

Summary Result of Cassava Processing and Distribution Survey in Indonesia



**ASEAN FOOD SECURITY INFORMATION SYSTEM (AFSIS)
IN COLLABORATION WITH
CENTER FOR AGRICULTURAL DATA AND INFORMATION SYSTEM
MINISTRY OF AGRICULTURE REPUBLIC OF INDONESIA
2016-2017**



SUMMARY RESULT OF
**CASSAVA PROCESSING AND
DISTRIBUTION SURVEY IN INDONESIA**

**ASEAN Food Security Information System
in Collaboration with
Center for Agricultural Data and System Information
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FOREWORD

We praise God Almighty, because of His mercy it has been finished the Summary Result of Cassava Processing and Distribution Survey in Indonesia. The Summary is one of the output of project which is a cooperation between the Ministry of Agriculture Republic of Indonesia and the ASEAN Food Security Information System (AFSIS).

We extend out gratitude and appreciation to all team member and those who have participated in the implementation of the project, both at the central level and at the local level. In particular, we would like to extend our appreciation to the managers and staffs of the Food Crops Agency from West Java Province, Lampung Province, Sumedang District and Central Lampung District. They have provided support and cooperation during the listing process and pilot survey. Acknowledgment is also conveyed to the AFSIS Secretariat, AFSIS Expert and MAFF Japan for their trust in CADIS to conduct all of the activities.

We are looking forward the constructive criticism and sugestions for further improvement and refinement of the result. Hopefully the result can provide benefits for agricultural policy makers and other data users, in particular.

Jakarta, March 2017
Director of CADIS

Dr. Suwandi



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CHAPTER I. INTRODUCTION

1.1. Background

Cassava is the third primary food source after rice and maize. Beside as a food and a source of carbohydrates, cassava can be used as industrial raw materials and animal feed. For industrial purposes, cassava can be processed into gablek, chips, tapioca flour and cassava starch, and even can be used as renewable energy. Cassava is a high potential as an alternative staple food substitution, because it is one of the highly nutritious food as a source of carbohydrates and low in cholesterol at an affordable price. A wide variety of types of food in Indonesia, which uses cassava as the basic ingredients dominated by the food industry, which is further processed into food, such as, chips, tape, getuk and others.

The opportunities for the development of cassava in the industrial sector is likely to increase, while the availability of data and information related to the processing and distributing of cassava is limited. Therefore, to complete that information, Indonesia through the Ministry of Agriculture in cooperation with the ASEAN Food Security and Information System (AFSIS) developed the survey methods of the processing and distribution of cassava.

1.2. Objectives

The objectives of the processing and distribution of the cassava survey are as follows:

- a) To develop the data collection methods of the survey;
- b) To collect, process, and analyse the pilot survey results; and
- c) To disseminate the pilot survey results through the workshop to gain input from the relevant agencies.

CHAPTER II. METHODOLOGY

2.1. Concepts and Definitions

a) Cassava

Cassava is one type of cultivated crop which can produce food and energy. It can be processed into food ingredients includes tapioca flour, chips, tape, getuk and other processed food. Based on the levels of HCN (Cyanide), cassava divided into three groups, namely: 1) cassava with level of $\text{HCN} > 100$ ppm (varieties: Kasetsart (UJ-5), Thailand/Rayong (UJ-3), Adira 2 and Adira 4; 2) cassava with level of HCN 40-100 ppm (varieties: Adira 5) and 3) cassava with level of $\text{HCN} < 40$ ppm (varieties: Adira 1, Malang and Manado) (Suhartina, 2005; Sundari, 2010).

b) Processing Industry

Processing industry is an economic activity which transforms a basic stuff mechanically, chemically, or by hand, thus becoming finished / semi-finished and or increase the goods into higher value, and closer to the end user (<http://www.bps.go.id>).

c) Large Industry

Large industry is the industry that has the number of employees/workforce of 100 people or more (<http://www.bps.go.id>).

d) Medium Industry

Medium industry is the industry that has the number of employees/workforce between 20-99 people (<http://www.bps.go.id>).

e) Small Industry

Small industry is the industry that has the number of employees/workforce between 5-19 people (<http://www.bps.go.id>).

f) Micro (Household) Industry

Micro (household) industry is the industry that has the number of employees/workforce between 1-4 people (<http://www.bps.go.id>).

g) Sales Volume

The sales volume is the amount of goods sold at a certain period, for example one month, one year. The sales volume in this survey referred to all products sold in the period from January 1 until December 31, 2015, excluding products that have not been sold.

h) Raw Material Purchase Price

Raw material purchase price is the purchase price of raw materials to the companies/businesses location, including transportation costs.

i) Production Cost

The cost to produce a product, including labor costs, capital goods costs, raw materials costs, supporting material costs and marketing costs.

j) Profit Margin

Profit margin is derived from the sales value minus the production costs.

Quantitative analysis in value chain of cassava is held through the following steps (ACIAR, 2012):

1. Calculate the costs incurred by the company/business.

The costs incurred by the company/business include operational costs (fix costs and variable costs). Variable costs are the costs that change and have a direct relationship with the level of production in a production or sales cycle. Variable costs are the costs that relevant to short0term economic decision making. For example: the cost of fuel, chemicals, cooking spices, and water. Fix costs are the independent costs or regardless of the size of production, do not change in line with changes in the amount of production. For example: the cost of capital, depreciation costs, promotion costs, stationery costs, etc. The costs in the cassava value chain are presented in Table 2.1. The calculation of total costs is obtained by summing up all costs

(variable costs, fix costs, investment costs) in the production process.

Table 2.1. The Costs in the Cassava Value Chain

Operational Costs		Transaction Costs	Regulation Costs		Investment Costs
Variable Costs	Fix Costs		Formal	Informal	
<ul style="list-style-type: none"> • Production cost, including losses • Wages of production • Stock sold cost 	<ul style="list-style-type: none"> • Non-production staff salaries • Office supplies • Insurance • Legal and accounting services costs • Traveling costs • Utilities • Rent • Repair and maintenance • Depreciation • Marketing costs • Bank charges and interest 	<ul style="list-style-type: none"> • Legal fees for examination of contracts by lawyers • Information cost: where cassava can be obtained, available volume, price, who the supplier is (telephone cost, travel expenses, etc.) • Lack of standards in quality level setting, so there is a risk of paying higher than it should be 	<ul style="list-style-type: none"> • Business licensing • Taxes/charges • Determining the level of quality (grading) which is external to the value chain, such as certification required by law 	<ul style="list-style-type: none"> • Determining the level of quality (grading) which is internal to the value chain 	<ul style="list-style-type: none"> • Principal investment • Interest

2. Calculate the revenue of the company / business

The revenue is calculated by multiplying the selling volume at the selling price.

To find out the distribution of the added value received by each actor along the cassava value chain, we calculated the profit margin of each actor. Mathematically the profit margin can be written as follows:

$$\Pi = Pa - Pb - C$$

where:

Π = Profit received by each actor

Pa = Selling price at each actor (IDR)

Pb = Purchasing price of product at each actor (IDR)

C = The marketing cost of each actor (IDR)

2.2. Survey Stages

2.2.1. Design Survey

This survey was conducted using Multi-stage Random Sampling Technique that begins with the selection of province, district and subdistrict based on the potential production and industry potential of cassava. After that, select the respondents for Large and Medium Industry (Industri Besar dan Sedang-IBS) also for Micro and Small Industry (Industri Mikro dan Kecil-IMK) which use cassava as raw material.

