MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT
CENTER FOR INFORMATICS AND STATISTICS

REPORT ON

SURVEY OF MAIZE VALUE CHAIN IN SON LA PROVINCE

Hanoi, 2018

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CHAPTER 1. INTRODUCTION

1.1. General information

In the process of ensuring food security for people in the world in general and in Asia specifically, it is mostly focused in increasing supply in order to ensure the food per capital as high as possible and national food stock large enough for emergency. However, it is not enough when the definition of food security covers many different aspects such as affordability through increasing income, I mproving processing and preserving technologies for lower post-harvest loss. One of the solutions is setting up a value chain to ensure efficiency of actors in the value chain and interaction between them from production, processing and consuming product in the most sensible way.

Although Vietnam is a big rice exporter in the world, Vietnam still has some problems in the field of food security such as availability and affordability of people in the remote areas where conditions for paddy rice production is very low. In these areas particularly in the Northern, maize plays an important role in ensuring daily food for people here. Besides, in the development of husbandary industry, demand for materials in processing feed has strongly increased, leading to higher income of maizeproducers and other actors in the value chain. Therefore, making a survey of maizevalue chain in Son La province is a good chance for capacity building of agricultural statistic officers, then to set up database of national food security in the coming years and giving policy recommendations for the development of the important food in the country.

1.2. The goals of the survey

1.2.1. Long-term goals

Capacity building for statisticians of the Center for Informatics and Statistics on data collection in the value chain.

1.2.2. Short-term goal

- Developing a method for collecting data on processing and distribution of agricultural products.
- Processing and analyzing survey results

- Disseminating the results of the pilot survey through workshops to obtain comments from relevant agencies.

1.3. Interviewee and scope of the survey

The survey was conducted for key actors in the production and consumption of maize for animal feed including:

- 85 maize buying enterprises/units
- 25 maize processing enterprises/units
- 270 maize growers

1.4. Methods of implementation

Indirect survey: Collecting information from the General Statistics Office, Department of Agriculture and Rural Development on the situation of maize in Son La province.

This survey was conducted using Multi-stage Random Sampling Technique that begins with the selection of province, district and communes based on the potential production and industry potential of maize.

Direct surveys by the Center for Informatics and Statistics through structured questionnaires and sampling in four large maize producing districts of Son La province via the following steps:

Step 1. Preparation

- Designing questionnaires: to get feedback on questionnaires from specialists
- Explaining the questionnaires
- Identifying the surveyed areas (with support from Son La Department of Agriculture and Rural Development): selecting 4 representative districts including Moc Chau, Mai Son, Song Ma and Muong La and in each district to select 3-4 communes for survey. Each commune select 30-35 households for survey.
- Sampling
    - The selection of the province is done by the purposive sampling method with maize production centers as considerant. Son La Province were selected as

provincial samples. Select Son La province because Son La is the province with the largest maize area in the country.

- District sampling: Use expert method to select the sample size of the selected district. The selection of the district is done by the purposive sampling with maize industry centers as considerant. The data used as the basis of district selection is the number of maize buying enterprises/units and maize processing enterprises/units. Selection is made based on the maize production situation of each district. The selected districts are areas where maize is grown for animal feeds with stable maize production. The selected districts are: Mai Son, Song Ma, Muong La and Moc Chau
- Commune sample selection: Each district select 3 representative communes with a relatively large area of maize along with activities of purchasing and processing maize.
- Select the samples
- Using the principles of statistical Coefficient of Variation (CV) 10%,
- Systematic Random Sampling (SRS)
- List Frame as:

1. Maize farmers: From Commune officials, select 270 sample households by using Cluster Systematic Random Sampling.

2. Maize buying enterprises/units: Listing frame from Commune officials. Select 85 Sample by using Cluster Systematic Random Sampling.

3. Maize processing enterprises/units: We prepare the list of processing enterprises by asking Commune officials and farmers, then we do interview directly Interview 25 maize processing enterprises/units

Selection of maize farmers: Each commune select 25-30 households for the survey (by using Cluster Systematic Random Sampling). Selected households must have certain maize production selling to the market. Households just using maize for household purposes will not be selected.

Selection of buying and processing maize units: Since each commune has few purchasing and processing units (8-10 units), surveying all purchasing and processing units in each commune.

Table 1. Location of maize value chain survey

Province	District	Commune
1. Sơn La	Mai Sơn district	Hát Lót town
		Chiềng Lương commune
		Chiềng Sung commune
		Cò Nòi commune
	Song Ma district	Chiềng Cang commune
		Nà Nghiu commune
		Chiềng Khoong commune
	Moc Chau district	Chiềng Hắc commune
		Đông Sang commune
		Mường Sang commune
	Muong La district	Mường Bú commune
		Mường Trùm commune
		Tạ Bú commune
2. Hà Nội	Chuong My district	Trường Yên commune
		Đông Phương Yên commune

- Determine the list of surveyed actors.

Step 2. Pre-survey

- Cooperating with Son La Department of Agriculture and Rural Development to select pilot sites and identify the surveyed areas and actors in the maize value chain in the province. Making a list of buying/processing units and households in Son La province.
- Making pilot interviews with the actors in Mai Son district
- Revise the questionnaires and explanation of the questionnaire after the pilot survey

Step 3. Training on the survey techniques

- Direct survey: The interviewers will collect the following information:

- General information about households/units
- Production costs: seeds, materials, fertilizers, pesticides ...
- Purchasing cost: Purchase price of maize, transportation costs, loss, labor
- Processing cost: Depreciation of machinery, labor, electricity, fuel.

- Output cost: transportation cost, labor cost
- The price of maize at each level
- Difficulties of agents in the process of maize production, processing, purchasing and trading
- Opinion of the unit
    - Questionnaire: According to the surveyed entity and the information collected above, the following types of forms and questionnaires will be designed to conduct the survey:
- Questionnaire No. 01/SX. The questionnaire for collecting information on production - Applying to maizegrowers for sale.
- Questionnaire No. 02/TM. The questionnaire for collecting information on purchasing maize from the household - Applying to the units specializing in buying maize at home or at fields.
- Questionnaire No. 03/CB. Questionnaire for collecting information on maize processing (drying, picking, grinding, milling ...) - Apply for drying, picking, grinding, milling ...
    - Survey training
- Organization of training: Direct training for enumerators and chiefs of enumerator team.
- Training content: To acknowledge the contents of the survey, survey plan, implementation plan in the locality, instructions on selecting household samples, communication skills, and interview techniques and how to record information in the questionnaire.
- In the course of training, to introduce clearly related concepts, methods of calculation and methods of interviewing to collect information; the ability to record information in the questionnaire. It should be combined with local conditions and circumstances to explain and guide enumerators to solve common problems in reality.

Step 4. Official survey

- To make interviews with actors involved in the maize value chain in Son La province. To select 4 districts for survey, 3 communes in each district.
- To make interviews with actors involved in the maize value chain in Hanoi (mainly maize consuming unit)

Step 5. Data processing and report writing

- After finishing the survey, the data was cleaned on paper and entered into the software designed on the computer.
- After completing the questionnaire data entrance, data will be processed by Stata and Excel.
- The next stage is to develop an analysis based on the data tabulation that had been developed previously. The method of analysis is using the descriptive analysis presented in the form of charts, tables, and analysis of profit. The analysis results are presented in Chapter II.
- To make the survey report: Making the survey report based on the surveyed data which is processed.

Step 6. Organize the workshop

- The Center for Informatics and Statistics reports the results of the maize value chain survey at the workshop. It is expected that 30-40 participants will be invited to the workshop

1.5 Some definition

- Maize is a type of maize used for animal feed, with high energy of 3,300-3,450 Kcal/ kg, the main ingredients of starch, sugar accounting for 80% of raw material, and is often used to increase the energy consumption in chicken feed. Maizeincludes 8-10% protein, fiber 1.5% - 3.5%, lipid 4-4.5%, and significantly carotene (pro-vitamin A). Feed rich in maizewill provide red egg and yellow skin for chicken. Cattle, including dairy cows, beef cats and poultry can digest good nutrients in maize(90%).
- Dried maizekernel is kernel (seed) picked from maizeand then dried with a moisture content of less than 15%
- Fresh maizekernel: seed picked from maizewith a moisture content of more than 15%

- Fresh corn: maizewith the moisture content of below 20%
- Maizepurchasing units: purchasing dried or fresh maizefrom maize growers or other purchasing units and then sell them to upper-level purchasing units or sell them to maize processing units.
- Maizeprocessors/processing units: specializing in drying, grinding corn. They can buy maizefrom maize growers or from other purchasers.
- Processing: An economic activity that transforms something chemically or physically, into semi-finished things and increases the value of the goods which is closer to the final users.
- Sales volume: the quantity of goods sold at a given time, (eg, a month, a year). The sales volume in this survey refers to all products sold between January 1st and December 31st, 2017.
- Input prices: prices of raw materials (inputs), not including shipping costs.
- Cost of production: the cost the households spent on the crop production in one season, including:
    - Cost of varieties, fertilizer, feed
    - Expenses on plant protection, raw materials, taxes, fees, depreciation of fixed assets, veterinary drugs and other direct expenses.
    - Expenses for outsourced services.
    - Expenses for machinery and self-employed labor of the household.
- The production prices is the monetary expression of all costs of production of the product minus the value of the by-products over the production of the product in a crop (crop)

$$\text{Production cost of 1 kg product} = \frac{\text{Total production cost (-) Value of by products}}{\text{Total production (kg)}}$$

- Selling prices: one of economic categories, going along with the development of commodity production. The selling price is the monetary value of goods, and also revealing all the economic relations such as goods supply and demand, accumulation and consumption, competiveness ...

- The value of the goods is the market price recognized by buyers. Value always determines market prices, is the nature of the price. In contrast, the sale price is the form, is the phenomenon of value. Selling price is the relationship of economic benefits, is the standard for the producers to choose products to produce.
- Value added (VA): This is an indicator reflecting the value of labor produced in a given period. This is part of the production value that is left after the intermediary costs are subtracted.

$$VA = GO - IC$$

- Profitability in agricultural production is the difference between the price and the product cost obtained from producing a product unit, in a production cycle of agricultural products.
- The profit ratio is a relative indicator reflecting the relationship between the profit earned from a unit of production and the production cost of a unit of product in a production cycle.
- Economic efficiency is an economic indicator that reflects the correlation between the result and the cost. The correlation can be subtraction, division of the elements that represent the result and the cost. Economic efficiency reflects the level of exploitation of investment factors, natural resources and management methods.

1.6 Advantages and disadvantages in the survey

1.6.1 Advantages

The close cooperation with the local authorities especially Son La Department of Agriculture and Rural Development and agriculture divisions at distric levels, along with the support and assistance of local people have created favorable conditions to collect information to achieve the objectives achieved.

Based on the list provided by the communes, the heads of households in the project area provided information seriously. Interviewing and providing information at the households/offices are made with the witness of commune officials.

1.6.2 Disadvantages

When accessing to maize processing units, some difficulties are faced as follows:

- The survey team failed to meet the unit owner and turn into collect information from his/her relatives, thus the information is not complete.
- In some cases, investigators have to wait until the next day to interview the unit owner, thus taking too much time and influencing the work plan of the other units.
- When arriving at the location of the selected units, the units are not be there, therefore another units must be chosen to take place
- There are many units refused to be interviewed as they are afraid of being identified their revenue and income tax as well.
- Some interviewed households do not understand Kinh language, making it difficult to communicate.
- The education level of the households is low so they found difficult to understand the questionnaire.

CHAPTER II: MAIZE PRODUCTION IN SON LA PROVINCE

2.1. National geographic and social economic condition in Son La

2.1.1 National condition

2.1.1.1 Geographic position

Son La is a mountainous province in the Northwest region in Vietnam, with total area of 14,125 km2. It borders Lai Chau, Yen Bai provinces to the north; Phu Tho, Hoa Binh provinces to the east; Dien Bien province to the west; Thanh Hoa and Laos to the south. Son La has 12 administrative units (1 city, 11 districsts). Son La is 300 km far from Ha Noi, its infrastructure particularly traffic is very difficult in some remote districts like Muong La 350 km, Song Ma 400 km ...away from Hanoi.

2.1.1.2 Terrain characteristic

Son La's terrain is divided into areas with different ecological characteristic. Son La has 2 large highlands are Moc Chau and Na San. Moc Chau highland is at average height of 1,050 m from sea surface, it has near-temperate climate, fertile land which is suitable for development of tea, fruit and milk-cow husbandary. Na San highland is at average height of 800 m along Highway 6, fertile land which suitable for development of sugar-cane, coffee, mango, longan, pineapple...

2.1.1.3 Climate

The weather condition in Son La province is mountainous tropical: cold dry in winter, hot wet in summer and heavy rain. Its terrain is deeply and strongly seperated into lots of sub-region climate which is good for the development of agriculture and forestry production. Moc Chau highland is very suitable for temperate crops and animals. The land along Da River is suitable for tropical forestry plants all year round. Son La's climate has two seasons including dry season and wet season. The annual average temperature is 21.40 Degree Celsious (the *highest temperature is 27 Degree Celsiou and the lowest temperature is 16 Degree Celsious*). The annual average precipitation is 1,200-1,600 mm and humidtity is 81%.

2.1.1.4 Land resource

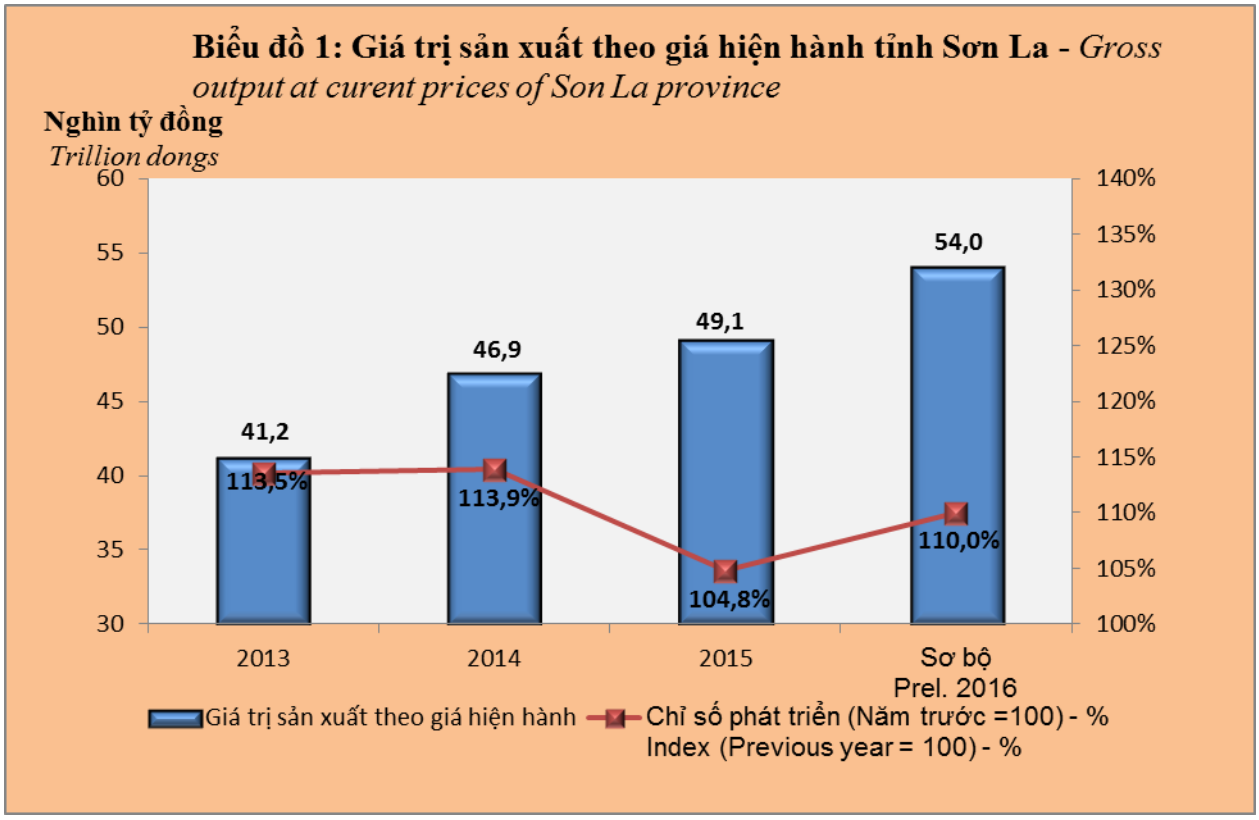
The total natural area of Son La is 1,405,500 hecta in which the in-use land covers 702,800 hecta, accounting for 51% of natural land area. Not in-use land and river, stream are still about 702,700 hecta, accounting for 49% natural land area. When Son La Hydro-power Project is completed, creating about 25,000 hecta of lake surface availalble, which is a good condition for Son La province to develop aquaculture, waterway traffic, and tourism.

