based on the bilateral trade agreement. Nepal is about 180 km from Phuentsholing town and much nearer to Samtse town in Bhutan. The negotiation of a bilateral trade agreement began in 2010 and is making good progress. Imports from China have been rising. A wide range of products is imported by sea, ranging from industrial inputs to consumer and capital goods. Major items of exports to countries outside SAARC are red rice, handicrafts, handmade paper, lemon grass oil, cordyceps (fungus caterpillar) and mushrooms. These trade agreements are enabling environment for exports of Buckwheat.

9.5 Cottage, Small and Medium Industry Policy of the Kingdom of Bhutan (2012)

The overall objective of the policy is to foster job creation and enhance income generation by promoting the creation of new cottage, small and medium industries (CSMI) and improving the performance and competitiveness of existing ones to increase their participation and contribution to the Bhutanese economy. This policy is supports establishment of entrepreneurs in Buckwheat and its products. The Policy states that the Royal Government of Bhutan shall 1) improve the quality of products and services through the introduction of effective quality standards, testing and compliance services; 2) promote CSMI products through "Brand Bhutan", starting with a focus on indigenous arts and crafts of Bhutan; 3) strategically position goods and services produced by CSMI in high value market niches using Bhutan's Seals of Excellence and Quality, the Seal of Origin, Bhutan Organic Logo and Green Labelling; 4) facilitate the participation of export oriented CSMI in targeted business to business events, trade fairs and exhibitions; 5) stimulate product development and quality improvement, ranging from production to final packaging focusing on high value markets and niche products; and 6) develop a culture of entrepreneurship at all levels of society to stimulate a greater awareness and interest in self-employment and the business sector, including the development of a green mind-set, amongst other strategies.

9.6 The Cooperative (Amended) Act of Bhutan (2009)

The Cooperative (Amended) Act of Bhutan (2009) mandates the Ministry of Agriculture and Forests to register cooperatives; monitor and evaluate; provide legal services on trainings and information; require registered cooperatives to be governed by constitution and by-laws; and facilitate subsidies, donations, legacies, grants, aids and such other assistance from any local or foreign institutions whether public or private but with prior approval from the Ministry of Finance.

9.7 The National Youth Policy, Ministry of Education, RGoB (2011)

The National Youth Policy is to provide the youth with proper educational and training opportunities and to facilitate access to information in respect of employment opportunities and to other services, including entrepreneurial guidance, financial credit and strengthening of the private sector to promote a strong and vibrant Bhutanese economy.

9.8 The RNR Marketing Policy of the Kingdom of Bhutan, MoAF, RGoB (2017)

The overall policy objective is to enhance the competitiveness, efficiency, and effectiveness of the RNR marketing system; to provide improved market access for smallholder farmers, and cottage, small, and medium industry; to provide better quality products to the consumer at a reasonable price; and contribute towards local and national economic development. The overall guiding principles of this policy are: 1) Government interventions shall be limited to the creation of enabling market environment and correction of market failures to enable Bhutanese farmers and private sector to reap the maximum benefits from the RNR sector, in a sustainable manner; 2) Develop RNR marketing systems to stimulate commercial production in consonance with the domestic, regional, and global market dynamics; 3) Create and support markets and marketing of commodities that are important components of the food security basket; and 4) Promote a whole value chain approach to ensure commercialization, specialization, and profitability of operations.

10. PUBLIC AND PRIVATE SERVICE PROVIDERS

10.1 Dzongkhag and Gewog Agriculture Extensions Officers

All agriculture extension services are provided by government, recruited Dzongkhags and Gewog Agriculture Extension officers who are part of Department of Agriculture. While activities (both government and the project-tied) are coordinated by the Dzongkhags Agriculture Officers, the Gewog Agriculture Extension officers provide all extension services to the farmers such as on production technologies and techniques; supply of inputs procured by the government or the project; facilitating access to market infrastructures and providing market information; creating awareness on benefits of working in groups and formation of farmers groups or cooperatives; advices and training on soil management, pest and diseases management, post-harvest amongst others.

10.2 Department of Agriculture (DoA)

DoA being the largest department within MoAF, has the administration and technical responsibilities and central programs that are executed through a network of research and extension. As policy related to agriculture and agri-business is guided by the department, which has several support divisions and agencies, this is a significant department to liaise for development and support to actors across Buckwheat value chain.