2.2.2. Listing

Listing includes several stages are as follows:

1) The Selection of Provinces, Districts and Subdistricts

Selection of sample enumeration area carried out by multi-stage sampling.

Stage 1: Province Selection

The selection of the province is done by the purposive sampling method with cassava production centers as considerant. Lampung and West Java Provinces were selected as provincial samples.

Table 2.2. Cassava Harvested Area and Number of Cassava Industries by Provinces in Indonesia

Province	Average of Harvested Area 2011 - 2015 (Ha)	Share (%)	Number of Large & Medium Industries 2013	Share (%)	Number of Micro & Small Industries 2015	Share (%)
Lampung	318,951	29.90	59	25.43	3,294	4.45
East Java	172,296	16.15	8	3.45	25,651	34.69
Central Java	163,180	15.30	121	52.16	14,579	19.71
West Java	95,623	8.96	8	3.45	7,590	10.26
Other Provinces	316,658	29.69	36	15.52	22,840	30.88
Indonesia	1,066,709	100.00	232	100.00	73,954	100.00

Source: BPS, processed by CADIS

Stage 2: District Selection

The selection of the district is done by the purposive sampling with cassava industry centers as considerant. The data used as the basis of district selection is the number of Large and Medium Industries (Industri Besar dan Sedang-IBS) and Micro and Small Industries (Industri Mikro dan Kecil-IMK), both sources from BPS. Based on these data, the Central Lampung and Sumedang were chosen as district samples.

For IBS, the listing is done for the entire companies/businesses (take-all) as listed in Pre-printed

VCC-L. If it is found that there are IBS companies are not listed in the Pre-printed VCC-L, then the companies/businesses are included in the enumeration.

Stage 3: Sub-District Selection

For IBS, the registration/listing was done for all sub-districts where there are companies/businesses as listed in Pre-printed VCC-L.

For IMK, the registration/listing performed on the sub-districts sample. Selection of sub-districts sample is done by the purposive method with the additional criteria, in that sub-district at least have 3 (three) IMK cassava industries. Central Lampung and Sumedang have minimum of 3 sub-districts as samples.

2) Respondent Selection

In this survey, respondents were categorized into two groups, namely: 1) Large and Medium Industries (IBS), there are 28 active companies, and 2) Micro and Small Industries (IMK), there are 66 active businesses were taken entirely from the listing result.

3) Data Collecting Method

The data collecting method in this survey is conducted by visits and interviews to the respondents using VCC-2016S questionnaire.

4) Survey Activities

Survey activities, officers, documents used and the survey schedule are as follows:

Table 2.3. Survey Activities, Officers, Documents Used and the Survey Schedule

No.	Activities	Officers	Documents	Schedule
1	Survey Preparation	Team	--	October 2016
2	Regional Coordination	CADIS	List of Companies in VCC-L Questionnaire	October-November 2016
3	Survey	Team, Province, District	VCC-L and VCC-2016S Questionnaire	November 2016
4	Survey Supervision	Supervisor Team	VCC-L and VCC-2016S Questionnaire	November 2016
5	Processing of Survey Results	Team	VCC-2016S Questionnaire	January 2017
6	Survey Results Analysis	Team	Survey Results	January 2017

Survey organization can be seen in Figure 2.1. Technical Team consisting of CADIS, Directorate General of Food Crops and the National Statistics Office of Indonesia (BPS-Statistics Indonesia) in collaboration with regional officer in the sample area.

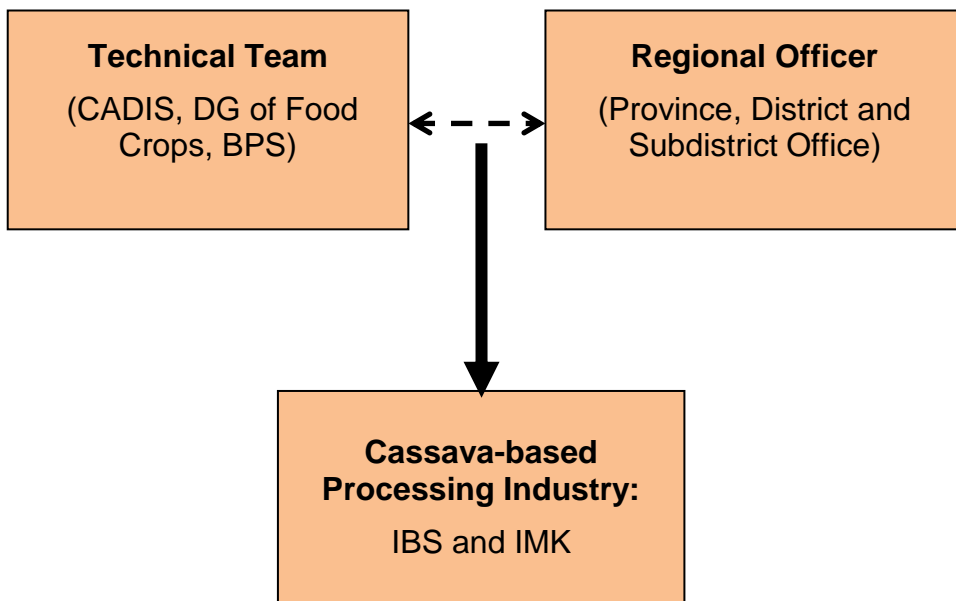


Figure 2.1. Survey Organization

2.2.3. Data Collecting

The data collected through interviews to the respondents using VCC-2016S questionnaires. Data enumerator are the team who have already appointed by Ministry of Agriculture and related institutions.

2.2.4. Data Processing

Data processing of the survey results is conducted in the following stages:

1) Verification and Validation of the Questionnaire

The verification and validation is done after the questionnaire completely filled with the answer from the respondents. The purpose of this step is to check whether the questionnaire is in

accordance with the concepts and guidelines have been prepared. Some points that need to be examined includes:

- The identification that includes the identity of the location, officers and respondents.
- Units are filled with appropriate answer, which includes the unit of weight, unit of time, and unit of price. For example: in kilograms, per day, rupiah per kilogram, etc.
- Fairness of answers need to be examined. If there is impropriety such as too big or too small then it needs to be reexamined whether the unit is correct or not. If necessary, the enumerator verify to the respondent through the phone number given by the respondent.
- Check the "Notes" block / description to seek additional information needed at this verification and validation stage.

2) Data Entry

The process of data entry from the survey results was conducted by using the EPIDATA program, a program for entry and documentation of data. EPIDATA used after data collection and before the analysis stage or data tabulation. The results of EPIDATA are in the Excel form files that are ready to be processed for tabulation and analysis.

3) Data Tabulation

Results of data entry were tabulated to fulfill the information required in the analysis. Tabulation of the data is also equipped with graphics and pictures.

4) Data Analysis

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 margin.



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CHAPTER III. SURVEY RESULTS AND ANALYSIS

3.1. Data Tabulation Results

Tabulation of data entry results are displayed on the following tabulated results:

1) Area Identification

Each respondent can be presented by provinces, districts, subdistricts and villages where the industry is domiciled.

2) Industry Status

- ✓ Type of Industry: Industrial fetched as respondents categorized into industry types based on the number of its workforce/labor, i.e. the code 1 is for large and medium industries (IBS) and code 2 for micro and small industries (IMK).
- ✓ Year started operation.
- ✓ Capacity of the use of cassava as raw material.