2.1.2 Social-economic condition

2.1.2.1 Economic condition

In recent years, Son La's economy has gained some achivements such as high the economic growth rate year by year, gross ouput at current prices in 2013 of 41.2 thousand billion dongs, increasing by 13.5% from 2012; of 46.9 thousand billion dongs in 2014, increasing by 13.9% from 2013, of 49.1 thousand billion dongs in 2015, increasing by 4.8% from 2014 and up 10% to 54 thousand billion dongs in 2016 against 2015

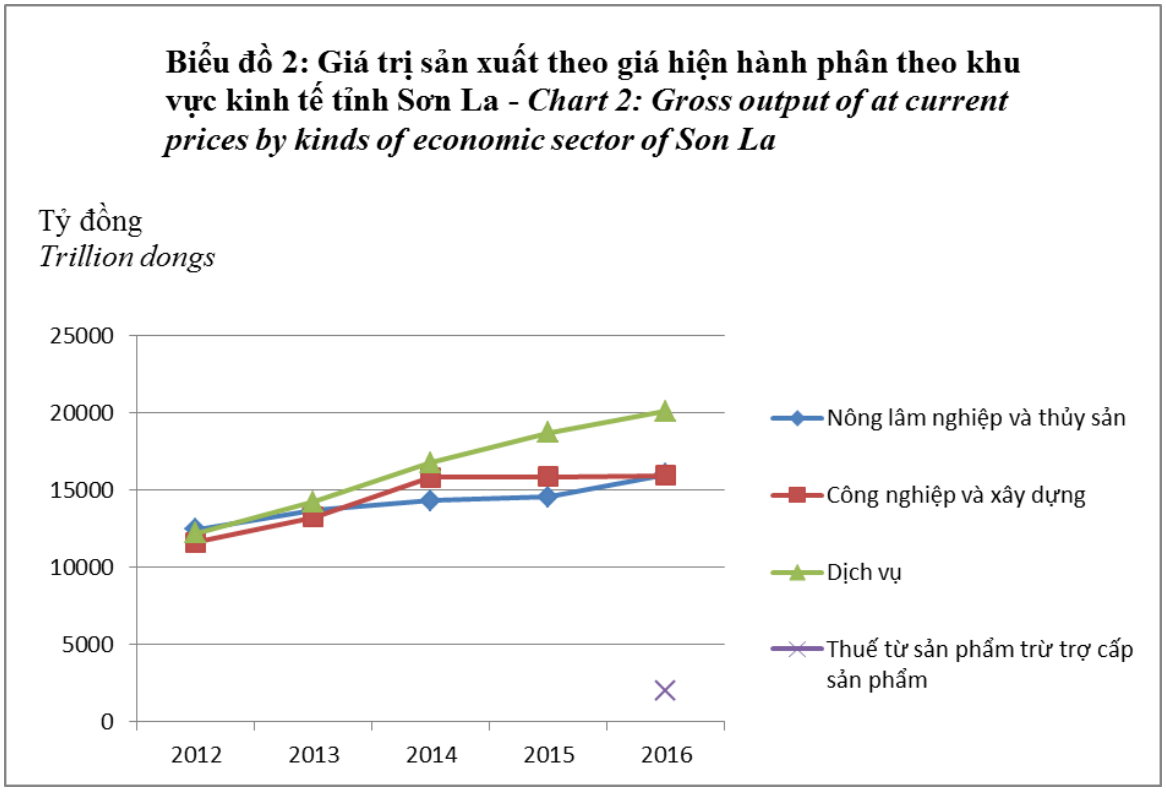
Figure 1. Gross output at current prices in Son La province



Nguồn: Son La statistics office

By economic sectors, service is the most rapid and sustainable development sector over the last years, up to 12,219.4 billion dongs in 2012 to 20,097.9 billion dongs in 2016. Followed by agriculture forestry and aquaculture sector with the growth value of from 12,427.3 billion dongs to 16,002.1 billion dongs in 2016. Industry and contruction sector has unstable growth rate, of from 11,610.5 billion dongs in 2012 to 15,818.3 billion dongs in 2014 and at 15,916 billion dongs in 2016.

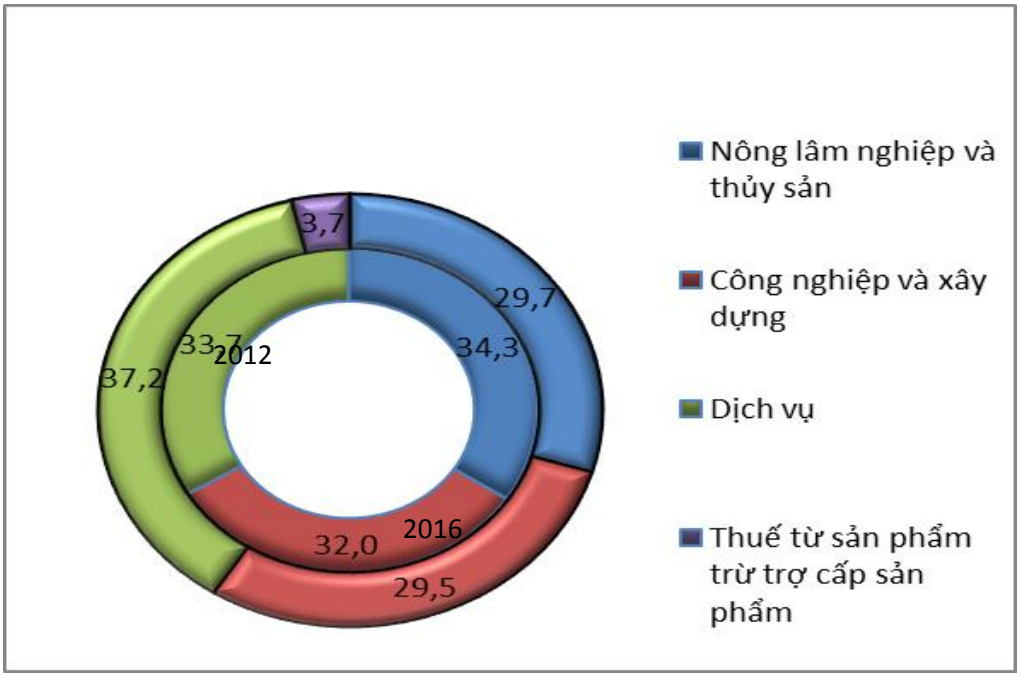
Figure 2. Gross output at current prices by kinds of economic sector in Son La



Source: Son La province statistics office

Economic structure in Son La has been changing over the year. Service has the biggest contribution in the provincial economic growth of the, which increased from 33.7% in 2012 to 37.2% in 2016. Agricultural Forestry and Aquacultural sector gradually decreased from 34.3% in 2012 to 29.7% in 2016. Industrial and Contructional sector in the same period decreased from 32% in 2012 to 29.5% in 2016.

Figure 3. Gross output structure at current prices in 2012 and 2016 (%)



Source: Son La statistic office

2.1.2.2 Social condition

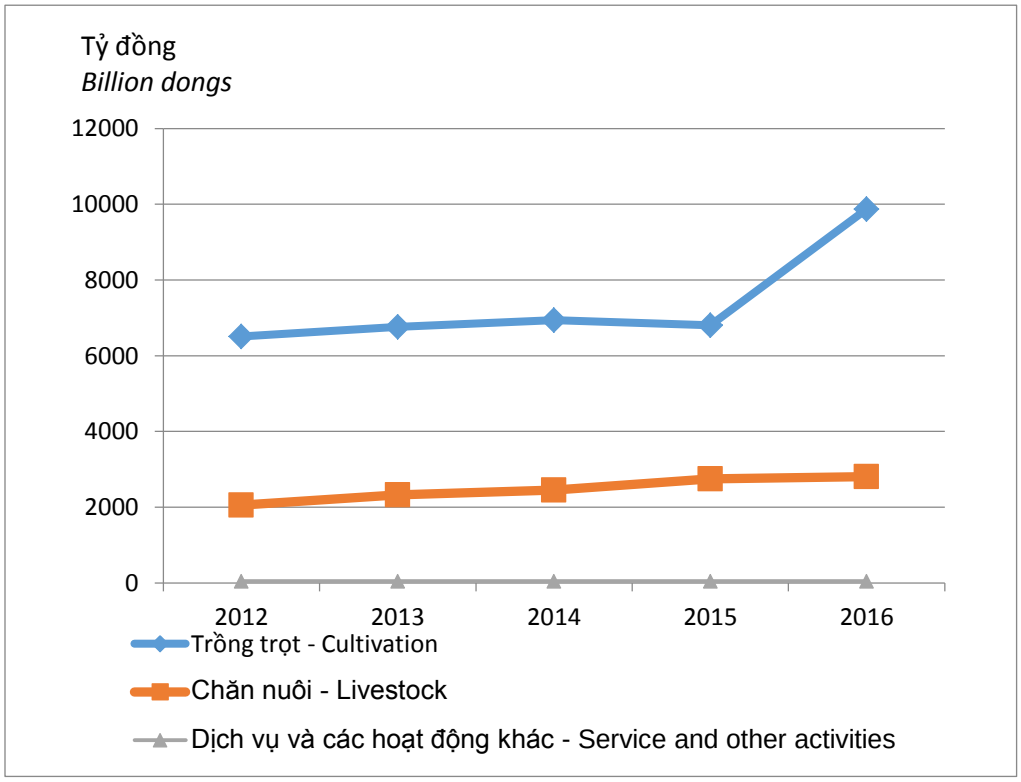
Socio condition in Son La has progressively developed, material and spritiual life of ethnic people has been improved, hunger emilination and poverty reducdion, imperative social problems have been solved; defence – security have been ensured, international cooperation has increasing solidated, enhanced, expanded and developed. Son La has 12 ethnic groups living together, in which Thai accounts for 54%, Kinh 18%, Mong 12%, Muong 8.4%, Dao 2.5%, and the lefts are Kho Mu, Xinh Mun, Khang, La Ha, Lao, Tay and Hoa. The population is 1,160,000 people, in which working age population is 721.82 thousand, accounting for 62.2% of total population, the population at labour age is 227.370 thousand, popular labor number is 421.630 thousand. Young labors are abundant and well-eductated in order to meet the demand of labor use in producting and processing in the agricultural forestry and aquacultural sector.

2.2. Development of agriculture in Son La in 2012 - 2016

2.2.1 Production value of agriculture

Development of agriculture in Son La has relatively increased. Figure 4 and Figure 5 shows gross output of agriculture has stable growth rate, especially in cultivation and livestock sector.

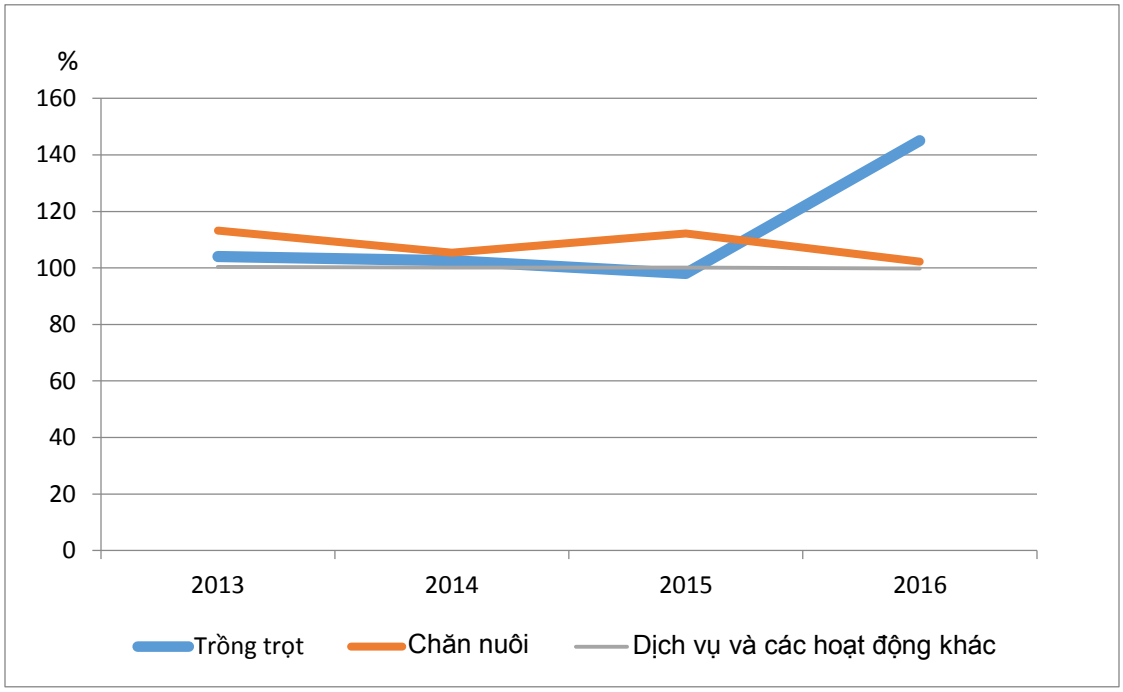
Figure 4. Gross output of agriculture at 2010 comparison prices in Son La



Source: Son La Statistic Department

Production value in cultivation has been highest and increased from 6,505 billion dongs in 2012 to 6,803 billion dongs in 2015 (up 1.5%) and suddenly increased to 9,869 billion dongs in 2016 (up 45.1%). Production value in livestock has lightly rised from 2,054 billion dongs in 2012 to 2,810 billion dongs in 2016 (up 8.1%). Service sector has been stable over the last years, at 47.8 – 48.1 billion dongs from 2012 to 2016 (up 0.1%).