10.3 Department of Agricultural Marketing and Cooperatives (DAMC)

DAMC was established in October 2009, with a vision to have a vibrant and responsive marketing and cooperative institution, supporting profitable and people-cantered marketing of RNR products, for both domestic and international markets contributing to sustainable socio-economic development. The department provides services related to market studies; providing and access to market infrastructures within the country; and linking producers to the markets; formation of farmers groups and cooperatives, and registration. In accordance to its vision to promote marketing of RNR products through promoting efficient and effective marketing systems, facilitating institutional linkages and strengthening farmers groups and cooperatives, the department remain significant for

establishing linkages across value chain actors and linking to the domestic and international markets.

10.4 National Post Harvest Centre (NPHC)

The NPHC can help educate the growers on good post-harvest practices especially grading, cleaning, curing and improving packing materials and packing. NPHC has plans to develop as many products as possible.

10.5 Bhutan Agriculture and Food Regulatory Authority (BAFRA)

BAFRA facilitate the development of agro-based industries and enhance Bhutan's ability to compete in the global market, thereby improving the livelihood of the Bhutanese people. In doing so, BAFRA is mandated and provides services for: 1) Implement RNR related legal instruments such as the Plant Quarantine Act, Seed Act, Pesticide Act, Livestock Act, Food Act, National Bio-safety Framework, Forest and Nature Conservation Act, Biodiversity Act and their secondary and tertiary legislations; 2) Implement sanitary and phyto-sanitary (SPS) measures effectively to protect the health and life of humans, plants and animals including the environment from risks of entry, establishment and spread of exotic pests and diseases; 3) Function as a National Food Inspectorate to ensure that food is of good quality and safe for human consumption; 4) Regulate and promote the quality of agriculture inputs (seeds, agro-chemicals, livestock, veterinary biological, etc); 5) Facilitate development of agro based industries to promote trade and market access through standardization and implementation of quality assurance systems; and 6) Function as the Competent Authority (CA) for implementation of the Biosafety Act for safe transfer, handling and use of Living modified Organisms (LMOs), Genetically Modified Organisms (GMOs) and their products.

10.6 The National Seed Centre (NSC)

The National Seed Centre produces and promotes high quality seeds, planting materials and other agricultural inputs in affordable price to improve the livelihoods of the farmers. In addition, the centre coordinates the registered seed growers, private nursery growers, agriculture sales and service representatives, and private sector entrepreneurs to ensure the availability of certified seeds, planting materials and fertilizers to the farmers. For commercial Buckwheat farming, the centre is significant, to start producing high quality and varieties of seeds.

10.7 Agriculture Research and Development Centres (ARDCs)

These centres undertake research and production of crops and the technologies / know-how are transmitted to farmers through extension agents. Two main research approaches for field crops are crop variety development and crop production management. In crop variety development, the major activities include introduction and evaluation of exotic genetic materials or germplasm (both on-station and on-farm), collection and characterization of local germplasm for identification of useful traits and their improvement, improvement of local cultivars through appropriate selection methods, and finally cross breeding and evaluation of cross-bred progenies as a longer term breeding strategy. In production management, main activities are: plant nutrient management (crop responses to inorganic and organic sources, IPNS or integrated plant nutrient system), weed management (efficacy of different methods, awareness and education), pest management (rice blast management, IPM or integrated pest management), agronomy and cropping systems (sowing times, seed rates, water management practices, cropping patterns) and socio-economic studies (costs of production and adoption studies). Buckwheat if included as another crop for variety development and production management will immensely benefits the producers.

10.8 Agriculture Machinery Centre (AMC)

AMC established in 1983 is to: 1) create innovative indigenous farming tools suitable to Bhutanese farms; 2) develop and make available appropriate farm mechanization technologies based on needs, region and time; 3) continue to upgrade the technical capacities of end users as well as the promoters; 4) ensure standard (safe & quality) farm mechanization services to industry and society; and 5) provide the technical guidance to hiring services rates for Farm Mechanization Corporation Limited (FMCL), which handles private sector functions in machineries sales and services. Any planting and post-harvest processing equipment required for Buckwheat can be liaised with AMC.

10.9 The National Plant Protection Centre (NPPC)

NPPC generates pest management technologies that is safe for human health and environment; disseminates pest management technologies for effective adoption; reduces crop losses to pest organisms; coordinates information management for surveillance and pest database; is a diagnostic centre for pests; regulates and procures supply of pesticides and herbicides. As farmers are already experiencing proper pest management problems, the centre has crucial role towards overcoming these challenges for the farmers.

10.10 Rural Development Training Centre (RDTC)

The training centre for the farmers focuses on: 1) enhancing the skills and knowledge on agriculture production, marketing and rural development; 2) support market oriented farming trainings in sustainable production methodologies; 3) and support institutional strengthening of producer groups. The main training programmes on farm business and community leadership. The Buckwheat producers can avail necessary farming trainings from RDTC.