3) Use of Raw Materials

The uses of raw materials are grouped by type, volume usage, and the price in the previous month (October 2016) and in the average in 2016 (January to December):

- ✓ Fresh cassava.
- ✓ Gaplek.
- ✓ Flour.

4) Stock

Stock is cassava owned and stored at the time of enumeration.

5) Procurement Cassava as Raw Material:

- ✓ Method of payment for purchasing the cassava are grouped into 3 code. Code 1 for payment in cash, code 2 for payment by credit/installment, and code 3 for delay payment with certain due date.
- ✓ Source of raw material: from farmers, own farm, farmer groups, imports, traders, wholesalers, cooperatives, partners, etc.
- ✓ Location of cassava purchasing: from the same subdistrict, other districts, or other provinces.
- ✓ Problems in procuring cassava and the reasons why if so: whether because of rare, expensive, low quality, continuity, etc.
- ✓ Preference size of cassava: tuber size (large, medium, small), color (white, yellow), varieties.
- ✓ Willingness to use local raw materials, especially for industries that use starch as a raw material (Yes / No).

6) Products

- ✓ Types of the products: peel cassava, flour, fermented cassava, chips, crackers, etc.
- ✓ Conversion rate: the number of cassava used to produce 1 kg of product.

- ✓ Volume of products: in October 2016 and 2015 (January – December).
- ✓ Marketing mechanism: direct sales, through hotel/ restaurant/shop, market, other industries, wholesaler, export, stored as stock and scattered.
- ✓ Cost of production: loading/unloading, peeling, processing, storing, packing, quality control, etc.

7) Qualitative Data

- ✓ A similar survey ever undertaken by other institutions and followed by the respondents.
- ✓ License ownership.
- ✓ Innovation for products that have been done: taste, shape, package.
- ✓ Other competitors in the same product.
- ✓ How to get information: radio, newspapers, internet, agencies.
- ✓ Information needed: the price of raw materials, product pricing, marketing, innovation, etc.
- ✓ Suggestions from customers (follow or not follow).
- ✓ Membership in organizations related products.

3.2. Analysis of Survey Results

3.2.1. Characteristics of Cassava in Indonesia

Indonesia is a large country where located in the path of the equator, tropics and have thousands of islands. Among the thousands of islands that stretches from East to West, there are five major islands as production centers of agricultural products,

namely Kalimantan with an area of 53.95 million ha, Sumatra, 47.36 million ha, Papua 42.20 million ha, Sulawesi 18.92 million ha and Java 13.2 million ha (Figure 3.1).



Figure 3.1. Indonesian Archipelago

One of the many important agricultural products derived from the five islands is cassava commodity. Cassava production in Indonesia as a source of food ranks third after rice and maize production. Rice production in 2016 are 79.14 million tons, the production of maize are 23.15 million tons and cassava production reached 20.63 million tons.

The productivity of cassava in Indonesia is relatively high at 24.14 tonnes per hectare, although mostly grown on marginal lands that are widely available in the five islands. Cassava planting on marginal land as a form of use the potential land which is still very wide. Utilization of marginal land for cultivation of cassava is very precise. Because more fertile agricultural lands utilized for the cultivation of rice and corn, as well as other major agricultural commodities. Cassava plant is quite important for the people of

Indonesia, there are many farmers who grow these commodities as the main source of income. Agricultural Census 2013 data shows there are 2.9 million farmers growing these crops.

From the 34 provinces in Indonesia, five provinces contributed to the total production amounted to 81.63%, which the Lampung province accounted for the production of 33.93%, and then Central Java contributed 16.68%. East Java amounted to 15.71%, West Java amounting to 9.21% and North Sumatra by 6.10%, while the share of production amounted to 18.37% is the contribution of the 29 other provinces in Indonesia (Table 3.1). Based on the share of average production over five years, shows Lampung province with 33.93% share per year is the main center for cassava production in Indonesia and the average production during the five years from 2012 to 2016 amounted to 7.74 million tons.

Table 3.1. Cassava Production Centers in Indonesia, 2012 – 2016
(Million Tons)

Province	Year					Growth (%)	Average	Share (%)	Cum. Share (%)
	2012	2013	2014	2015	2016				
Lampung	8.39	8.33	8.03	7.39	6.57	-4.66	7.74	33.93	33.93
Central Java	3.85	4.09	3.98	3.57	3.55	-1.48	3.81	16.68	50.61
East Java	4.25	3.60	3.63	3.16	3.28	-4.67	3.58	15.71	66.32
West Java	2.13	2.14	2.25	2.00	1.98	-1.28	2.10	9.21	75.53
North Sumatra	1.17	1.52	1.38	1.62	1.27	3.24	1.39	6.10	81.63
Others	4.39	4.26	4.15	4.06	4.09	-1.42	4.19	18.37	100.00
Total	24.18	23.94	23.44	21.80	20.74	-1.71	22.82	100.00	

Source: BPS-Statistics Indonesia

Results of cassava production in Indonesia is predominantly used for processing into agricultural products, such as modified cassava flour (mocaf), tapioca, noodles, cakes, bread, cosmetics,

bioethanol and others. However, the production of cassava in Indonesia also exported to other countries. Exports amounted to 96.53% of cassava is already in the form of processed cassava, totaling just 3.47% are exported in the form of fresh cassava (Figure 3.2).

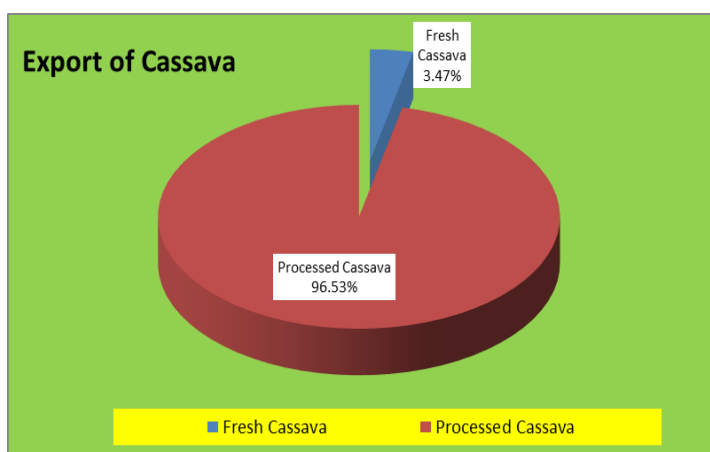


Figure 3.2. Export of Cassava in Indonesia

Besides export cassava, Indonesia also imported cassava. Exports imports balance of cassava shown in Figure 3.3 shows that the value of imports is much higher than the value of exports. The highest import value in 2012 amounted to US\$ 384.65 million, of which the following year fall and rise again until 2016 with the import value of cassava is only US\$ 228.95 million. The Indonesia main import of cassava is in the form of cassava starch (HS code 1108.14.0000), while exports of cassava is in the form of starch and sliced cassava.