Figure 5. Gross output of agriculture at 2010 comparision prices

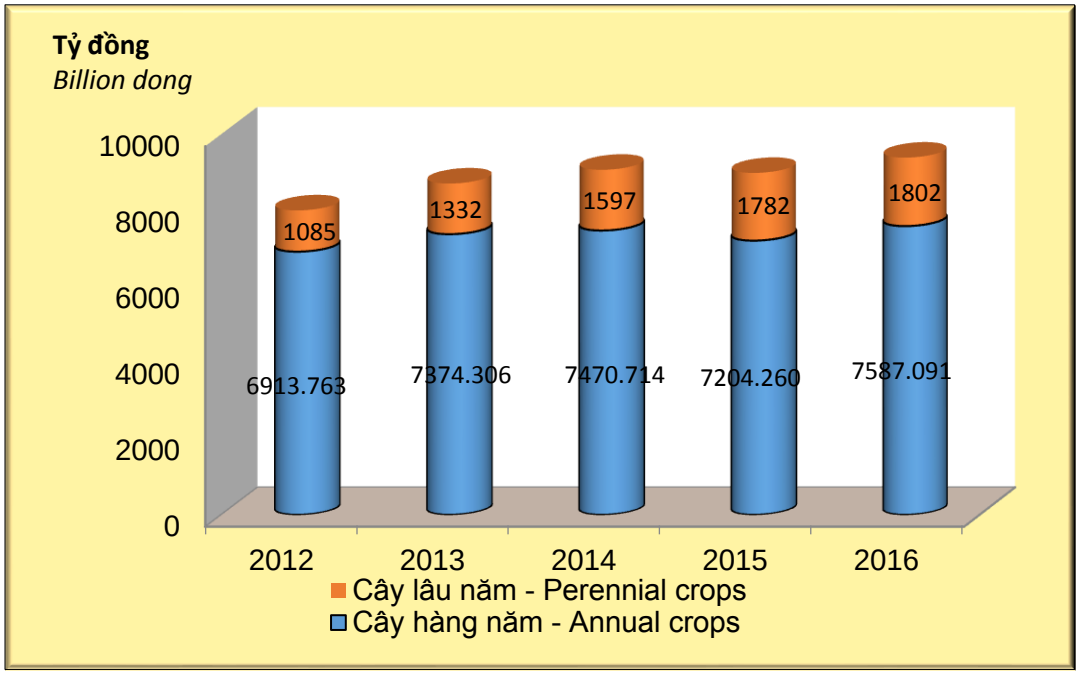


Source: Son La Statistic office

2.2.2 Gross output of livestock sector

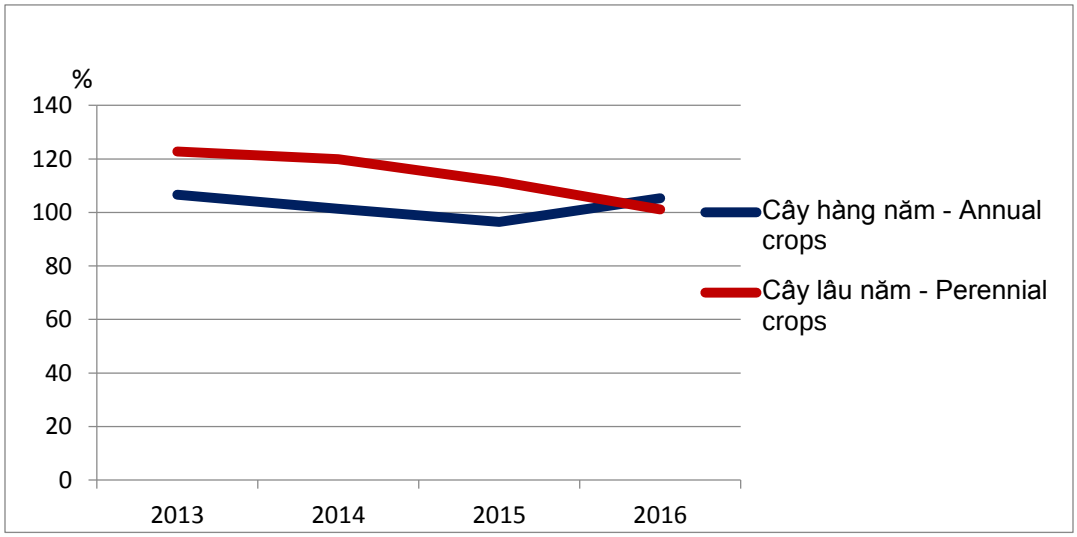
According to data of Son La Statistic Department, gross output growth of livestock sector averaged at 4.1% per year, increasing from 6,505 billion dongs in 2012 to 9,869 billion dongs in 2016. Production value of anually crops was relative low, at average of 2.4% per year, from 6,913.8 billion dongs in 2012 to 7,587.1 billion dongs in 2016. Production value of perenial crops was relative high, at average of 13.5% per year, from 1,085 billion dongs in 2012 to 1,802 billion dongs in 2016.

Figure 6. Cultivation value at 2010 comparison prices



Source: Son La Statistic Department

Figure 7. Development index of cultivation at 2010 comparison prices



Source: Son La Statistic Department

Ratio of production value of annual crops was much bigger than perennial crops but decreased gradually. In 2012, ratio of production value of annual crops accounted for

86.4%, perennial crops at 13.6%; in 2016, production value of annual crops reduced to 80.8%, perennial crops rised to 19.2%.

2.3. Maize production

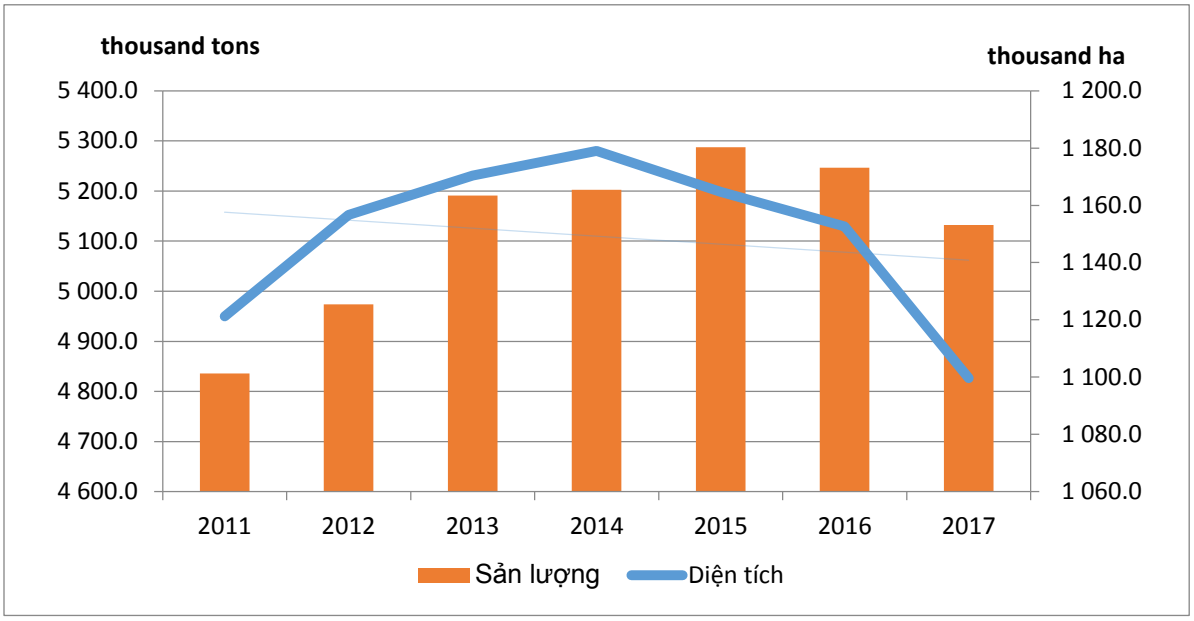
2.3.1. Maize production of Vietnam

Recently, together with development of feed producing sector, material production including maize for this sector has increasingly expanded. To meet the demand for livestock in households, nowadays maize has become one of main agriculture commodities

Vietnam is one of 17 main maize producers in the world. Maize is planted in most of Vietnam's regions, especially maize is staple food of people in Northern mountainous region. Maize is encouraged to produce for ensuring food security as well as inputs for feed proccesing industry.

Maize planting area in the country has decreased for the last few years. From more than 1121.3 thousand hecta in 2011 to 1,099.7 thousand hecta in 2017, equivalent to average down 0.3% per year, however, maize production has increased at average of 1% per year, from 4.8 million tons in 2011 to nearly 5.13 million tons in 2017 thanks to yield of 43.1 quintal/ha in 2011 and 46.7 quintal/ha in 2017.

Figure 8. Maize production in Vietnam in 2011-2017



Source: General Office of Statistic

Maize is mostly planted in 3 ecological regions including Midland and Northern mountainous region (accounting for 43% of total area in 2015), Highland (21%) and North Center coast region (18%). Other regions account for nearly 10%.

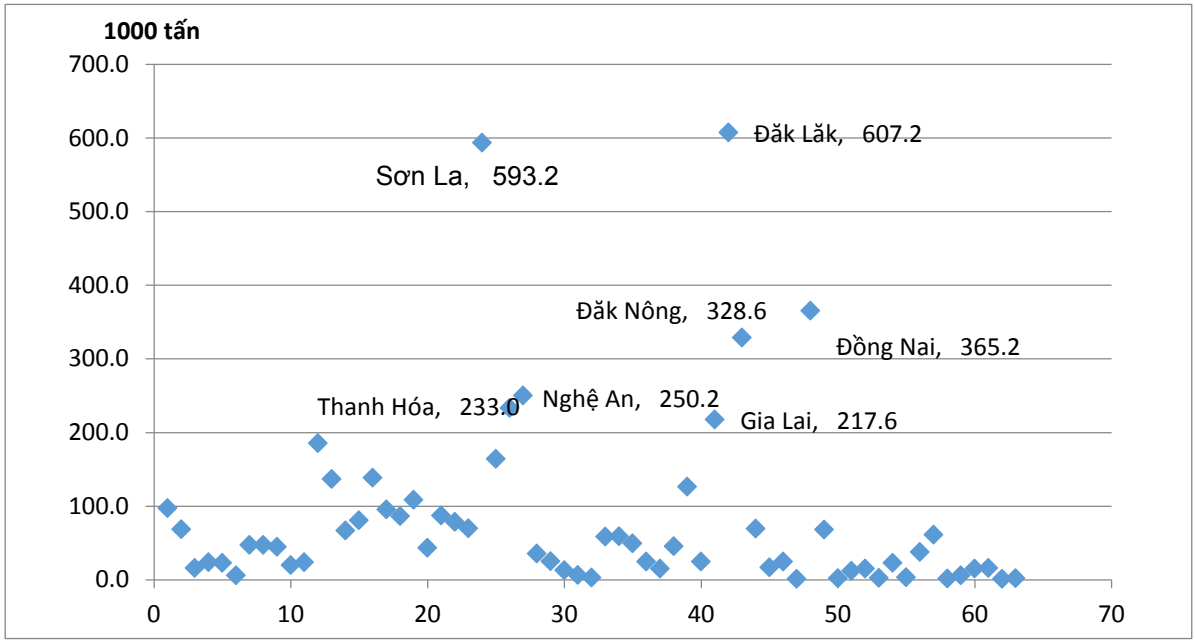
Table 2. Maize planting area by regions in 2011-2016 (thousand ha)

Region	2011	2012	2013	2014	2015	2016
Whole country	**1 121.3**	**1 156.6**	**1 170.4**	**1 179.0**	**1 164.7**	**1 152.6**
Red River Delta	96.0	86.4	88.3	88.1	91.4	89.8
Midland and northern mountain region	465.7	502.0	504.5	515.3	504.9	509.5
North-center and Center coast region	207.6	202.4	206.0	208.0	210.4	207.1
Highland	232.6	246.9	251.7	249.6	241.2	235.3
Southeast Region	78.7	79.3	79.8	80.0	78.8	75.7
Mekong Delta	40.7	39.6	40.1	38.0	37.8	34.7

Source: General Office of Statistic

Main maize producing provinces in Vietnam are Daklak (accounting for 11.6% of total maizeproduction in 2016), Son La (11.4%), Dong Nai (7.0%), Daknong (6.3%),…

Figure 9. Maize productionn in some main provinces in 2016



Source: General Office of Statistic

As an annual crop, maize is grown in many crops in the year, including winter-spring, summer-autumn, and autumn-winter seasons depending on geographical location and soil condition.

2.3.2. Maize production in Son La

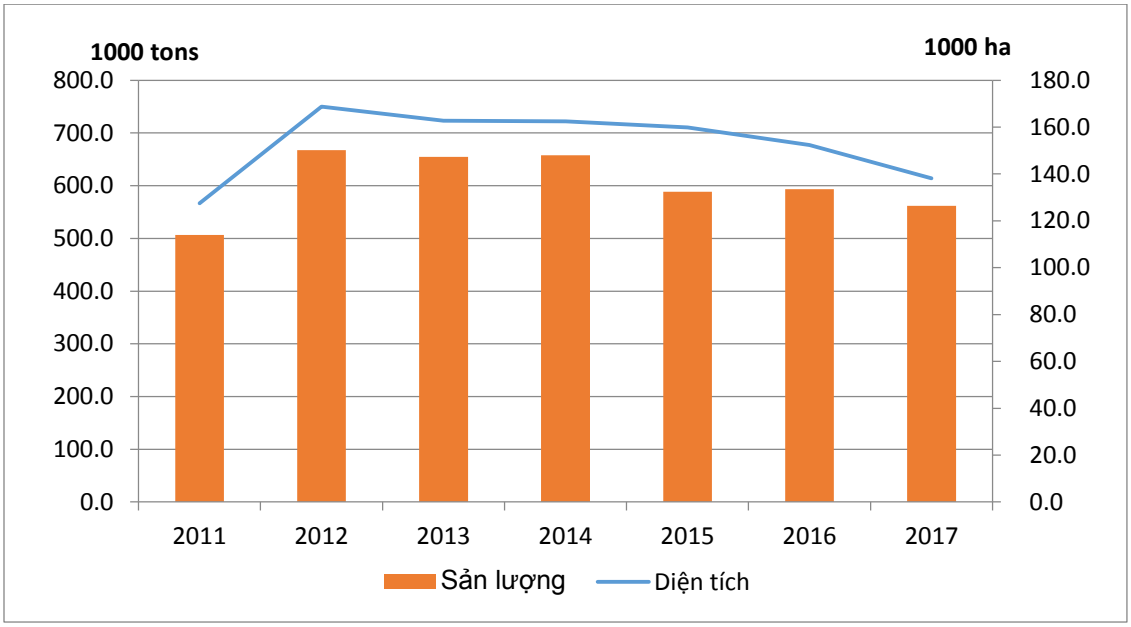
Son La is a big maize producing province in Vietnam. Maize is mostly grown on the foot of upland, along the banks of rivers and streams. In recent times, maize planting area has been expanded to the foot of field land in spring crop. Son La's maize is consumed in many markets such as Ha Tay, Thanh Hoa, Nam Dinh, Vinh. This shows that Son La's maize has become a highly commodity product. However, when Vietnam enters the period of integration with regional economy, competition among commodity farming products is unavoidable.

In Son La, maize is grown in two main seasons, summer-autumn in the foot of upland (from April to July), winter season along the banks of rivers, streams. For recent years, farmers have planted spring season in the foot of field land after havesting Mua

paddy. With advantage of soil and climate, maize production in Son La has rapidly developed for the past few years. Area and production of maize has increasingly expanded, accounting for remarkable ratio in total area and production of maize in the whole country.

Maize production in Son La is considered commodity and one of the most suitable crops for soil and climate condition of the province. Maize planting area is mostly focused on spring-summer crop due to terrain of sloping land, planted depending on national conditions.

Figure 10. Maizearea and production in Son La in 2011-2017



Source: General Office of Statistic

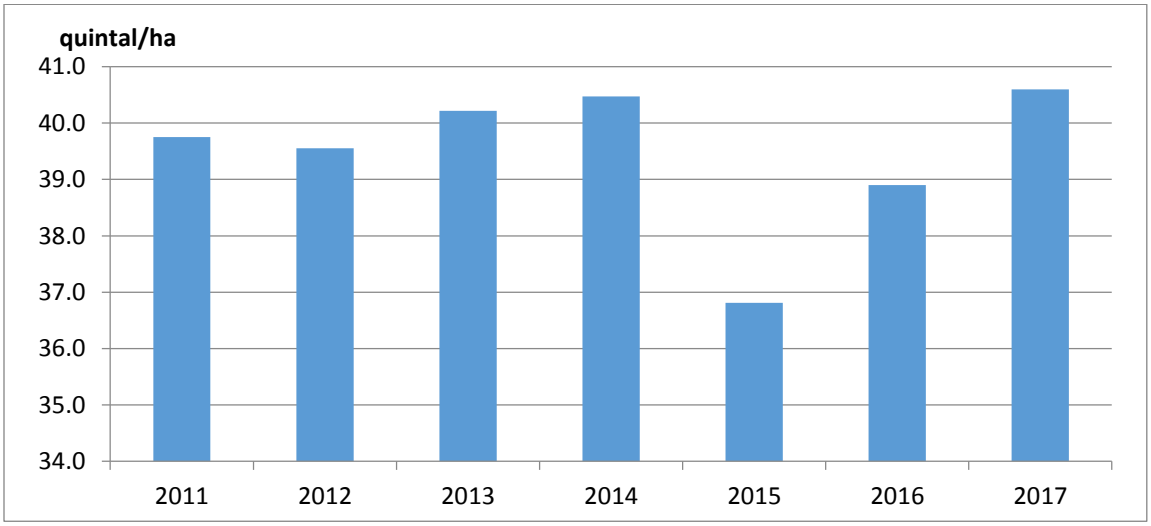
In general, maize production in Son La in the period of 2013-2017 tends to narrow. Figure 8 shows maize planting area in the whole province has been reduced at average of 4% per year, from 162.8 thousand hecta in 2013 to 138.1 thousand hecta in 2017.