10.11 Food Corporation of Bhutan Limited (FCBL)

The FCBL plays a significant role for agriculture by providing a platform / outlet for marketing agricultural produce. It has four auction yards in southern town, located near border with India. The main cash crops auctioned are potato, orange and vegetables including Buckwheat and the bidders are the Indian traders. In collaboration with MoAF, FCBL has established 171 farm shops located in various Gewogs in the Dzongkhags. These farm shops are mandated to buy agricultural produce from farmers, which have not started yet except for purchase of Maize. On another benefits, the farm shops are retail units for FCBL providing essential edibles and agricultural tools / seeds on affordable prices to the remote located farmers.

10.12 Bhutan Chamber of Commerce and Industry (BCCI)

As BCCI alliances with local and foreign business organisations; provides relevant business information on the opportunities, technologies, government rules and regulations; and organises several exhibitions and trade fairs in the country, it can bring together the Buckwheat producers, vendors and traders on negotiation for regular sustained production and supply to the domestic and international markets.

10.13 Bhutan Development Bank Limited (BDBL)

Bhutan Development Bank Limited (BDBL) was incorporated by the Royal Charter, in January 1988, with assistance of the Asian Development Bank (ADB) that gives focus to the rural farmers and provides nation-wide credit program, which mainly provide seasonal, small and medium term loans to the country's small farmers. It had also commenced its Industrial Lending operations providing term finance and working capital for industrial and Agro-based ventures. Farmers Outreach banking was also introduced to the clients in the rural areas, where the field officers visit the farmers for loan disbursement, collection, deposit, withdrawal etc, at fixed period, place and time. The

clients in the rural areas can save their expenses to come to the branch office. BDBL is therefore one pioneer service provider for providing credits to farmers.

10.14 Rural Enterprise Development Corporation Limited (REDCL)

The REDCL launched in 2016 is to provide fund for the non-formal rural activities on a low interest rate of 4% per annum and without any collateral requirement in order to stimulate economic activities and add value to the domestic resources and create employment. REDCL so far has financed many rural enterprises in livestock and agriculture, eth ceiling of Nu. 0.8 million and with interest rate of 4% with 10 years repayable period.

10.15 Bhutan Agro Industries Limited (BAIL)

Bhutan Agro Industries Limited (BAIL) is a fruit and vegetable processing company in Bhutan. It was established in 1993 with the financial and technical assistance of the Danish International Development Agency (DANIDA). BAIL is located at Wangchutaba, 12km from the capital city of Thimphu. BAIL was set up to help uplift the Bhutanese rural economy by creating opportunities for farmers to earn additional income. The company achieves this objective by buying off surplus horticulture produces of the farmers, which is also the main source of the company's raw materials. Presently they manufacture canned fruits, vegetables and juice; and pickles in oil. Besides the domestic market, BAIL products are marketed and sold in India and Bangladesh. Collaborations with BAIL to produce Buckwheat Products can help producers in increased markets within the country.

10.16 Bhutan Cooperatives Shop (B-COOP)

The B-COOP Shop is a place where local products from cooperatives (includes farmer groups and individual farmers) are displayed and retailed. The vision is to contribute to strengthening the marketing of local products through cooperative marketing. The objectives include: 1) To assist the cooperatives to market their products, 2) to make local products readily available to the consumers with standard quality, 3) to showcase the proper packaging and quality standards, and 4) to create a niche market by developing and promoting potential Geographical Indicator (GI) products. There are two B-COOP outlets in Thimphu and one at Gelephu. Presently these B-Coop shops mostly sale dairy products and eggs and also buckwheat flour

10.17 Centenary Market, Thimphu

Located below the main town in Thimphu, near the Wangchhu River, Thimphu’s weekend market is by far the largest domestic market for the farmers in Bhutan. Farmers come from different parts of the country to sell their farm products in the market. Few of the vegetable vendors sell Buckwheat flour.