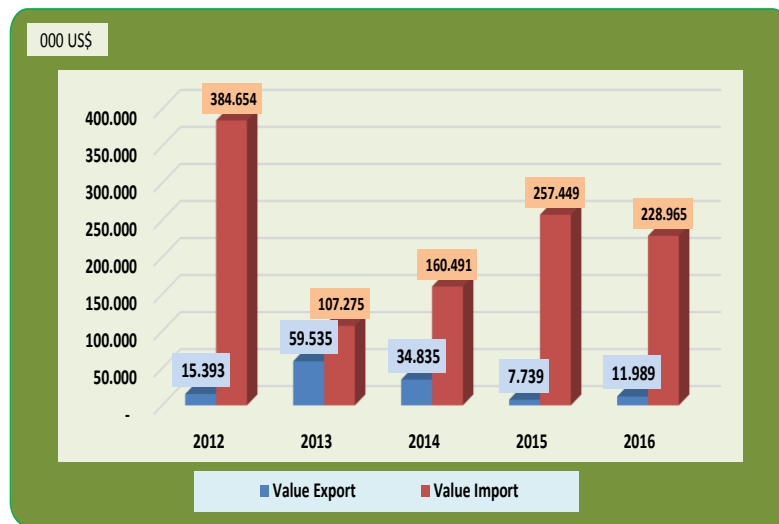


Figure 3.3. Export and Import Value of Cassava in Indonesia

The high production of cassava in Indonesia open up opportunities for the development of the processing industry. As mentioned earlier, products from raw materials of cassava produced in Indonesia among mocaf, tapioca, noodles, cakes, bread, cosmetics, bioethanol and others. Manufacture of products made from cassava was carried out by large and small industries. In 2014, there were as many as 246 large and medium-sized industries (IBS) that process cassava. In addition, many micro and small-scale industry (IMK) that processes cassava into various products. In 2015, there were 73.954 registered IMK actively process cassava.

3.2.2. Cassava Characteristics in Survey Area

From some provinces that have high potential for cassava production, two provinces were selected as the survey area, they are the provinces of Lampung and West Java. Furthermore, from

Central Lampung district has the highest production compared with other regions. Production of cassava in Central Lampung in 2015 by 2.52 million tons of which contributed 34.16% to production in Lampung Province (Table 3.2). Processing industry made from cassava also encountered in Central Lampung district, the main products are starch. Instead, the survey sites in Sumedang is not a region that has a high production, contributing to the production of West Java Province amounted to only 5.81%, but many cassava industry in the district. Source of cassava for

industrial processing in Sumedang not also supplied from the own district but also came from Garut, Subang and others (Table 3.3).

Table 3.2. Cassava Production
in Central Lampung

No	District	Production (Ton)	%
1	Lampung Tengah	2.523.230	34,16
2	Lampung Utara	1.526.969	20,67
3	Lampung Timur	1.224.711	16,58
4	TI Bawang Barat	741.497	10,08
5	Tulangbawang	472.557	6,40
6	Way Kanan	399.810	5,41
7	Lampung Selatan	248.978	3,37
8	Pesawaran	107.636	1,45
9	Mesuji	97.682	1,31
10	Pring sewu	19.823	0,26
11	Tanggamus	10.311	0,14
12	Lampung Barat	5.529	0,07
13	Metro	2.958	0,04
14	Bandar Lampung	2.937	0,04
15	Pesisir Barat	2.755	0,03
	Total	7.387.084	100,00

Table 3.3. Cassava Production
in Sumedang

DISTRICT	PRODUCTION (TON)	%
Kab. Bogor	177.234	7,88
Kab. Sukabumi	215.179	9,56
Kab. Cianjur	150.915	6,71
Kab. Bandung	135.025	6,00
Kab. Garut	687.357	30,55
Kab. Tasikmalaya	351.141	15,61
Kab. Ciamis	81.600	3,63
Kab. Kuningan	74.070	3,29
Kab. Cirebon	2.205	0,10
Kab. Majalengka	12.654	0,56
Kab. Sumedang	130.638	5,81
Kab. Indramayu	2.742	0,12
Kab. Subang	24.778	1,10
Kab. Purwakarta	80.455	3,58
Kab. Karawang	8.866	0,39
Kab. Bekasi	1.132	0,05
Kab. Bandung Barat	80.344	3,57
Kab. Pangandaran	8.774	0,39
Kota Bogor	6.646	0,30
Kota Sukabumi	371	0,02
Kota Bandung	590	0,03
Kota Cirebon	113	0,01
Kota Bekasi	702	0,03
Kota Depok	3.604	0,16
Kota Cimahi	1.535	0,07
Kota Tasikmalaya	9.152	0,41
Kota Banjar	2.232	0,10
TOTAL	2.250.054	100,00

Source: BPS-Statistics Indonesia and Directorate General of Food Crops

The industry takes a different cassava varieties. The varieties of cassava for starch processing industry is different from the foods industry such as chips, comring and others. Cassava varieties that are needed by tapioca industrial is the cassava which has high yield starch, for example Kasesart variety from Thailand. This variety is widely grown in Central Lampung regency. By contrast, cassava varieties that widely planted in Sumedang are Darul Hidayah, Adira 1 and the other. It also planted cassava from varieties of UJ 3, UJ 5, Malang 4 and etc specifically to meet the needs of tapioca starch industry.

3.2.3. Survey Results

1) Respondent Characteristics

Respondents in this survey is the company/business with cassava as raw material consists of Large Medium Industry (IBS) and Small Micro Industries (IMK) categories. Location of survey covering 2 districts, namely Central Lampung district, Lampung Province and Sumedang district, West Java Province. Based on the results listings that have been done, there are 105 industrial of cassava raw materials in the two districts with the details of 36 samples IBS and 69 IMK. However, there are 11 industries that experienced permanently closed at the time of listing, namely 7 IBS in Central Lampung and 4 IMK composed of 3 IMK in Sumedang and 1 IMK in Central Lampung, so the total sample were 94 industry with details of 29 IBS and 65 IMK. Allocation samples of each district based on detailed industry categories presented in Table 3.4.

Table 3.4. Number of Respondents in Sumedang and Central Lampung

NO	PROVINCE	DISTRICT	LARGE SCALE INDS.		SMALL SCALE INDS.	
			Listing Result	Survey	Listing Result	Survey
1	WEST JAVA	SUMEDANG	6	6	31	28
2	LAMPUNG	CENTRAL LAMPUNG	30	23	38	37
TOTAL			36	29	69	65

Note: Total Listing = 105 industries
 Permanently closed = 11 industries (7 IBS and 4 IMK)
 Total Respondents = 94 Industries

Total respondents in the survey are 94 industries. Industrial cassava fetched as respondents to this survey are mostly micro and small industry (IMK) in the amount of 69.15% and 30.85% of large and medium industry (IBS) (Figure 3.6).

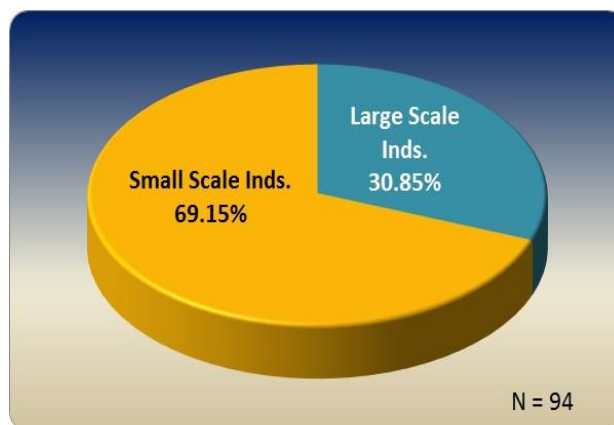


Figure 3.6. Percentage of Respondents by Industrial Category

Allocation of sample in Central Lampung were 60 respondents, amounting to 61.67% of IMK respondents and 38.33% for IBS respondents. While the sample allocation in Sumedang as many as 34 respondents, with 17.65% allocation of IBS and 82.35% of IMK (Figure 3.7).