While yield has slightly risen and unstable over the years, at average of 0.3% per year, from 40.2 quintal/hecta in 2013 to 40.7 quintal/hecta in 2017 (see Figure 9). Due to rising in yield can not make up the reducing in area, maize production has decreased by 3.8% per year, from 654.7 thousand tons in 2013 to 561.9 thousand tons in 2017 (see

Figure 8). Maize is the main input for animal feed production, but prices of meat was down in 2016 and 2017 leading to low demand for feeds and maize also. Meanwhile, maize imports to Vietnam has risen for recent years and maize import price was lower than local maize so that maize consuming has been lessened in the province. Moreover, impact of global climate change in recent years has influenced on maize farming condition, price of maize was very low, insecure, difficult to sell so some maize planting areas has transfered to fruit crops and other crops bringing higher economic results.

Average yield of maize in Son La (40.6 quintal/ha) compared to Northern region (46.7 quintal/ha) owing to farmers in some regions planting maize in 15 degree slope land. Average yield of maize was at 40.6 quintal/ha in 2017, up 2% from 2013 due to favourable weather, some area has been invested into intensive farming, combining to applying new and gene-modified varieties with higher yield.

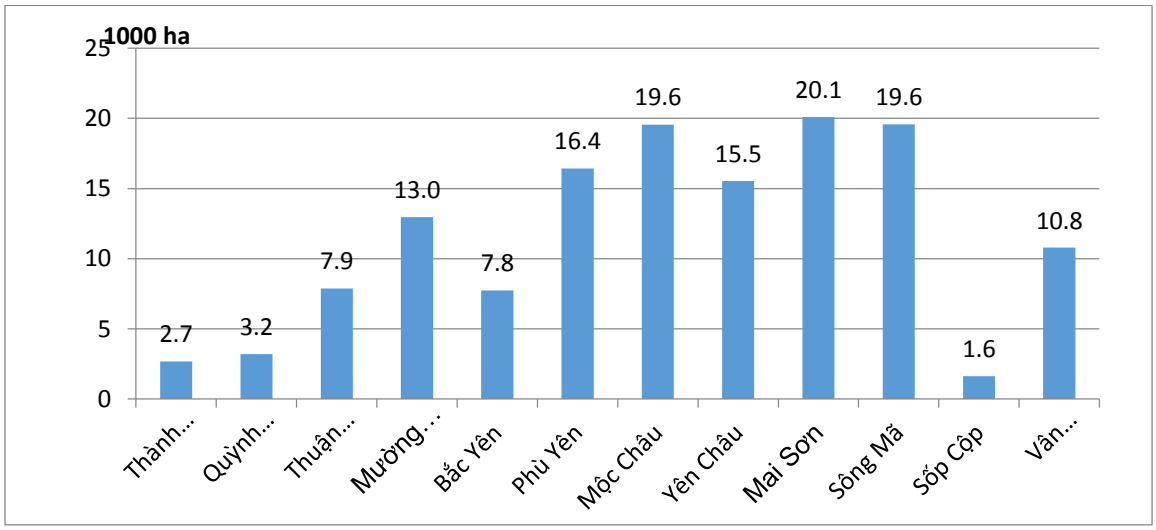
Figure 11. Yield of maize in Son La 2011-2017



Source: Son La Statistic Department

By structure, surveyed districts accounted for 50% of maize planting area and over 50% of total maize production in the province. Mai Son district has highest maize planting area in Son La, at 20.1 thousand ha accounted for 14.5% of total maize area in the province; Moc Chau and Song Ma has 19.6 thousand ha, Phu Yen has 16.4 thousand ha...

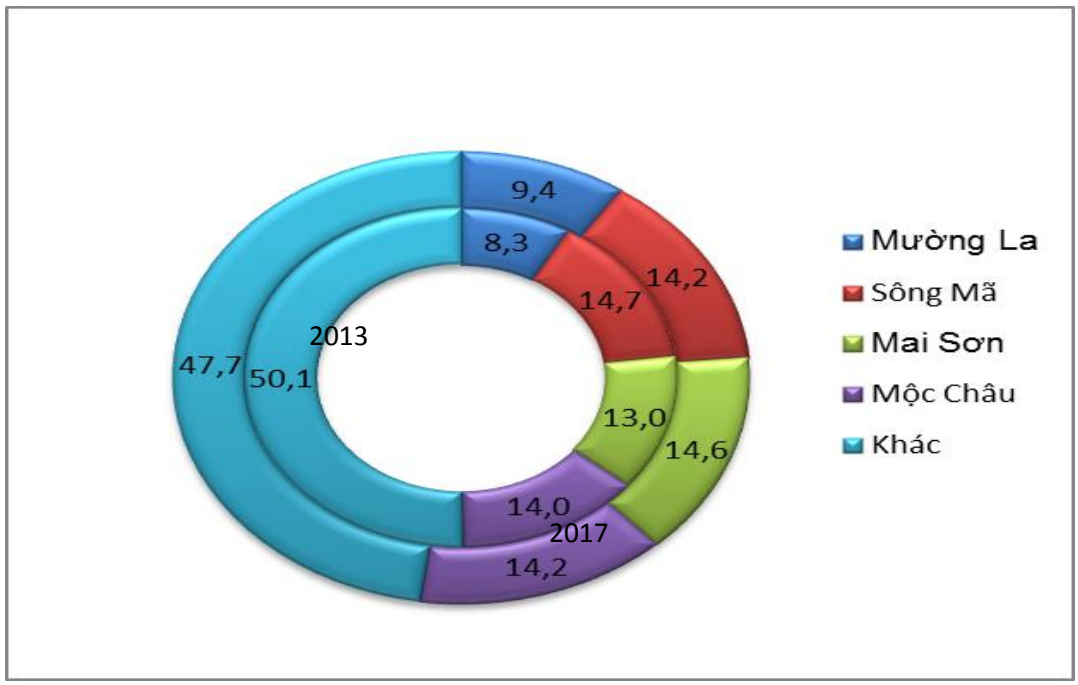
Figure 12. Maize planted area by districts in 2017



Source: Son La Statistic Department

Maize area structure in 2013 and 2017 has changed: Mai Son has rised from 13% to 14.6% (up 1.6%), Muong La from 8.3% to 9.4% (up 1.1%), Moc Chau from 14% to 14.2% (up 0.2%), other districts from 47.7% to 50.1% (up 2.4%); in contrast, Song Ma has decreased from 14.7% to 14.2% (down 0.5%).

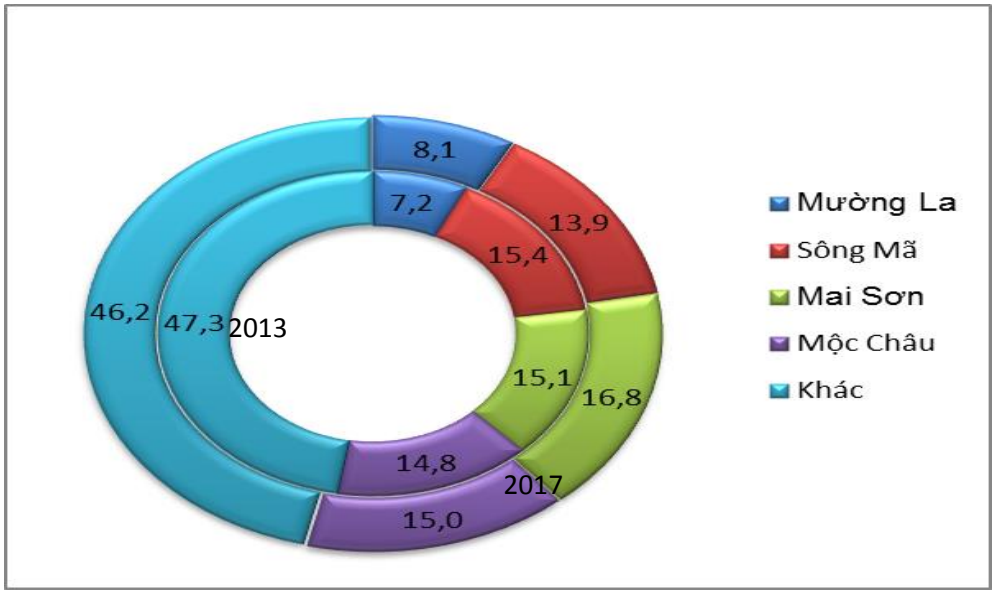
Figure 13. Maize planting structure in Son La in 2013-2017



Source: Son La Statistic Department

Similarly, maize production structure in 2013 and 2017 has been remarkable changed: Mai Son has risen from 15.1% to 16.8% (up 1.7%), Muong La from 7.2% to 8.1% (up 0.9%), Moc Chau from 14.8% to 15%, other districts from 46.2% to 47.3%; in contrast, Song Ma has decreased from 15.4% to 13.9% (-1.5%).

Figure 14. Maize production structure in Son La in 2013-2017



Source: Son La Statistic Department

Maize varieties are grown in Son La, including non-glutinous: CP989, LVN 10, DK 9901, NK 66, NK 4300, NK 7328, Bioseed 9698, CP 888, CPA 88, DK 9955, DK919, DK8868, DK 6919,…; glutinous: MX2, MX10, MX4, WAX44, HN88, WAX22, S2, VN2, VN6, King 80, Bach Ngoc, …

About 80% of maize production is collected, dried and preserved by enterprises, private traders. These maize becomes commodity product selling to other provinces and the left 20% are consumed by local people. However, maize processing in Son La is mostly in drying units, with products are dry maize for other processing units. At present, Son La has not yet have feed processing units.

2.3.3. Disadvantages and challenges in maize production in Son La

- Cultivation in general and maize cultivation in particularly are still limited with unequality among regions, especially remote and mountainous area.

- Most of land area in the province are slope land (over 80% of natural land), strongly seperated terrain, low vegetational cover, concentrated rainy season leading to degraded land due to eroding.

- Son La has many ethnic groups with difficult lives; low advanced technology application, out-of-date cultivation practices.

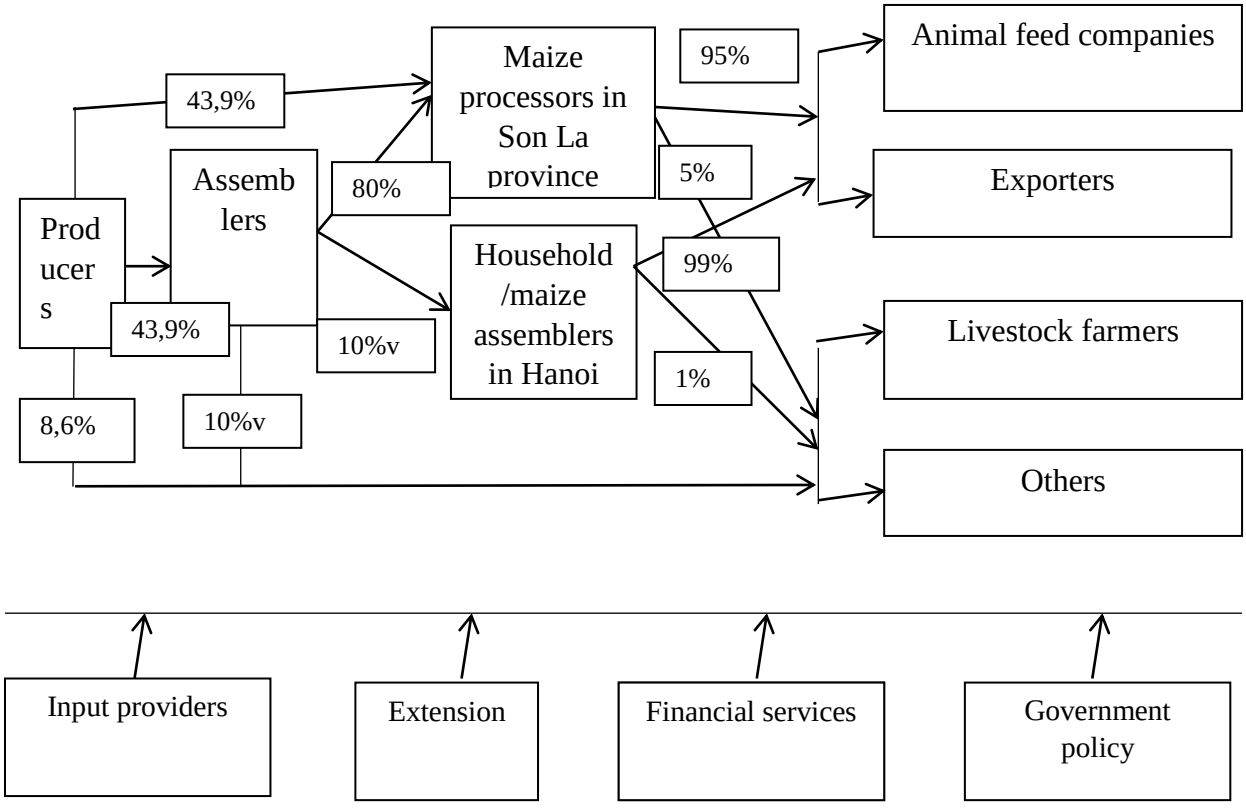
- Harvesting and preservation activities have not been paid much attention then leading to decreased quality of maize at post harvesting time.

CHAPTER III: RESULTS OF THE SURVEY OF MAIZE VALUE CHAIN IN SON LA PROVINCE

3.1 Chain structure

The maize value chain in Son La province is made up of a number of key actors including maize growers or maize producers, households or local maize buyers. Next are maize processing households or units in Son La and Hanoi from where maize is available for feed companies or exporters which mainly export the products via borders to the Chinese market or sold to domestic maize consumers, such as livestock farmers or other consumers.

Figure 15. Map of maize value chain in Son La



Source: The maize investigation team in Son La in 2017

Thus, there are three major supply channels for maize produced in Son La including:

a) Channel 1: Maize growers => Buyers => Processing households in Son La => Company/Exporters/Others

b) Channel 2: Maize growers => Buyers => Processing households in Hanoi => Company/Exporters/Others

c) Channel 3: Maize growers => Buyers

Key actors in the maize value chain have different economic and social conditions and have different relationships in the value chain operation in Son La province.

3.2 Actors in the chain

3.2.1 Maize growers

The first actor of the maize value chain in Son La is maize producers with different land and labor conditions. Of the 211 households surveyed in 4 districts (13 communes), there were 165 Thai households (78.2%), the largest proportion compared to other ethnic groups. Next are Kinh households, 33 households accounting for 15.6% while H'Mong households with 12 households account for 5.7% and only one household is Muong, accounting for 0.5%.

The education level of the surveyed households is also very different among ethnic groups, with the Kinh and H'Mong being higher than the other ethnic groups. Of the households that produce maize, nearly 12% of households are illiteral, while the number of households with high school level is about one third of the surveyed households. However, maize households with primary education level are at the end of secondary school or secondary school, accounting for 39.3% of total surveyed households.