11. THE VALUE CHAIN MAPPING

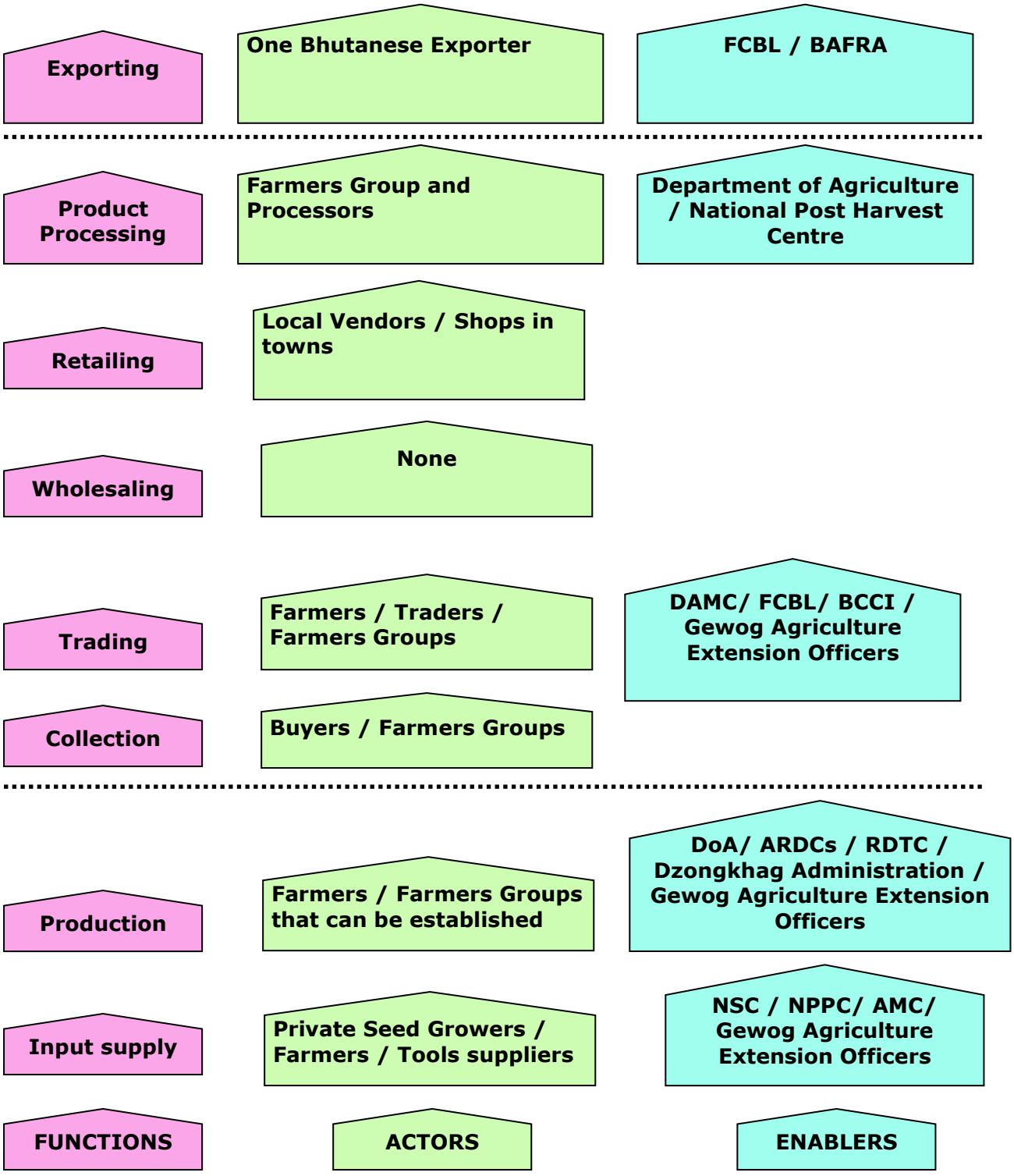

Figure 6: Value Chain Mapping for Buckwheat in Bhutan

12. CHALLENGES AND OPPROTUNITIES

12.1 Challenges

Several Challenges were mentioned by the producers in Buckwheat farming. Amongst all, crop destruction by wild animals remain significant for 78.5% households; labour shortage for 47.1% HHs; no markets for produce as mentioned by 31.1% HHs; and other problems as listed in the table 49.