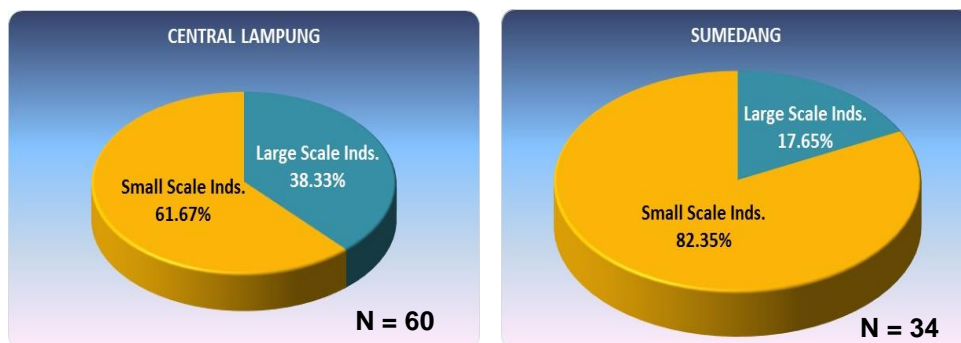


Figure 3.7. Percentage of Respondents by Survey Location

If broken down by products for each industry category, from 29 samples of IBS, as much as 93.1% dominant by starch industrial and located in Central Lampung. While 6.9% is *comring* industry, dominant in Sumedang (Figure 3.8). In IMK, there are more varied products. From 66 respondents, the main type of products is in the form of cassava chips (45.45%), *tiwul* (13.64%), *tape*/fermented cassava (12.12%), *kemplang* (10.61%), *klanting* (9.09%), *comring* (7.58%) and *opak* (1.52%).

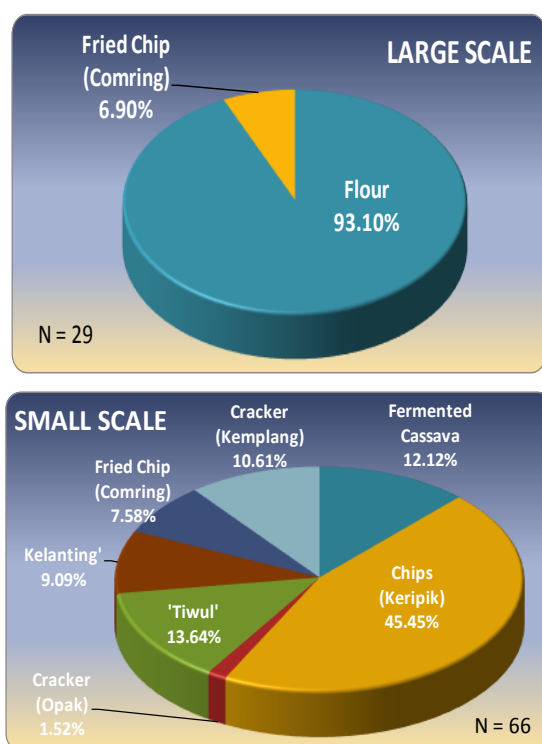


Figure 3.8. Percentage of Respondents by Type of Product

Based on the business license owned by industry respondents, showing all the major industries were already having a business license, while for small micro industries of 65

respondents only 24.62% have a business license, the other 75.38% do not yet have business license (Figure 3.9).

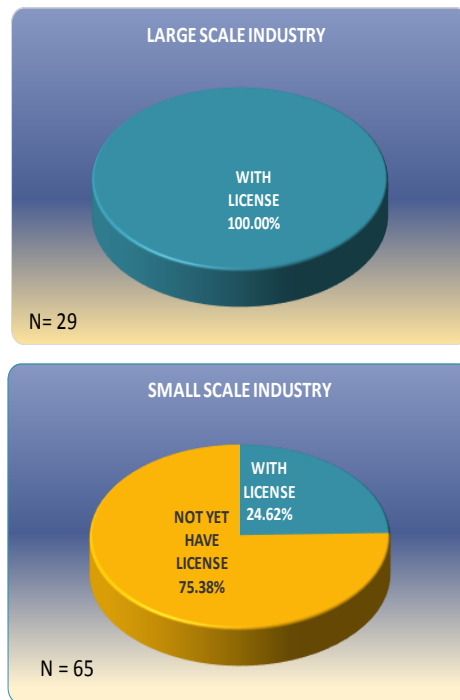


Figure 3.9. Percentage of Respondents by License Ownership

2) The Use of Cassava at IMK and IBS

Based on the distribution data, the use of cassava per day at the time of the survey by the IMK is generally spread in three groups, namely: 1) a group of less than 100 kg, there are 31 units, 2) a group of 100 to 500 kg, there are 28 units, and 3) a group of more than 500 kg, there are 6 units. The average use of cassava is 203 kg per day, with the lowest usage as low as 0.83 kg and the highest is 2,000 kg per day. Data in detail can be seen in Figure 3.10.

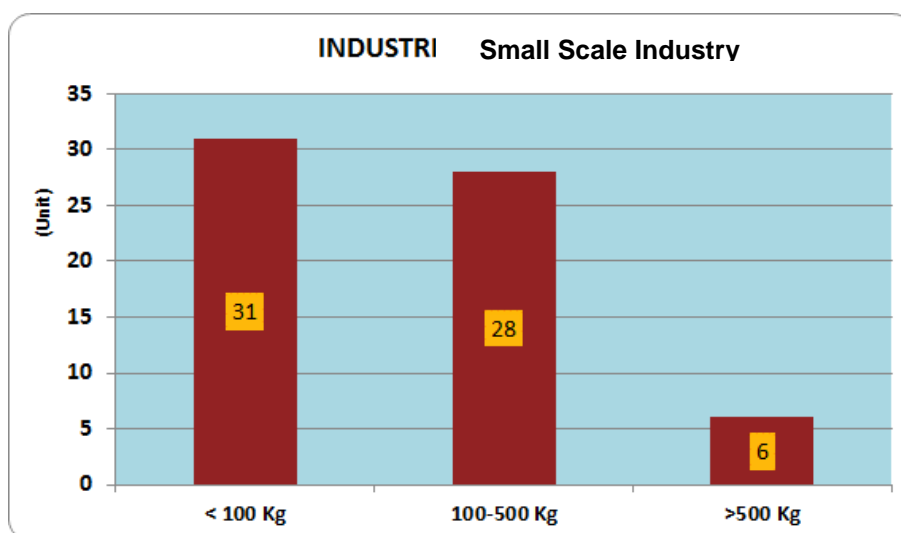


Figure 3.10. The Cassava Usage per Day at IMK

A total of 70.97% of respondents use a medium-sized cassava for their industries, 25.81% using large cassava, the rest just 3.23% that use small sized cassava. White cassava are preferred by the industry (Figure 3.11). Medium sized cassava is commonly used for *tape*, but for *comring* and *tiwul* does not require a certain size because during the process of production, the cassava is grind and formed into a paste.