Table 3: Education levels of maize growers by ethnic groups (%)

Education levels	H'Mong	Kinh	Muong	Thai	Chung
Illiteracy		6.1%	100.0%	13.3%	11.8%
Primary School	25.0%	3.0%		17.0%	15.2%
Secondary School	25.0%	33.3%		41.8%	39.3%
High school	41.7%	51.5%		24.2%	29.4%
College/University	8.3%	6.1%		3.6%	4.3%

Source: Survey data in 2017

Maize growers have an average household size of 5.0 people, with Kinh group with population of greater than 5.4 people. H'mong households - 5,1 people; Thai people - 5.0 people and Muong people - 4.0 people. However, Kinh households are more labor-intensive, with an average of 2.8 people, including 2.5 maize producers. The Muong have less labor and also have the least area of maize, only about 1 hectare equal to half of the Kinh population. Thai people have an average area of 1.8 hectares while this number of H'Mong people is 1.6 hectares.

Table 4. Current status of maize production by ethnic groups

Indicators	H'Mong	Kinh	Muong	Thai	At average
Number of people	5.1	5.4	4.0	5.0	5.0
Number of people involved in agricultural production	2.3	2.8	2.0	2.6	2.6
Number of people involved in maize production	2.3	2.5	2.0	2.4	2.4
Area of maize (ha)	1.6	2.0	1.0	1.8	1.7

Source: Survey data in 2017

In addition to the land resources and self-employment, maize producing households also had to mobilize financial resources from outside by borrowing money from banks or purchasing households through getting payment in advance in input materials and consumer goods.

Table 5. Capital mobilization of maize growers

Source	Percentage of households borrowing	Loan amount (million DONG)	Rate of investment in maize (%)	Loan term (month)	Interest rate (%/year)
Banks	35.5	47.5	82.2	22.6	10.3
Family/Friends	3.9	7.2	100.0	11.7	9.6
Input sellers/Maize buyers	1.3	35.0	100.0	6.5	12.0

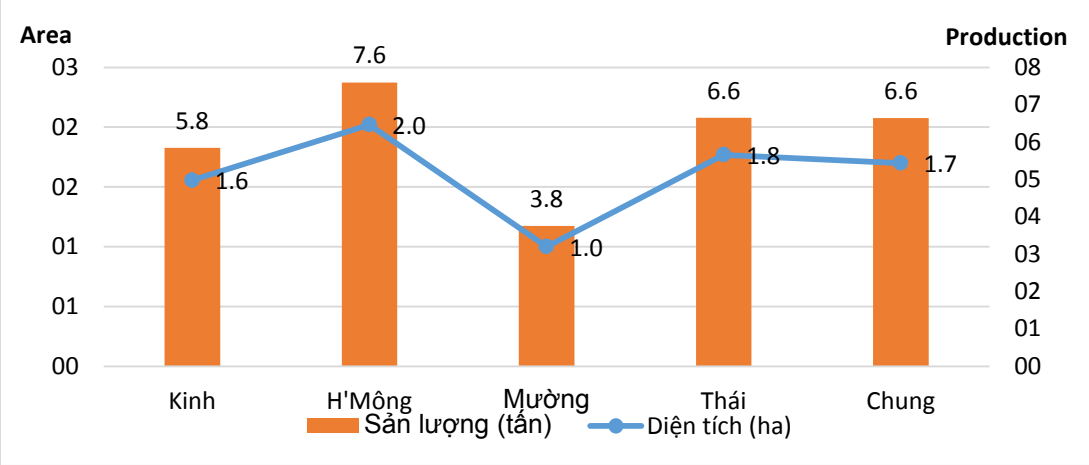
Source: Survey data in 2017

As such, bank funding remains a major support for maize growers in the province as maize production areas are often prioritized for the poor for development loans from agricultural and rural development banks. However, there are still a small number of households, accounting for 1.3% of households borrowing, still rely on material selling

agents of maize buyers later. Talks with some maize buyers showed that they often made payment in advance in agricultural materials as well as consumer goods for maize growers to buy maize from households when harvesting. This is a form of advance investment but also has many limitations. First of all, maize growers have to pay monthly interest for the amount of materials in advance, which is much higher than the interest rate of 1-2% per month. Therefore, the households'income is not much.

The H'Mong households have the largest maize area and output in the surveyed households with an average of 2 hectares and the annual yield is about 7.6 tons while the average of all households is only 1.7 hectares and 6.6 tons.

Figure 16. Maize area and yield of the households



Source: Survey data in 2017

The amount of maize consumed by households mainly in maize (fresh or dried) accounts for 69.7% of annual production, while maize seed is only 29% and milled maize is 1.3%. Maize growers mainly sell maize at the field or at home to collectors or livestock farmers in the area.

Table 6. Percentage of households selling maize by location (%)

Products	Location			Sell to whom		
	At farm gate	At home	Other places	Animal raisers	Collectors	Processors
Fresh maize	63.41	31.71	4.88	2.44	68.29	29.27
Dry maize	51.47	41.18	7.35	1.50	68.95	29.55

Fresh maize kernels	33.33	66.67			70.00	30.00
Dry maize kernels	0.00	78.57	21.43		70.00	30.00

Source: Survey data in 2017

Maize farmers who sell fresh maize products right after harvesting in the field, account for 63,415% of the total households. This figure for dry maize is 51.47%, while maize seed (fresh or dried) is traded at home. This indicates that most maize producers lack the means of transporting fresh maize home or have to sell to the collector for payment for a loan to pay for fertilizers, supplies, etc. during production. Livestock farmers often buy fresh maize for stocking for livestock at the beginning of the crop with cheaper prices. The percentage of households having to sell maize at the collectors' house is not high, less than 3% of the households.

The price of maize of the household is also significantly different by location and type of product. Maize sold at the fields and at harvest time when fresh produce is much cheaper than dried maize and at home. If the producers splited and dried maize seed, the price would be higher.

Table 7. Prices of maize (đ/kg)

Products	At the field	At home	Livestock farmers	Collectors
Fresh maize	2.776	2.833	2.800	2.850
Dried maize	3.124	3.561		3.660
Fresh maize kernels		3.500		3.750
Dried maize kernels		4.108		3.957

Source: Survey data in 2017

For maize production, the households had to invest in fertilizer, pesticides, labor and other services such as land preparation, plant care if they do not have family labor as well as invest in machinery and equipment for water and pesticides spraying, etc.

Table 8. Material costs in maize production of the households (thousand dong/ton)

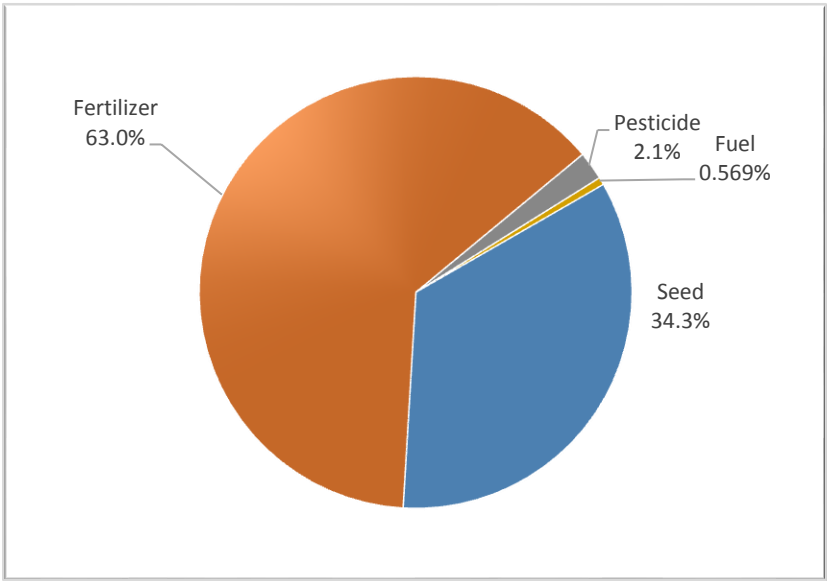
Items	Volume (kg)	Value (thousand dong)	Percentage (%)
Seedlings	5	578	34.3
Ure	62	491	29.1
Phosphate	31	138	8.2
Kali	3	8	0.5

NPK	96	426	25.3
Pesticides	0	36	2.1
Fuels and electricity	0	10	0.6
Total		**1,686**	**100.0**

Source: Survey data in 2017

In maize production in Son La, for the production of one ton of maize, households often pay a direct material cost of about DONG1,686 million. In the direct material costs for maize cultivation, the cost of fertilizer accounts for the largest proportion, about 63%, followed by seed costs - 34.3%, the rest less than 3% is the cost of pesticides and raw materials and fuels.

Figure 17. Material cost structure of maize production (per ton)

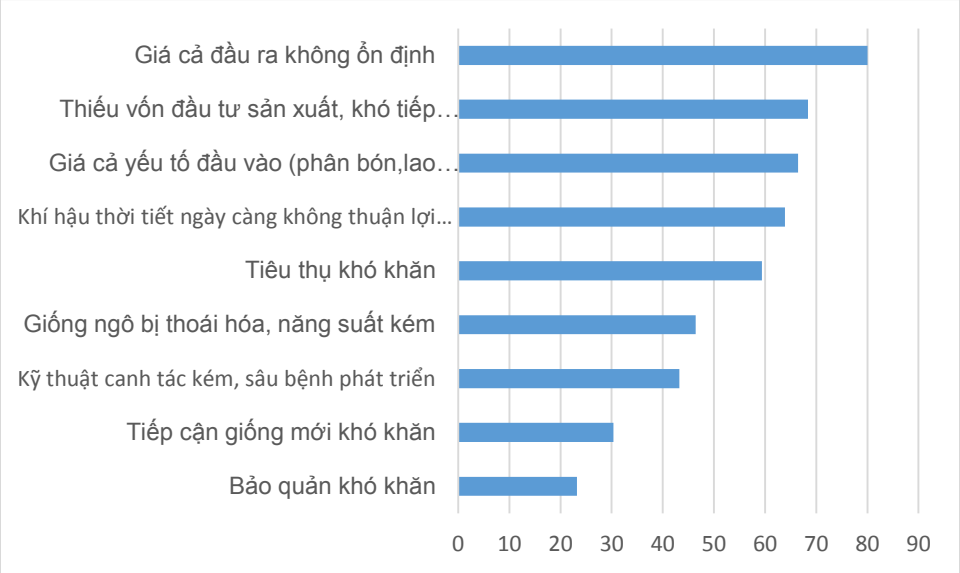


Source: Survey data in 2017

The second largest expense in household production is the depreciation of equipment purchased during the production of maize, valuing 346, 78 thousand dong per ton of product. In addition, for households lacking family labor, it is necessary to hire other services such as pesticides spraying, plant care, harvest, etc., at around dong 65.09 thousand dong per ton of product. The total cost of production of the surveyed households was about 2,098 million dong/ton. Thus, the average selling price of the surveyed households shows that for each ton of maize producers can earn a profit of at least 1 million dong.

In the process of maize production, the households also faced many difficulties, of which the most prominent problem is the precipitous decline in maize prices in recent years. Up to 80% of the respondents complained about the problem. The main reason is due to the fierce competition of imported maize material. This is the commodity imported by feed processing companies for raw materials for feed production for domestic cattle and poultry with prices are much cheaper than domestic maize. Therefore, the demand for raw materials in the country is sharply reduced and prices have also dropped sharply. The second problem faced by maize farmers in Son La is the lack of capital for production, especially for poor households in remote areas. Up to 68% of respondents complained about the difficulty. Next comes difficulties in high input prices - accounting for 66%; climate weather which is not favorable for maize production - accounting for 64%; Consumption of maize is difficult - accounting for 59%, degrading maize breeds - 46%, etc.

Figure 18. Percentage of households facing difficulties



Source: Survey data in 2017

In Son La province, over the last few years, the government and its partners in the chain, such as collectors and processors, have taken measures to support maize growers, but not much. This has been demonstrated by the fact that beneficiaries are still low. The most participatory means of support were farmer training sessions on cultivation

techniques - 28.4% of respondents were involved. The next is loans for investment - 26.5% of households. Trade support measures are at least under 15%.

Table 9. Support measures for maize growers

Support area	Percentage (%)
Loans for Investment	26.5
Price subsidies for inputs	14.2
Organizing training on cultivation techniques	28.4
Product consumption support	14.2
Build up business linkage to ensure output for the household	11.0
Credit incentives	9.7
Assistance to purchase equipment and machinery	18.7
Other	0.6

Source: Survey data in 2017

3.2.2 Purchasing Households/Units

Out of 61 households/units collecting maize in 4 districts of Son La province, more than a half (52.5%) are Thai ethnic group; 29.5% of the Kinh ethnic group, while the H'Mong ethnic group only accounts for 4.9%. As a result, households engaged in the collection of maize in the province are mainly Thai and Kinh. The number of laborers engaged in buying maize from the households is very different. Thai households have 2.8 laborers involved in purchasing maize, while this figure for Kinh households is 2.2 people; H'Mong people - 2.0 people.

Table 10. General information on collectors

Indicators	Kinh	H'Môn g	Thai	Other
Ethnic group (%)	29.5	4.9	52.5	13.1
Number of people	3.9	4.3	5.4	5.0
Number of employees, of which:	3.9	4.3	5.4	5.0
Number of laborers purchasing maize (people)	2.2	2.0	2.8	2.3
Working capital (dong million)	1,644	75	569	500
Warehouse area (m2)	281.3	126.7	409.4	323.1
Years of experience	11.7	5.0	7.0	10.6

Source: Survey data in 2017

The working capital of maize households is also very different. Kinh households have much more capital than other households, on average more than 1.6 billion dong,

while this figure for Thai is only 569 million dong and Hmong households only about 75 million dong. In terms of experience in buying and selling maize, Kinh households is 11.7 years longer than 7 years for Thai and 5 years for H'Mong households. It can be said that the purchase of maize in the area is done by the Kinh and Thai. In the process of trading, maize collectors have to mobilize capital from two main sources: banks and family/friends, of which the capital from the bank accounts for 92% of the loans of the households that have to borrow capital.

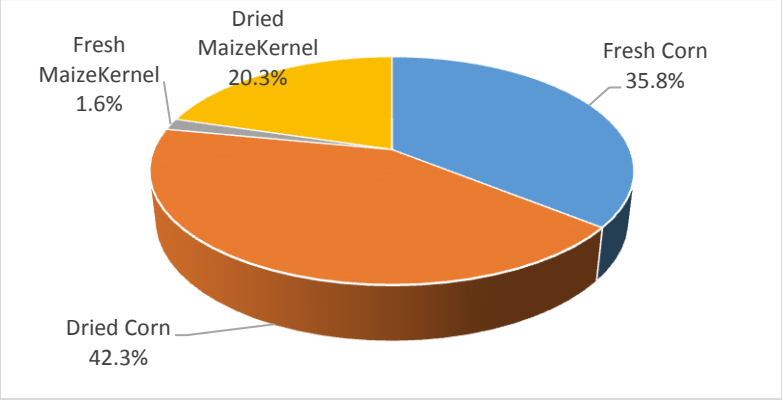
Table 11. Source of funds mobilized by purchasing households (%)

	Percentage of households borrowing loans	Average amount of loans	Percentage of Average amount of loans for investment in maize cultivation	Average Loan term	Average Interest rate/year
Banks	92.0	689.0	89.0	20.0	9.7
Family/Friends	8.0	73.8	100.0	9.8	9.3

Source: Survey data in 2017

The average amount of capital mobilized from the bank is 689 million dong compared to 73.8 million dong from family and friends. This is a 20-month loan from a bank and 9.8 months from friends and relatives. Interest rates of these two sources are not much different: 9.7% for bank loans and 9.3% for loans from relatives and friends.

Figure 19. Percentage of households purchasing by type of maize (%)



Source: Survey data in 2017

Households can purchase maize in some form such as: fresh maize (harvesting day), maize kernels (for a post-harvest period) or fresh maize seeds of people who have maize graining machine.. Up to 42.3% of households buy maize in the form of dry maize, while the percentage of households buying fresh maize is 35.8% of the surveyed households. The number of households buying seeds (fresh or dried) was low, accounting for only 22% of the surveyed households.