Table 49: Challenges Associated with Buckwheat Farming as mentioned by Producers

Challenges	Count and %	Dzongkhags				Total
		Haa	B/thang	Trongsa	S/jongkhar	
Labour shortage	Count	65	29	32	51	177
	% of Total	17.3%	7.7%	8.5%	13.6%	47.1%
Marginal land holdings	Count	1	18	10	3	32
	% of Total	0.3%	4.8%	2.7%	0.8%	8.5%
Poor soil fertility	Count	3	1	0	2	6
	% of Total	0.8%	0.3%	0.0%	0.5%	1.6%
Pests, diseases and weeds	Count	47	5	3	11	66
	% of Total	12.5%	1.3%	0.8%	2.9%	17.6%
Damage by wild animals	Count	74	80	82	59	295
	% of Total	19.7%	21.3%	21.8%	15.7%	78.5%
Lack irrigation facilities	Count	10	0	0	0	10
	% of Total	2.7%	0.0%	0.0%	0.0%	2.7%
Insufficient seeds	Count	5	0	6	0	11
	% of Total	1.3%	0.0%	1.6%	0.0%	2.9%
No markets for the produce	Count	93	0	3	21	117
	% of Total	24.7%	0.0%	0.8%	5.6%	31.1%
Don't know	Count	1	0	1	9	11
	% of Total	0.3%	0.0%	0.3%	2.4%	2.9%
Total	Count	103	88	88	97	376
	% of Total	27.4%	23.4%	23.4%	25.8%	100.0%

Gathered from FGD, producers mostly mentioned crop damage by wild animals as the major problem in Buckwheat farming. As already mentioned, in terms of marketing, the buyers come to the producers to buy and the scale of Buckwheat marketed is too low.

For retailers in Bumthang and Samdrupjongkhar, the flour has to be kept for longer duration before end consumers buy it as they reported having less numbers of end consumers. However, Thimphu retailers had no challenges in marketing Buckwheat flour as mentioned the demand has been increasing. For processors, the challenge is meeting the demand of flour with increasing demand from the retailers in Thimphu. The Buckwheat group (processor) in Bumthang mentioned that there are no significant differences in marketing the products of both sweet and bitter buckwheat. Also, there are no problems in marketing the produce. Demands are high in the markets both within and outside the Dzongkhag.

12.2 Opportunities

From producers perspectives, ensuring proper markets with linkages between the retailers and processors and also exporters can help enhance the scale of production for the Buckwheat. Need to form farmers groups on Buckwheat production and provide technical know-how on product diversification with exposure to other countries in the region where Buckwheat is cultivated were issues of opportunities for the producers.

Likewise, the processors expressed the need for exposure trips to neighbouring countries to see different products made out of both sweet and bitter buckwheat to take up products diversification by the processors. Tea bags from tender leaves of buckwheat is another opportunity which according to elders has health benefits but not from any research findings.

13. CONCLUSION AND RECOMMENDATIONS

- While both varieties of Buckwheat are cultivated by the producers (though Sweet Buckwheat is cultivated by majority of producers from Samdrupjongkhar Dzongkhag), the scale of production is small in the country (3,480 MT in 2017). There has been gradual decrease in production volume as well the cultivated area over the years. On the other hand, the economic analysis at the producer's level showed that it has good potential to generate good revenue to farmers, if cultivation is taken up in slightly larger scale as Buckwheat farming is less labour intensive as compared to Potato as main cash crop.
- For large scale cultivation of buckwheat, the general recommendation is to support producers with electric fencing, supply of high yield seeds, exposure and training on product diversification, support establishment of organised farmers groups / processing unit and making formal linkages to the end markets (both domestic and exports).
- A large quantity of Buckwheat is mostly consumed by the households by making various products and very less quantity is marketed as 86.7% of the households did not market any Buckwheat last year. For those that market, the formal marketing channel does not exist and are mainly the buyers visiting and collecting directly from the producers. On the other hand, though only one exporter exists, the export quantity (to Japan) has been increasing over the years. There is a strong need to study marketing bottleneck, market options and make strong linkages with the producers.
- Despite the harvested area and production quantity gradually decreasing over the years, there is increasing demand for the flour from the consumers, especially the hoteliers and even educated health conscious consumers. At the producer's level, they are challenged with wild animals destroying Buckwheat, manpower shortage, and preference over rice as staple food for intensified Buckwheat cultivation amongst others.
- At present, there are only two registered farmers group in Buckwheat (one in Samar Gewog, Haa and another as processor in Chokhor, Bumthang). While significant activity to boost Buckwheat production has not picked up by the farmers group in Haa owing to lack of formal market linkages, the farmer group in Chokhor as processors are on the other hand a significant supplier of Buckwheat flour to many of the retailers including those in Thimphu. It is suggested to support organisation with more numbers of farmers groups and processors.
- As the producers lack entrepreneurial skill and business knowledge, there is need to train farmers and producer groups on business planning and entrepreneurship development so that they are able to understand market dynamics and develop business perspective. To this, some of the challenges faced by the processors such as manual segregation of stones from grains; lack of proper storage facilities; insufficient knowledge on product diversification and accordingly packaging are issues to be addressed.