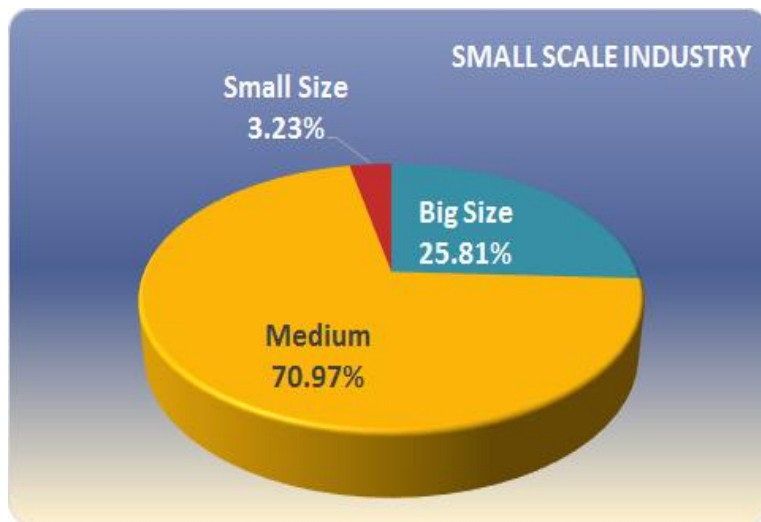


Figure 3.11. The Cassava Usage by Size at IMK

Table 3.5. The Cassava Usage per Day of IMK

The Cassava Usage per Day (Kg)	
Mean	203,02
Median	100,00
Minimum	0,83
Maximum	2.000,00

The average usage of cassava per month when the survey was conducted in October 2016 as many as 5,164 kg, with a maximum use of 60,000 kg and a minimum of 25 kg. The low use of this raw material because the products made from cassava is not the main products.

In the survey were also asked on the cassava raw material usage in 2015. The survey results showed an average use of cassava was 66,507 kg in a year, with the lowest usage

was 75 kg and the highest was 1092 million kg. The detailed descriptive statistics are presented in Table 3.6 and Table 3.7.

Table 3.6. The Cassava Usage of IMK in October 2016

The Cassava Usage in October 2016 (Kg)	
Mean	5,164.10
Median	1,200.00
Minimum	25.00
Maximum	60,000.00

Table 3.7. The Cassava Usage of IMK in 2015

The Cassava Usage in 2015 (Kg)	
Mean	66,507.62
Median	12,000.00
Minimum	75.00
Maximum	1,092,000.00

For the IBS, the average usage of cassava per day at the time of the survey is generally spread and can be grouped into three groups, namely: 1) a group of less than 10 tons, there are 5 units, 2) groups of 10 to 100 tons there are 7 units, and 3) a group of more than 100 tons, 17 units (Figure 3.12). The average use of cassava was 144.5 tons per day, with the lowest usage was 60 kg and the highest was 750 tons per day (Table 3.8). Quality of cassava that is more desirable for IBS generally in medium-sized, white, and Kasetsart varieties.

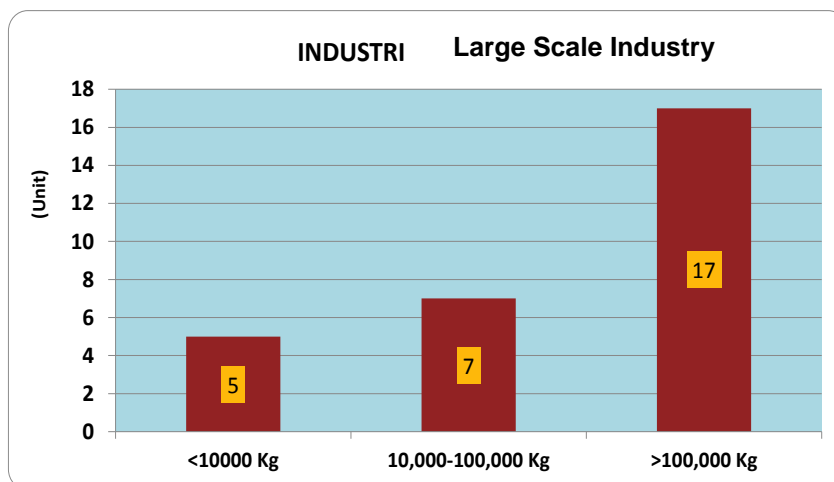


Figure 3.12. The Cassava Usage per Day at IBS

Table 3.8. The Cassava Usage per Day of IBS

The Cassava Usage per Day (Kg)	
Mean	144,499.01
Median	100,000.00
Minimum	60.00
Maximum	750,000.00

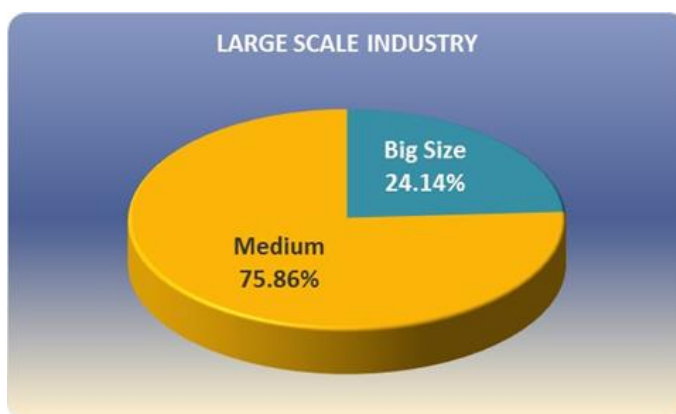


Figure 3.13. The Cassava Usage by Size at IBS

The average use of cassava per month at the time the survey was conducted in October 2016 was 3,856 tons, with a maximum usage reached 17,500 tons and a minimum total of 1.56 tons (Table 3.9). In the survey it were also obtained information of cassava raw material usage in 2015. The survey results showed an average use of cassava was 55,561 tons a year, with the lowest usage was 18.12 tons and the highest usage was 570,000 tons. The detailed descriptive statistics is presented in Table 3.10.

Table 3.9. The Cassava Usage of IBS in October 2016

The Cassava Usage in October 2016 (Kg)	
Mean	3,856,002.07
Median	2,800,000.00
Minimum	1,560.00
Maximum	17,500,000.00

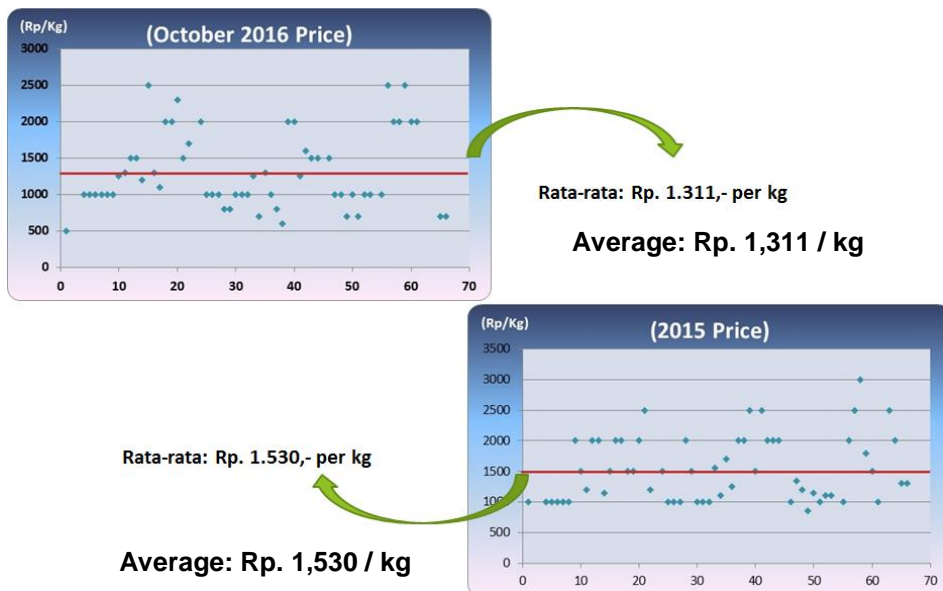
Table 3.10. The Cassava Usage of IBS in 2015

The Cassava Usage in 2015 (Kg)	
Mean	55,561,400.24
Median	26,520,000.00
Minimum	18,120.00
Maximum	570,000,000.00

3) Price of Cassava for IMK and IBS

Cassava price movements in the last 2 years shows the slight decline. The average purchase price of cassava for IMK in

October 2016 was Rp. 1,311/kg. In 2015, the average price of cassava in the sample location (Central Lampung and Sumedang) reached Rp 1,530/kg (Figure 3.14).