Buyers outside the purchasing facility with the area of stockpiles also mobilize laborers to the field or the residence of maize growers to buy maize.

Table 12. Location of maize – selling households (%)

	At the maize fields	In maize growing households	In maize purchasing units	In maize collecting households at 1st level	In maize processing units
Fresh maize	72.7	22.7	4.5	-	-
Dry maize	51.9	40.4	5.8	1.9	-
Fresh kernel maize	-	50.0	50.0	-	-
Dry kernel maize	8.0	72.0	12.0	4.0	4.0

Source: Survey data in 2017

Majority of households buy maize at the fields or at home of maize growers for fresh maize and dried maize. Over ¾ of fresh maize and ½ of dry maize were purchased at the fields while maize (fresh or dry) was purchased mainly at the maize farmer's houses or at the purchasing units. In addition, collectors can mobilize maize products in other communes in the district or in other districts in Son La.

Table 13. Percentage of households by purchasing area (%)

	In communes	In districts	In the province
At the maize fields	73.2	23.2	3.6
In maize growing households	59.1	38.6	2.3
In maize purchasing units	47.1	47.1	5.9
In maize collecting households at 1st level	40.0	40.0	20.0
In maize processing units	100.0	-	-

Source: Survey data in 2017

The product prices from collectors depends on the type of product as well as the location where the household collects the product. The lowest is the fresh maize

purchased at the fields at harvest time and the highest price is for the dried maize at households/collectors at 1st level. Consequently, collectors often take advantage of the harvest time because of abundant maize supply and fresh maize, the price will be cheaper.

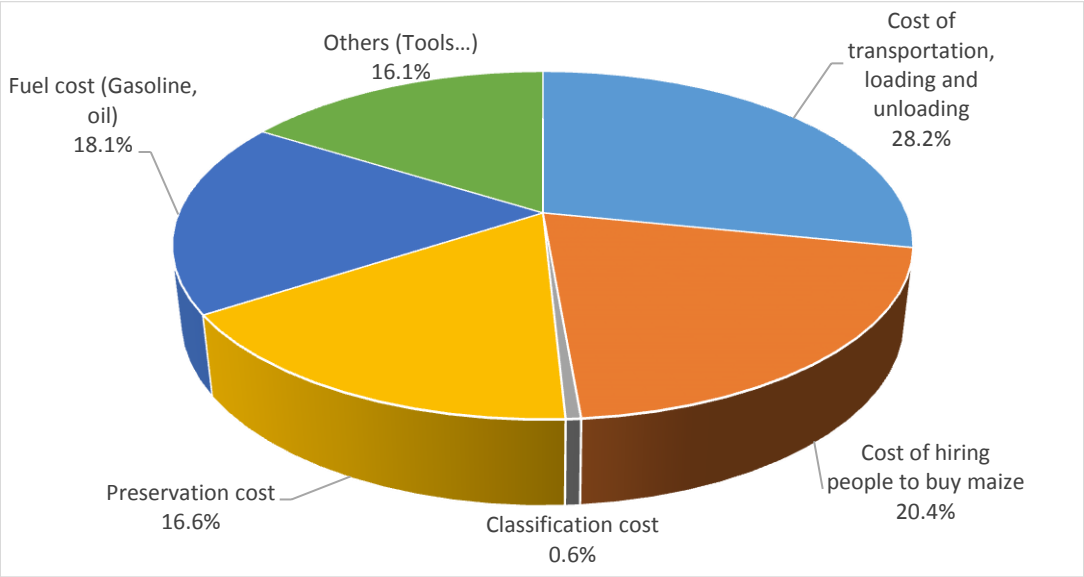
Table 14. Buyers' price of maize (DONG/kg)

	At the fields	At households	At purchasing units	At households/collectors at 1st level
Fresh maize	2,853	2,780	2,900	
Dried maize	3,400	3,505	3,450	3,400
Fresh maize kernels		3,300	3,500	
Dried maize kernel		4,386	4,283	4,500

Source: Survey data in 2017

Depending on the location of the purchase, the households had to pay additional items such as transportation, loading and unloading or fuel costs such as gasoline, oil, etc. The cost of transporting maize from the place of purchase to the collecting units accounted for 28.19% of the total cost of purchasing 1 ton of maize. Next is the cost of remuneration for the purchaser, which accounts for 20% of the total cost.(See the Figure 20)

Figure 20. Cost structure of maize purchase of households (%)



Source: Survey data in 2017

So even if fuel costs are included, the cost of transporting maize accounts for nearly 60% of the total purchase cost, while storage cost account for 16.6%.

In addition, collectors have to invest in equipment to maintain their purchasing activities. First of all, it is the storage where the maize product is preserved. As maize is collected from the fields/houses, transportation vehicle mainly include small cars or agricultural machines.

Table 15. Initial investment costs of collectors

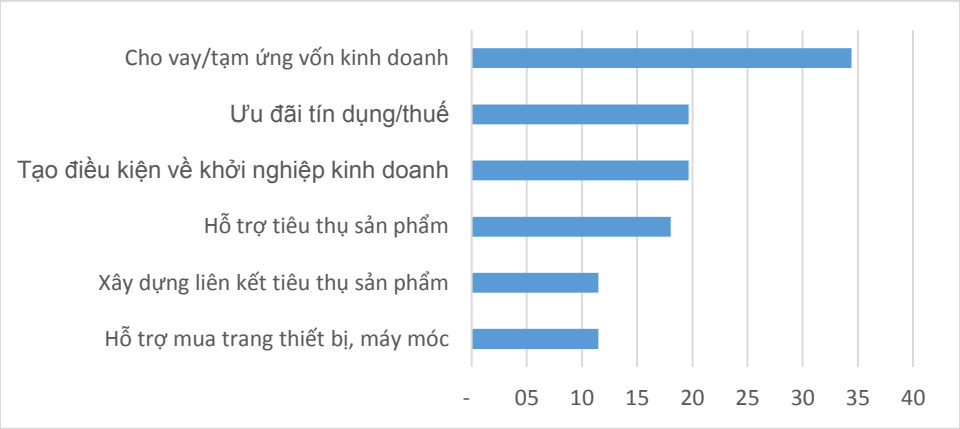
Equipment	No. of year using	Value of investment (million dong)	Depreciation/year/ton (thousand dong)
Warehouse	5.4	219.2	62.2
Electronic scale	1.6	38.0	26.3
Cars/agricultural machine	4.2	415.1	1.6
Repair costs for warehouse	0.1	4.3	83.4
Expenses for repair/upgrading cars	0.7	21.0	53.2
Other expenses	7.6	17.2	35.2
Total initial investment cost		714.8	261.9

Source: Survey data in 2017

The amount of money spent on these equipments is not small, more than 700 million dong, so the lower-income households unable to afford equipments must sell maize in the fields or at home at lower prices than that from collectors or processing households. This value of the equipment will be depreciated annually and included in the product cost.

During the process of buying maize, the households encountered many obstacles which affected the income of the household. The households are very interested in borrowing loans. About 34.4% of surveyed households are interested in loans. The second important issue is the preferential policy on credit and taxation for agricultural products, accounting for 19.7% of surveyed households, equal to the percentage of households interested in facilitating the business environment. The problem of product consumption was also raised by 18% of surveyed households.

Figure 21. Percentages of households accessing to support solutions



Source: Survey data in 2017

An important factor in the value chain of Son La maize is the participation of households/purchasing units in Hanoi. These are the stimulants for the consumption of Son La maize throughout the country.

Table 16. General information on purchasing households in Hanoi

Indicators	Kinh	Others
Ethnic group (%)	36.4	63.6
Number of labor purchasing maize	5.3	5.2
Working capital (million dong)	41,333	1,667
Warehouse area (m^2)	7,750	535
Years of experience	14.3	15.7

Source: Survey data in 2017

Based on data collected from 11 households in Chuong My district where consumed maize of Son La households, compared with the collection households in Son La province, the households here have a larger business size both in terms of number of employees and warehouse area. Their business capital is more than dong 41 billion for Kinh households and more than dong 1.6 billion for other ethnic households. Years of experience of the households are usually over 15 years.

In terms of product types, households in Hanoi only buy maize that has been dried (maize or maize kernels), which is mainly dried maize, accounting for 90.8% and only 9.2% is dried maize. The maize sellers for these households are maize purchasing or

processing households in Son La province, so the volume of transactions is usually very large under the contracts they have gained.

Almost all households have to mobilize capital from banks with an average loan of about 30 million dong per loan with a term of 7-8 months and a pretty high interest rate of 13.6 percent. The average purchasing cost of household is 100-160,000 dong/ton for maize or maize seed.

The purchase price of maize dried at the premises in Hanoi averaged 4667 dong/kg. Maize prices of these facilities fluctuate at 4900-5260 dong/kg. These units usually sell to collectors or feed mills in neighboring provinces.

The level of initial equipment investment of the collectors in Hanoi is also larger. The value of the storage is over 3 billion dong, the transport is also bigger than dong 800 million, etc. Thus, the collectors here have to spend a considerable amount of capital of more than 4.2 billion dong. However, the annual depreciation rate for 1 ton of purchased products is higher than that of the collectors in Son La.

Table 17. Initial investment cost of Hanoi collectors

Equipment	Used year (year)	Value of investment (million dong)	Depreciation/year/ton (thousand dong)
Warehouse	6.5	3,313.6	77.3
Electronic scale	0.7	63.6	6.1
Cars/agricultural machine	0.5	781.8	0.1
Repair costs for warehouse	8.6	30.7	5.7
Expenses for repair/upgrading cars	-	-	-
Other expenses	6.0	56.4	2.5
Total initial investment cost	-	4,246.2	91.7

Source: Survey data in 2017

Hanoi collectors are those who transport maize products from Son La to companies/exporters. They are facing less difficulties and risks because they orders the suppliers in Son La to mobilize maize with calculated prices in their favor.

3.2.3 Processing households/units

Maize processing households in Son La province are mainly Kinh and Thai. Processing activities in the area require capital and equipment and especially convenient

conditions for handling and trading. So these are the households living in the district center, who have years of experience in processing over 10 years with the volume of purchasing and processing from 2-3 thousand tons per year.

Table 18. General information on processors in Son La province

	Kinh	Thai
Ethnic group (%)	63.6	36.4
Number of people	3.9	5.3
Number of employees	2.4	3.8
Volume (tons)	3,054	2,115
Years of experience	13.2	10.3

Source: Survey data in 2017

Apart from household labor, processing households also mobilize capital from banks. As many as 89.5% of surveyed households have access to this loan source and the average loan is over 2 billion dong per household. Term of loans is quite long, the average one is 17.6 months with interest rates above 10% per year.

The processing activities of households in Son La are rather poorly concentrated mainly on drying or grinding maize to mainly serve the livestock farmers. Machines for these activities are mainly maize seed spliting machines, dryers, shovels or mills. Storage occupies the largest value, accounting for one third of the total value of the original shopping. The amount paid by the processing households was much higher than that of the collectors, reaching over 3.3 billion dong. The cost structure of this equipment depreciation per ton of processed products showed that 20.7% was the cost of the warehouse 15.1% - the cost of the mill, while the costs of the maize seed corn kernel picking machines and drying machines are 11%.

Table 19. Investment in equipment of processing households in Son La

Equipments	No. of year using	Value (million dong)	Depreciation/year/ton (thousand dong)
Workshop	10.6	1,254.6	46.1
Electronic scales	6.7	471.7	8.3
Maize pickers	7.5	139.1	10.8

Equipments	No. of year using	Value (million dong)	Depreciation/year/ton (thousand dong)
Dryers	9.3	238.3	13.5
Grinders	7.8	20.2	33.6
Excavator	6.0	465.7	17.5
Fire protection equipment	5.0	5.0	0.1
Fixing and upgrading cost	1.0	66.3	9.0
Others	4.2	645.7	83.1
Total		3,306.6	222.0

Source: Survey data in 2017

In order to have raw materials for processing, the households mobilize maize products such as fresh maize, dried maize and fresh maize from maize growers in the area or from collectors. Due to their simple operation to maintain their income, these households act as collectors for cheaper and more proactive inputs. However, the purchase area of the household is mainly at its processing plant, accounting for 90-93% of the total volume of processed raw materials annually.

Table 20. Location of maize purchasing of processors in Son La province(%)

	In the processing units	At the maize fields	In maize producing households
Fresh maize	93.5	2.8	3.7
Dried maize	89.8	6.0	4.2
Fresh maize kernels	100.0		

Source: Survey data in 2017

In addition to the main source of maize in the commune accounting for over 70%, maize processing households also mobilized maize from other communes in the district. Some households also mobilized maize from other processing units in the province, but only 6%.

Table 21. Percentage of households purchasing by sources (%)

Location	In the commune	In the district	In the province
At processing units	76.5	17.6	5.9
At the maize fields	70.0	30.0	
At maize growers' house	75.0	25.0	
At collectors' house	100.0		

Source: Survey data in 2017

Processing costs of the household depend on deep processing (grinding) or only by separating maize seed or drying. Expenditures incurred in processing operations include fuel, electricity, labor and operation costs as well as expenses for preservation of maize such as mold prevention and antiseptic.

Table 22. Maize processing cost (thousand dong/ton)

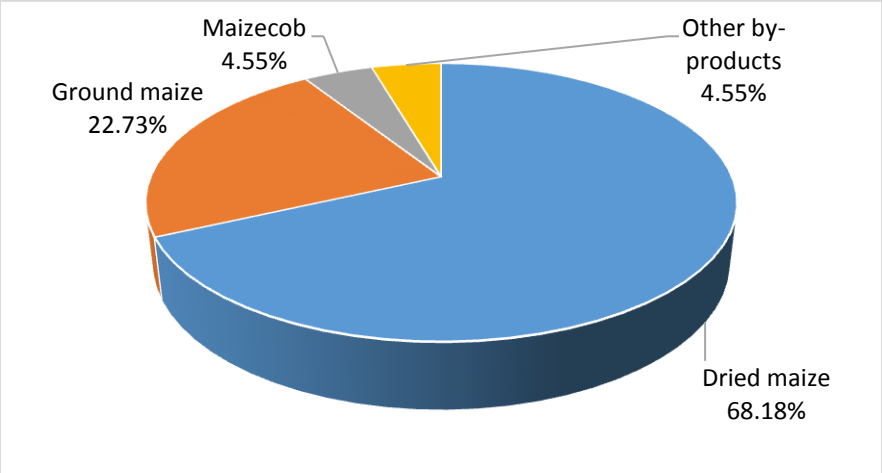
Items	Picking maize	Drying	Grinding
Fuel costs	6.3	38.4	127.3
Electricity costs	20.0	33.8	18.3
Labor costs	26.7	53.0	30.0
Anti-molds and antiseptic	20.0	42.5	11.5
Other expenses		15.0	10.0
Total	73.0	182.7	197.2

Source: Survey data in 2017

The aggregate data show that the cost for separating maize seed is only 73,000 dong/ton while the cost for drying is 182,700 dong/ton and grinding is 197,200 dong/ton.

The processed products of the households are mainly dried maize after being picked and dried and ground maize to serve as livestock feed. There are also some other by-products such as maize cobs for fuel. However, dried maize accounted for the largest proportion of the processor, accounting for 68.18% of the value sold. Next comes the crushed maize 22.73%, while the maize cob 4.65% and other by-products - 4.55%.

Figure 22. Percentage of products sold by processing households



Source: Survey data in 2017

The customers of maize processing households are in a wider range, especially for dried maize. Up to 40% of dried maize seed of processing households is consumed outside the province. While ground maize is sold mainly in the commune, accounting for 2/3 of the processed products. Main by-products are mainly consumed in the commune.