Gambar 3.14. Cassava Price per Kg at IMK

Based on the survey result, the average price of cassava in October 2016 for IMK in Sumedang was Rp. 1,704/kg, while in 2015 was Rp. 1,896/kg. The comparison of price of cassava in each sub-district of Sumedang can be seen in Table 3.11. Similar things can also be found from the survey result on IMK in Central Lampung. The average price of cassava in October 2016 was Rp. 1,014/kg or decreased by 18% compared to the price in 2015 which amounted to Rp. 1,230/kg. The comparison cassava price in each sub-district of Central Lampung can be seen in Table 3.12. The decline of the cassava price at the industrial level was allegedly influenced the selling price of cassava at the farm level.

Table 3.11. The Cassava Price of IMK and IBS in October 2016 and 2015 per Sub-District in Sumedang (Rp)

Sub District	IMK		Sub District	IBS	
	Oct 2016	2015		Oct 2016	2015
Ganeas	2,500	1,500	Sumedang Utara	1,800	1,500
Pamulihan	1,183	1,567	Tanjungsari	1,250	2,000
Rancakalong	1,330	2,100	Situraja	600	1,200
Situraja	2,000	1,750	Cibugel	900	1,550
Sukasari	2,250	2,325			
Sumedang Utara	1,500	2,000			
Tanjungsari	1,738	1,775			
Rata-rata	1,704	1,896	Rata-rata	1,058	1,558

Table 3.12. The Cassava Price of IMK and IBS in October 2016 and 2015 per Sub-District in Central Lampung (Rp)

Kecamatan	IMK		Kecamatan	IBS	
	Oct 2016	2015		Oct 2016	2015
Bandar Surabaya	1,000	1,250	Bandar Mataram	595	971
Kalirejo	700	1,300	Bandar Surabaya	600	1,350
Punggur	1,525	1,750	Bumi Ratu Nuban	650	1,200
Rumbia	965	1,210	Bumi Nabung	650	1,133
Seputih Surabaya	1,200	1,150	Gunung Sugih	580	1,325
Terbanggi Besar	971	1,107	Kalirejo	520	1,200
Way Seputih	500	1,000	Rumbia	525	1,215
			Seputih Banyak	500	1,350
			Terusan Nunyai	650	1,085
			Way Seputih	640	1,267
Rata-rata	1,014	1,230	Rata-rata	606	1,166

The prices of purchased cassava by IBS in 2016 decreased significantly compared to that of 2015. The price decrease due to

an abundance of imported tapioca starch product. Thus, the industry has been reducing their production of tapioca from the existing capacity. Consequently, cassava from farmers are not absorbed and the price drops. The survey result showed that prices in October 2016 averaged only Rp. 637/kg, fall down 50% compared to 2015 (Figure 3.15).

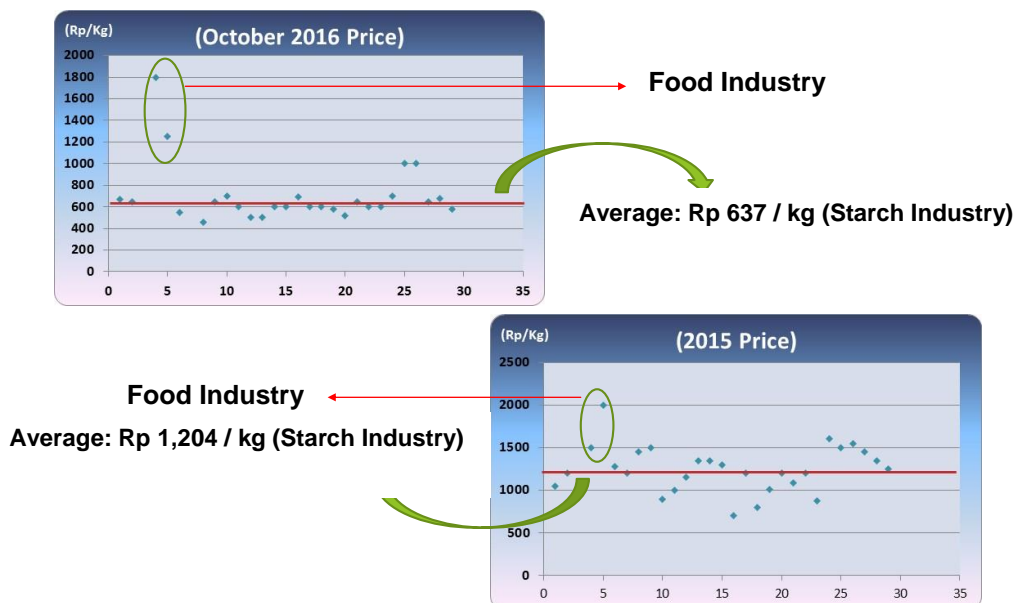


Figure 3.15. Cassava Price per Kg at IBS

For IBS that produce processed foods, the cassava price is still quite good compared to the cassava price in tapioca flour industries. These industries are only found in Sumedang. The average price of cassava in the processed food industries in Sumedang amounted to Rp. 1,525/kg, down to the year 2015 which amounted to Rp. 1,750/kg. The decreasing price only occurred in Tanjungsari Sub-district, while in the opposite occurred in Sumedang Utara Sub-district (Table 3.11).

The difference between the price of cassava for IMK and for IBS is due to the differences between cassava varieties that used for food industry and cassava for starch industry. Varieties used in IBS tapioca starch contains high levels of HCN, while in the food industry it contains low HCN levels.

4) Source of Raw Material and Payment Method

Cassava used in IBS amounted to 59.15% obtained from farmers; 39.8% came from the middleman/traders/retail/market; 0.98% is obtained from the distributor/ wholesaler; 0.05% came from farmer groups and only 0.05% is obtained from own farm. As for IMK, the main source of cassava from farmers as much as 52.72%; from middleman/traders/retail/market was 43.12%; from own farm was 2.60%; distributor/ wholesaler as much as 0.80%; and farmer groups amounted to 0.76% (Figure 3.16).