Table 23. Product consumption by province (%)

	In the commune	In the district	In the province	Outside the province
Dried maize seed	40.0	10.0	10.0	40.0
Ground maize	66.7	16.7	16.7	
Maize cob	100.0			
Other by-products	100.0			

Source: Survey data in 2017

The selling price of the processing household varies according to the type of products and the customers as well as the place of sale. The highest selling price of maize was obtained from feed processing units at more than 5,000 dong/kg, while the figure was only 4,850 dong/kg for local producers and 4,960 dong/kg for higher level agents. The same situation is for ground maize products.

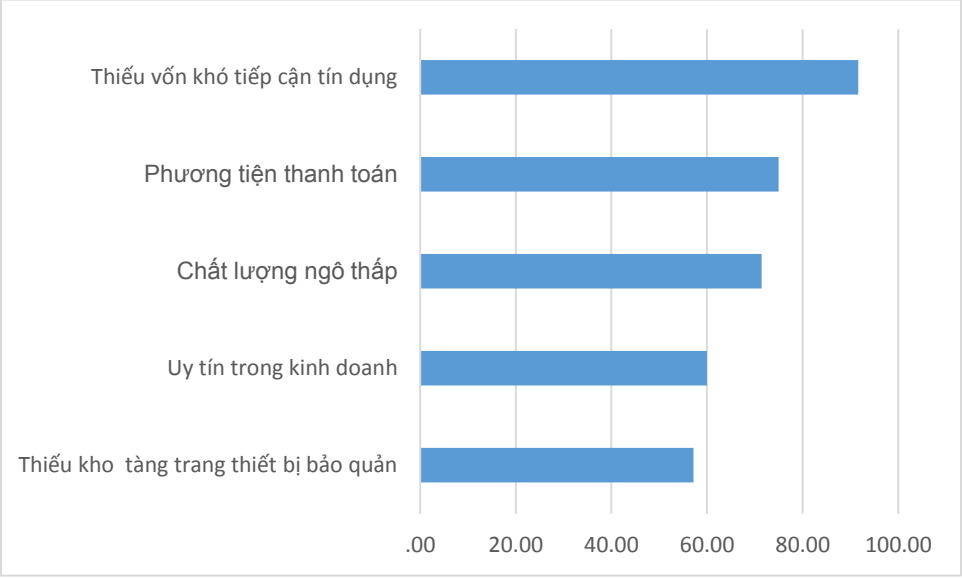
Table 24. Sale price of processing households (dong/kg)

Products	In the processing units	Livestock farmers	Higher level agents	Feed processing units
Dried maize kernels	4,800	4,850	4,960	5,058
Ground maize	5,475	5,600	5,700	-
Maize cob	700	-	-	-
Other by-products	4,500	-	-	4,900

Source: Survey data in 2017

In the processing, the households face some difficulties such as the lack of store management, maintaining the prestige in business, etc. Lack of capital and access to credit is the biggest obstacle in processing activities of the households. Up to 91.7% of respondents said that this is an important issue in processing today. The second most important factor for households is the means of payment, with rate of 75% of households interviewed. The quality of maize was also important for the processing efficiency of the households with the rate of 71.4%, while 57.2% of the interviewed households still encountered difficulties in expanding storage and storage facilities

Figure 23. Percentage of households facing difficulties



Source: Survey data in 2017

3.3 Linkage between actors

The survey results show that actors in the maize value chain are relatively independent. All trade interactions between agents are based primarily on market supply and demand. When it comes to harvesting season, maize buyers come to the field (where maize is produced) or to the maize grower's home to buy maize. Prices are usually negotiated between the two parties. Buyers usually make the price before depending on the consumption situation in the area for their most benefit. Maize growers often rely on information from many collectors or reference from their relatives to get the best deals. In remote areas, maize growers are less likely to be financially dependent, so they often get advance of material inputs and other household items such as rice, foodstuffs for households/collectors and make payment when maize is harvested, therefore, this advance binding is more tightly. At the end of the harvest, the households/ collectors will sell the maize to clear the debt. If the volume of maize is large enough, the debt will be deducted. In many cases, however, due to crop failure or maize growers sell to others, the losses is in the buyer/ collecting agent. There are many households/collectors who are still debtors with pretty big amount of money. As such, there are many risks to this form of informal credit.

The consumption of maize by the households/collectors or processors through partners in the province and outside the province often through verbal contracts (telephone orders) also faces many risks come from uncertainties of maize price.

Households/collectors or processors tend to be bullish on maize. This is a popular business in Son La province. However, these households often face many risks such as:

- Post-harvest losses (low maize quality, termites, etc.)
- Market instability (price drop)
- Difficulties in consumption (no buyer)

In short, the actors have a relatively independent association with no linkage to improve the efficiency of the chain.

3.4 Effectiveness of the maize value chain

The maize value chain survey in Son La province shows that there are 3 main channels for maize consumption in Son La province and the costs and benefits of the actors in the chain are very different.

3.4.1 The first consumption channel

This is the most popular channel in which the maize produced by the farmers is sold directly to the collectors, then to the processors and finally to the consumers in the province so it can be seen as the provincial channel.

A combination of survey data from the actors in the maize value chain in Son La province shows that total additional investment in the chain is 3.1 million dong/ton, of which maize growers have the largest investment of nearly 2.1 million dong.

Table 25. Efficiency of maize value chain in the 1st channel (calculated by per ton)

Actors	Cost added (thousand)	Revenue added (thousand)	Profit (thousand)	Rate (%)	Investment effectiveness
(1)	(2)	(3)	(4)=(3)-(2)	(5)	(6)=(4)/(2)
Maize grower	2,098	2,844	746	44.8	0.36
Collectors	188	230.6	43	2.6	0.23
Processors	850	1725	875	52.6%	1.03
Total	3,136	4,800	1,664	100.0%	0.53

Source: Survey data in 2017

The additional costs of collectors and processors are not much: 188 thousand dong for collectors and 850 thousand dong for processors. However, the profitability of the actors is very different: the collectors only get 43 thousand dong per ton product, while the figure for the producers is 746 thousand dong and the processor earns at most 875 thousand dong per ton product. Thus, of the total 1,664 million dong of additional profit gained from the value chain, the producers received 44.8%, the collectors - 2.6% and the processors 52.6%. Maize growers invest more but the profits are not good enough so the investment efficiency is only 35.6% while the processors have investment less than half of the maize growers but gain the efficiency of 103% . The level of profit distribution is

not very fair among actors. Taking into account the scale of production and business of the actors, the collectors and processors have thousands of tons of maize per year while the producers only have tens of tons, which shows the annual profit of these actors are obvious differences.

3.4.2 The second consumption channel

This is the most popular channel where the maize produced by the farmers is sold to the collectors, then to the processors in Hanoi and finally to the consumers, so it can be seen as the outside -province consumption channel.

In this channel, the total added cost of actors caculated in one ton of product is 2.68 million dong, in which the cost of processors in Hanoi is the lowest (much lower than the investment of the growers) but their profit is not small, accounting for 32.3% of the total added profit of the chain. Especially, the investment efficiency of the processors in Hanoi is much higher than that of other actors

Table 26. Efficiency of maize value chain in the 2nd channel (calculated in one ton)

Actors	Cost (thousand)	Revenue (thousand)	Profit (thousand)	Profit share (%)	Investment effectiveness
(1)	(2)	(3)	(4)=(3)-(2)	(5)	(6)=(4)/(2)
Maize growers	2,098	2,844	746	26.5	0.36
Collectors	492	1650.0	1,158	41.1	2.35
Processors in Hanoi	90	1000	910	32.3	10.11
Total	2,680	5,494	2,814	100	1.05

Source: Survey data in 2017

3.4.3 The third consumption channel

This is the shortest consumption channel in the local area, in which the maizes produced by the farmers are sold to the collectors through the local consumers who are mainly the farmers.

In this channel, the total added cost of the actors caculated by per ton of products is nearly 2.3 million dong, most of which come from maize growers. The added profit of the channel is not large and the profit is mainly attributed to the maize growers. The

investment efficiency of the actors in the channel is very low, the rate of added profit is only at 23-36%.

Table 27. Efficiency of maize value chain in the 3rd channel (calculated in one ton)

Actors	Cost (thousand)	Revenue (thousand)	Profit (thousand)	Profit share (%)	Investment effectiveness
(1)	(2)	(3)	(4)=(3)-(2)	(5)	(6)=(4)/(2)
Maize growers	2,098	2,844	746	94.6	0.36
Collectors	188	231	43	5.4	0.23
Total	2,286	3,075	789	100.0	0.35

Source: Survey data in 2017

By looking at different consumption channels in the value chain of Son La province, it is shown that the maize value chain by the second channel has the rate of return added over the added cost of 1,05 times, by the first channel of 0.53 times, and by the third channel of 0.35 times. Thus, with the participation of processors in Hanoi the value added of the chain will be larger than the simple chain of the third channel.

However, in order to participate more deeply in the consumption channel, the actors are required to have good conditions of fund, transports and reliable customer networks. For maize growers, the most important condition is stable quantity and quality of maize. Moreover, another requirements are stable prices and firm linkages to collecting cooperatives or processing co-operative. As for collectors, the critical condition are the out-of-province network, transportation, storage or packaging, etc.

CHAPTER IV: CONCLUSION AND RECOMMENDATION

4.1 Conclusion

Maize is an importatnt food in the development of Son La province, especially in the moutainous area. This is the main income for residents in balancing food at home and input for animal raising in the region.

The active participation of actors including maize growers, collectors and processors in the maize value chain of the province has contributed to the expansion of the marketing channel to neighboring areas including Hanoi market. This involvement of the actors depends much on customer networks, business conditions (transportation etc.)

As a result, all actors have to face many risks in chain operation such as low product quality, price change, high prices failing to compete with imported products and so on... Moreover, the maize products have not been diversified. Now they are still grown for maize kernels while the development of dairy requires the use of maize for green feed which is not yet developed by households.

Maize growers are mainly based on the collectors, without any linkages in the production and consumption of products, so the power of contracts is still limited and prices still low. The prices of maize are mainly determined by collectors.

The maize products are relatively simple, including fresh maize or dried maize and fresh maize kernel and dried maize kernel. The other processed products such as milled maize account small ammount, in turns making the added value of the maize value chain still low.

Some links in the maize value chain have met some limitations in infrastructure for production zone (such as roads for transporting commodity), investment capital in production, processing and preservation.

Institutional relationships such as the development of cooperative models, large fields or advance investments, contracted consumption have not been paid much attention

to by operators. Thus, maize production and trading has not been sustainable and effective.

In the current maize consumption channel in Son La province, the second channel obtain the greatest investment efficiency and added profit. However, in order to make the most of this channel, chain actors must have large consumption networks, big equipment for transport and storage.

4.2 Recommendation

Investment in transportation and commercial infrastructure for the maize growing area is needed to reduce transportation costs as well as other logistic costs.

Restructuring the maize industry on the basis of increasing value-added through deeply processing forwards to feed production in the livestock sector in the province and the Northwest.

Assisting maize growers, particularly poor households in the remote areas in accessing to credits, technical services and sustainable maize production processes for productivity and quality improvement.

Developing maize growing cooperatives where farmers can link to each other in production, processing, negotiating sales contracts for better prices and other contract terms

Developing advanced preservation and processing technologies to increase product value, minimize post-harvest losses, and efficiently utilize maize by-products in the area. Particularly avoiding dependence on consumption markets in other provinces and the competitiveness of imported maize.

For the sustainable maize development, it is required to organize production, processing and consuming maize in value chain in which the main role is great enterprises in financial investment, seed and integrated farming system support in oder to ensure the volume and quality of products meeting safety standards of animal feed consumption and processing.

Increasing investment by scientists, businesses, international organizations continue to support the province research and apply new scientific and technological advances in intensifying crop yields as well as building models of sustainable maize value chains then harmonizing the benefits of actors in the chain.

4.3 Some lessons learnt from the survey

In order to obtain comprehensive results on value chain surveys, it is noted as follows:

- Identifying the content, objects and interviewers in the survey
- Identifying actors in the value chain
- Classifying objects to survey
- Identify sample size with the acceptable accoutability, suitable human and fund resource
- Define the how to select samples
- Making survey from producers (farmers), traders, wholesalers, retailers, processors to consumers of processed maize products.
- It is required to call for involvment of stakeholders during the survey and finalizing the report.
- The selection of actors for survey should be carefully considered because many of them are so busy that they can participate in the project.
- Interviewing processors/collectors at the place they are working is very costly and therefore it should be prepared and contacted in advance. Sometimes investigators are required to follow vehicles transporting the products from the farmers to the collectors/processors to collect the information.

4.4 Meaning of the value chain survey

The value chain can be analyzed from all perspectives of any actors. Chain analysis is usually used for companies, enterprises or government agencies. The four aspects of value chain analysis in agriculture are included as follows:

- Firstly, value chain analysis helps us map systematically the actors in production, distribution, marketing a specific product
- Secondly, value chain analysis plays a central role in determining the distribution of benefits to chain actors.
- Thirdly, value chain analysis can be used to determine the role of value chain upgrading.
- Fourthly, value chain analysis can emphasize the role in value chain management.
- Through the value chain, it can be known the efficiency of using resources in production, the causes affecting the economic efficiency to take appropriate measures for economic efficiency improvement in agricultural production.

The value chain is seen as a basis for identifying directions for high growth in agricultural production. If economic efficiency is low, it is possible to increase agricultural output by measures of improving economic efficiency, while for high economic efficiency and productivity it is needed to innovate technology.

Thus, value chain analysis can be seen as the basis for formating programs or projects of supporting a value chain or a number of value chains to achieve certain desired development sequences. It also can be seen as the initiate process of changing production and business strategies towards stability, sustainability.

It is hoped that this method could be applied to make surveys in the maize growing areas throughout the country, so that the overview of the whole maize value chain in Vietnam can be shown. From this method, it is possible to conduct value chain investigations in other agricultural commodities.

Appendix 1. Questionnaire

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

CENTER FOR INFORMATICS AND STATISTICS

Corn value chain survey

Questionnaire 1/SX. MAIZE FARMER HOUSEHOLDS

I. GENERAL INFORMATION

No.	

1. Identity		
1.1.District		
1.2. Commune/ ward / town		
1.3 Village		
1.4. Name of household head		Tel.:
1.5. Ethnicity		
1.6. Education level of head	1. Primary school 2. Junior high school 3. High school 4. College/University graduate 5. Postgraduate	
1.7. Name of respondent		Tel.:
1.8 Relationship of the respondent to the household head		

1.9. Number of family members: …… persons

1.10. Agricultural labor: ……. persons In which: Female:…….. Persons

1.11. Labor participates in maize cultivation: …….. Persons

1.12. Income from agriculture per year ……. Mil.dongs

II. RECENT CORN PLATING SEASON IN 2017

2.1 How many corn planting season are grown in the year?……..season

Season 1 is planted from…… to …….

Season 2 is planted from…… to …….

2.2. Planted area of recent corn planting season: ……...m^2,

2.2.1. Number of corn plot: .....

2.3. The latest corn output: ....tons

2.4. Use of corn for breeding: ..... Kg

2.5. For sale: ..... Kg

2.6. Buying more: ……. Kg

2.7 Does the household have corn seed peeling machine? 1. Yes 2. No

2.8 Does the household have a corn crusher? 1. Yes 2. No

III. SELLING CORN

3.1. Sales volume of recent corn planting season by type of corn

	ĐVT	At corn farm	At corn grower household	Breeders	Purchasers	Processing est.	Other ……
Fresh corn							
Volume	Ton						
Average price	d/kg						
Dried corn							
Volume	Ton						
Average price	d/kg						
Fresh corn kernel							
Volume	Ton						
Average price	d/kg						
Dried corn kernel							
Volume	Ton						
Average price	d/kg						
Milled corn							

	ĐVT	At corn farm	At corn grower household	Breeders	Purchasers	Processing est.	Other ……
Volume	Ton						
Average price	d/kg						
By-product of corn (cob, stem, leaves ...)	Mil. dongs						

3.2. Sale destination

3.2.1. By types of corn

Unit: %

	Within Commune	Within District	Within Province	Different Province	Other	Total
Fresh corn						100
Dried corn						100
Fresh corn kernel						100
Dried corn kernel						100
Milled corn						100
By-product of corn (cob, stem, leaves ...)						

3.2.2 By byers

Unit: %

	Within Commune	Within District	Within Province	Total
Livestock households				100
Purchasing corn establishments				100
Processing establishments				100
Other……..				

IV. PLANTING COST OF RECENT CORN SEASON

4.1 Initial investment cost

Unit: mil.dongs

Content	Years of use	Initial value	Note
Corn storehouse			
Car/agricultural vehicle			
Motorbike			
Buffalo, cow			
Corn seed peeling machine			
Corn crusher machine			
Expenses for repair and renovation of machine			
Other expenses…….			
Total initial investment			

4.2 Do you apply for production loan?

1. Yes 2. No If “yes” please fill in the following table

Lender 1. Bank/Credit Fund 2. Family/Friend 3. Material Supplier 4. Buyer 5. Others (please specify)	Initial loan (million VND)	Investment ratio for processing corn (%)	Year of loan	Term of Loan (Month)	Interest rate (%/year)	Amount owed to date (million)
1	**2**	**3**	**4**	**5**	**6**	**7**

4.3 Cost of corn seed

Content	Quantity (kg)	Unit price (1000đ)	Amount (1000đ)
1. Buying seeds			
2. Self-produced seeds			

4.4. Cost of fertilizer

Content	Quantity (kg)	Unit price (1000đ)	Amount (1000đ)
Total cost of fertilizer			
4.4.1. Chemical fertilizers			
1.1 Urea			
1.2 Phosphorus fertilizer			
1.3 Kali			
1.4 NPK			
1.5 DAP			
1.6 Microbiological fertilizer			
1.7 Other:……			
4.4.2. Manure			
2.1 Buying			
2.2 Self-produced			

4.5. Cost of pesticides, raw materials, taxes, fees

	Amount (1000 dongs)		Amount (1000 dongs)
Total		4. Cost of machine repair	
1. Pesticides		5. Cost of irrigation and drainage	
2. Petrol, oil, grease, lubricant		6. Taxes, fees	
3. Electricity			

4.6. Cost of hiring labor		
	Amount (1000 dongs)	Note
Total		
1. Renting machine and equipment (tillage machine, spraying, fertilizing)		
2. Soil tillers		
3. Renting means of transportation		
4. Taking care (irrigation, weeding ...)		
5. Fertilizing, spraying		
6. Harvesting		
7. Corn seed peeling		
8. Grinding corn		
9. Shipping		
10. Drying		
11. Others		

4.7. Cost of self-employed labor of the household			
	Number of work day	Amount (1000 dongs)	Note
Total			
1. Tillage			
2. Weeding			
3. Fertilizing, spraying			
4. Harvesting			

5. seed peeling, grinding			
6. Shipping			
7. Drying			
8. Others			

V. DIFICULTIES IN PRODUCING CORN

No	Type of Difficulty	Yes or No? 1.Yes 2.No	Seriousness 1. Very serious 2. Serious 3. Not very serious 4. Not serious
1	Lack of funding/Difficult to access credit		
2	Prices of input (fertilizer, labor ...) increase		
3	Unstable selling price		
4	Corn degeneration, poor yield		
5	Access to new varieties difficult		
6	Climate is increasingly unfavorable (drought, flood, ...)		
7	Poor farming techniques, pests and diseases		
8	Preservation difficult		
9	Sale difficult		
10	Other:…….		

VI. Support from State (Central Government and Local Authority) / Partners (Purchasing Agent/Business):

No.	Type of support	Yes or No? 1.Yes 2.No	Impact on production 1. Very effective, 2. Effective 3. Not very effective 4. No effective
1	Investment loans		
2	Price subsidies (varieties, fertilizers, medicines, ...)		
3	Organize training on cultivation techniques		
4	In product sale		
5	Build up business linkage to ensure output for		

	households		
6	Credit incentives		
7	In purchasing equipment and machinery		
8	Others……		

VII. Recommendation to improve efficiency in producing corn

……

……

……

……

……

……

Interviewer

(Sign & State Full Name)

Interviewee

(Sign & State Full Name)

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

CENTER FOR INFORMATICS AND STATISTICS

Corn value chain survey

Questionnaire 2/TM. CORN PURCHASING HOUSEHOLDS/ESTABLISHMENTS

Number ____

I. GENERAL INFORMATION

1.1.District		
1.2. Commune/ ward / town		
1.3 Village		
1.4. Name of household head		Tel.:
1.5. Ethnicity		
1.6. Education level of head	1. Primary school 2. Junior high school 3. High school 4. College/University graduate 5. Postgraduate	
1.7. Name of respondent		Tel.:
1.8 Relationship of the respondent to the household head		

1.10. Number of family members: ……persons 1.10. Corn purchasing labor: ..... persons

1.11. Income from agricultural activities/year: ……. million dongs.

1.12. Working capital used for corn purchasing: ……. (million dongs)

Of which: equity capital: ..... dongs

1.13. Area of corn storehouse:…….m2

1.14. Households' experience in purchasing corn: ..... years.

II. PURCHASING CORN ACTIVITIES

2.1. Purchasing volume 2017

	Unit	At corn farm	At corn grower household	At purchasing est.	At 1st level purchasing household/est.	At processing est.	Other
Fresh corn							
Volume	Ton						
Average price	d/kg						
Dried corn							
Volume	Ton						
Average price	d/kg						
Fresh corn kernel							
Volume	Ton						
Average price	d/kg						
Dried corn kernel							
Volume	Ton						
Average price	d/kg						
Milled corn							
Volume	Ton						
Average price	d/kg						

2.3 Purchasing location by type of corn

Unitị: %

No		Within Commune	Within District	Within Province	Different Province	Total
1	Fresh corn					100
2	Dried corn					100
3	Fresh corn kernel					100
4	Dried corn kernel					100
5	Milled corn					100

2.4 Purchasing location by sources

Unit: %

	Within Commune	Within District	Within Province	Different Province	Total
At corn farm					100
At corn grower household					100
At corn purchasing establishment					
At 1st level corn purchasing household					100
At corn processing establishment					100
Other……..					100

2.5 Initial investment cost for corn purchasing

Unit: Million VND

No	**Content**	**Years of use**	**Initial value**	**Note**
1	Factory			
2	Electric Scale			
3	Car used for corn purchasing			
4	Factory maintenance cost			
5	Car repair and upgrade cost			
6	Other expenses……..			
7	**Total initial investment**			

2.6. Do you apply for production loan?

1. Yes 2. No If "yes" please fill in the following table

Lender 1. Bank/Credit Fund 2. Family/Friend 3. Material supplier 4. Buyer 5. Others (please specify)	Initial loan (million dongs)	Investment ratio for purchasing corn (%)	Year of loan	Term of Loan (Month)	Interest rate (%/year)	Amount owed to date (million dongs)
1	**2**	**3**	**4**	**5**	**6**	**7**

2.7. Purchasing cost (average for 1 ton of corn)

Unit: VND1000

No	Indicator	Fresh Corn	Dried Corn	Fresh Corn Kernel	Dried Corn Kernel	Mashed Corn
1	Transportation, loading & unloading costs					
2	Hiring cost (to hire workers for purchasing work)					
3	Classifying cost					
4	Storage cost					
6	Fuel cost (petrol, oil)					
7	Other expenses (equipment…)					
	Total					
	Rate of loss (%)					

III. SELLING CORN

3.1. Sales volume in 2017

	Unit	At selling household / est.	At livestock est.	Upper-level est.	Processing est.	Animal feed processing enterprise	Other ……
Fresh corn							
Volume	Ton						
Average price	d/kg						
Dried corn							
Volume	Ton						
Average price	d/kg						
Fresh corn kernel							
Volume	Ton						
Average price	d/kg						
Dried corn kernel							

Volume	Ton						
Average price	d/kg						
Milled corn							
Volume	Ton						
Average price	d/kg						

3.2. Sale destination (by types of corn)

Unit: %

	Within Commune	Within District	Within Province	Different Province	Other	Total
Fresh corn						100
Dried corn						100
Fresh corn kernel						100
Dried corn kernel						100
Milld corn						100

3.3. Sale destination (by buyers)

Uniţ: %

	Within Commune	Within District	Within Province	Different Province	Other
Livestock establishments					
Upper-level purchasing corn establishments					
Processing establishments					
Processing/Exporting Business					
Other ……					

3.4. Cost of selling (Average for 1 ton of corn):

Unit: 1000 VND

No	Indicator	Fresh Corn	Dried Corn	Fresh Corn Kernel	Dried Corn Kernel	Milled Corn
1	Transportation, loading & unloading costs					
2	Fuel costs (petrol, oil)					
3	Other expenses (Equipment...)					
	Total Cost					
	Rate of loss (%)					

IV. OTHER INFORMATION

4.1. Difficulties in purchasing corn:

No	**Type of Difficulty**	**Yes or No?** 1.Yes 2.No	**Seriousness** 5. Very serious 6. Serious 7. Not very serious 8. Not serious
1	Lack of funding/Difficult to access credit		
2	Unstable purchasing source, high risk		
3	Unstable selling price		
4	Lack of storage/storage facility		
5	Inconsistent and low quality corn seedling		
6	Means of payment (cash/ transfer/ prepayment)		
7	Business reputation		
8	Other (please specify)……		

4.2. Support from State (Central Government and Local Authority) / Partners (Purchasing Agent/Business):

No.	Type of support	Yes or No? 1.Yes 2.No	Impact on production 5. Very effective, 6. Effective 7. Not very effective 8. No effective
1	Business loan/ capital advance		
2	Start-up facilitation (land, business license, etc)		
3	In purchasing equipment and machinery		
4	In product sale		
5	In establishing connection with processing/ exporting firms		
6	Credit/Tax incentives		
7	Others……..		

4.3. Recommendation to improve efficiency in purchasing corn:

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Interviewer
(Sign & State Full Name)

Interviewee
(Sign & State Full Name)

MINISTRY OF AGRICULTURE AND RURAL DEVELOPMENT

CENTER FOR INFORMATICS AND STATISTICS

Corn value chain survey

Questionnaire 3/CB. CORN PROCESSING HOUSEHOLDS/ESTABLISHMENTS

Number | |

I. GENERAL INFORMATION

1.1. District		
1.2. Commune / ward / town		
1.3 Village		
1.4. Full name of household head /name of establishment		Phone:
1.5. Ethnicity		
1.6. Education level of head	1. Primary school 2. Junior high school 3. High school 4. College/University graduate 5. Postgraduate	
1.7. Name of the respondent		Phone:
1.8 Relationship of the respondent the household head/ position in the establishment		

1.9. Form of corn processing: 1. Peel seeds 2. Dry 3. Mill

1.10. Number of family members: ….....…persons 1.10. Corn processing labor: ..... persons

1.11 Time of processing corn per year: …… months, (From ……..to ……)

1.12. Income from corn processing/year: ……. million dongs.

1.13 Households' experience in processing corn: ..... years.

1.14. Volume of processed corn/year: ……..tons.

II. PURCHASING CORNS FOR PROCESSING

2.1. Purchasing by type of corn in 2017

	Unit	At processing establishment	At corn farm	At corn grower household	At collecting household	Other …….
Fresh corn						
Volume	Ton					
Average price	vnd/kg					
Dried corn						
Volume	ton					
Average price	vnd/kg					
Fresh corn kernel						
Volume	ton					
Average price	vnd/kg					
Dried corn kernel						
Volume	ton					
Average price	vnd/kg					
Mashed corn	vnd/kg					
Volume	ton					
Average price						

2.2 Purchasing location by type of corn

Unit: %

No		Within Commune	Within District	Within Province	Different Province	Total
1	Fresh corn					100
2	Dried corn					100
3	Fresh corn kernel					100
4	Dried corn kernel					100
5	Mashed corn					100

2.3 Purchasing location by sources

Unit: %

	Within Commune	Within District	Within Province	Different Province	Total
At processing establishment					100
At corn farm					100
At corn grower household					
At corn collector household					100
Other					100

2.4 Purchasing cost (average for 1 ton of product)

Unit: Million VND

No	**Content**	Fresh corn	Dried corn	Fresh corn kernel	Dried corn kernel	Note
1	Transportation, loading & unloading costs					
2	Hiring cost (to hire workers for purchasing work)					
3	Classifying cost					
4	Storage cost					
5	Fuel cost (petrol, oil)					
6	Other expenses…….					
	Total Cost					
	Rate of loss (%)					

III. PROCESSING CORN

3.1 Which processing activities does the household / facility have the following:

1. Peel seeds 2. Mill 3. Dry 4. Other: ..... ……..

3.2. Processing rate

3.2.1. Ratio of fresh corn /dried corn: .....

3.2.2. The ratio of fresh corn kernel/ dried corn kernel: ....

3.2.3. Rate of dry corn / dry corn kernel: .....

3.3 Initial investment cost

Unit: Million VND

No	Content	Years of use	Initial value	Note
1	Factory			
2	Electric Scale			
3	Seedling machine			
4	Drying machine			
5	Corn grinder			
6	Corn shovel machine			
7	Fire protection equipment			
8	Expenses for repair and renovation			
9	Other expenses……			
	Total initial investment			

3.4 Do you apply for production loan?

1. Yes 2. No If "yes" please fill in the following table

Lender 1. Bank/Credit Fund 2. Family/Friend 3. Material Supplier 4. Buyer 5. Others (please specify)	Initial loan (million VND)	Investment ratio for processing corn (%)	Year of loan	Term of Loan (Month)	Interest rate (%/year)	Amount owed to date (million)
1	**2**	**3**	**4**	**5**	**6**	**7**

3.5 Processing cost (average for 1 ton of product)

Unit: Million VND

No	**Content**	Peel seeds	Drying	Mill	Other ……..	Note
1	Fuel costs (petrol, oil, corncob, etc.)					
2	Electricity cost					
3	Hiring cost					
4	Drugs (anti-mold, sterilization ....)					
5	Other expenses…….					
	Total Cost					
	Rate of loss (%)					

3.6 Business expenses / year

3.5.1 Tax expense ..... 3.5.2 Fees .....

3.5.3 Other .....

IV. SELLING CORN PRODUCT

4.1. Sales volume in 2017

	Unit	Processing establishment	Breeders	Upper-level purchasing agent	Animal feed processing enterprise	Other ……	Total
1.Dried corn kernel							
Volume	Ton						
Average price	vnd/kg						
2.Milled corn							
Volume	Ton						
Average price	vnd/kg						
3. Corncob							
Volume	Ton						

Average price	vnd/kg						
4. Other by-products of corn							
Volume	Ton						
Average price	vnd/kg						

4.2. Sale destination (by types of corn)

Unit: %

	Within Commune	Within District	Within Province	Different Province	Other	Total
Dried corn kernel						100
Milled corn						100
Corncob						100
Other by-products of corn						100

4.3. Sale destination (by buyers)

Unitị: %

	Within Commune	Within District	Within Province	Different Province	Total
At processing establishment					100
At breeder household					100
At upper-level purchasing agent					100
At animal feed processing enterprise					100
Other ……					100

V. OTHER INFORMATION

5.1. Difficulties in processing corn:

No	Type of Difficulty	Yes or No? 1.Yes 2.No	Seriousness 1. Very serious 2. Serious 3. Not very serious 4. Not serious
1	Lack of funding/Difficult to access credit		
2	Lack of storage/storage facility		
3	Inconsistent and low quality corn seedling		
4	Means of payment (cash/transfer/prepayment)		
5			
6	Business reputation		
7	Other (please specify)……..		

5.2. Recommendations to improve efficiency in corn processing

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Interviewer

(Sign and state full name)

Interviewee

(Sign and state full name)