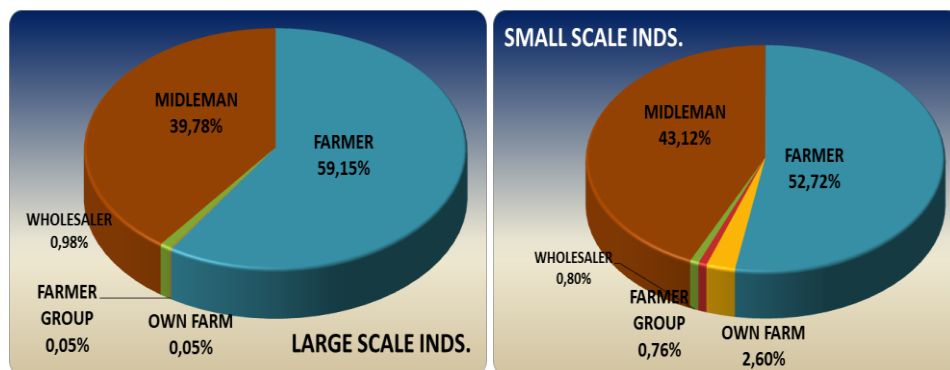


Figure 3.16. Source of Cassava at IBS and IMK

Payment by IBS mostly is made in cash (79.31%), while the remaining 20.69% paid with delay pay/tempo. Payment by IMK

majority is made in cash (92.31%), while the remaining 7.69% paid by the delay pay/tempo (Figure 3.17).

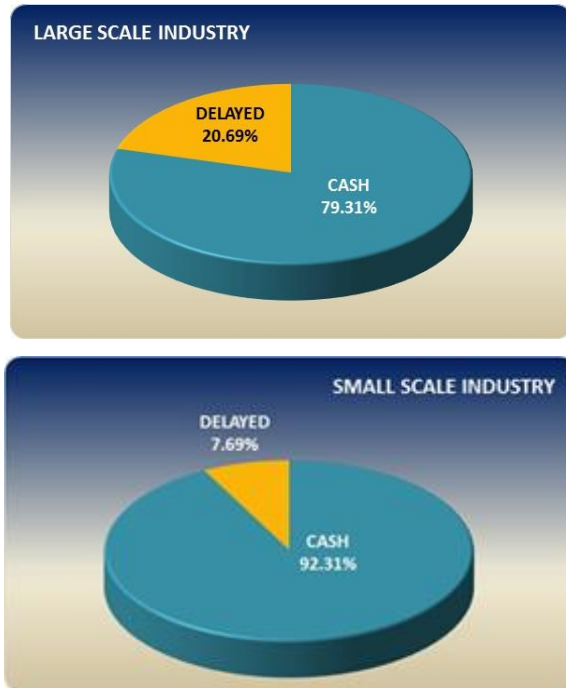


Figure 3.17. Payment Method at IBS and IMK

5) Procuring Cassava

For the IBS, 62.07% of the respondent mentioned that they have no difficulty in procuring cassava, while the remaining 37.39% mentioned that they have difficulties in procuring cassava. Difficulties encountered include the rarity of raw materials (35.71%), the high price/expensive (21.43%), the quality of cassava is low (21.43%), continuity is not guaranteed (14.29%), and competition (7, 14%) (Figure 3.18).

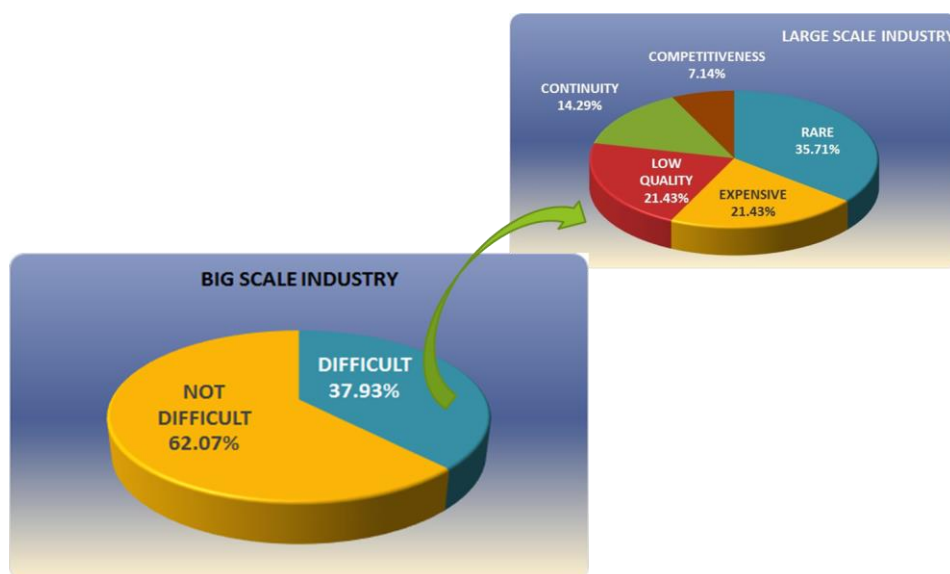


Figure 3.18. Problems in Procuring Cassava at IBS

For the IMK, 63.08% of the respondents said that they have no difficulty in procuring cassava, while the remaining 36.92% say that they had experienced some difficulties in procuring cassava. Difficulties encountered include the rarity of raw materials (42.86%), the high price/expensive (21.43%), the quality of cassava is low (17.86%) and the continuity is not guaranteed (17.86%) (Figure 3.19).

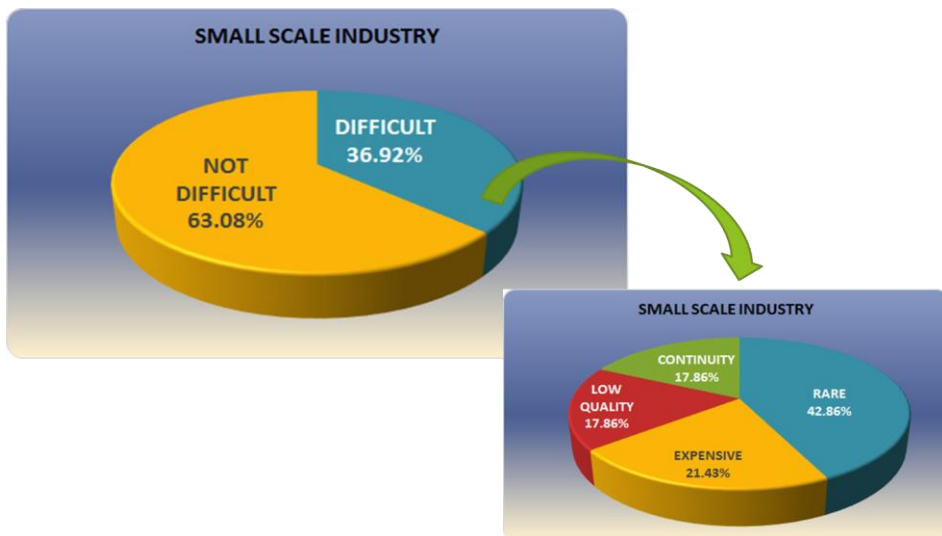


Figure 3.19. Problems in Procuring Cassava at IMK

6) Marketing Mechanism

IBS marketing their tapioca products to other industries by 42.22%, to wholesaler 26.67%, to market/vendors/stalls of vegetables amounted to 13.33%, as the stock amounted to 4.44% and 2.22% is exported. Meanwhile, IMK directly market their products/retail to consumers amounted to 41.90%, to market/vendors/stalls of vegetables amounted to 38.10%, to the hotel/restaurant/catering/food stalls about 11.43%, to wholesaler of 5.71%, to other industries amounted to 1.90% and the rest 0.95% as a stock (Figure 3.20).

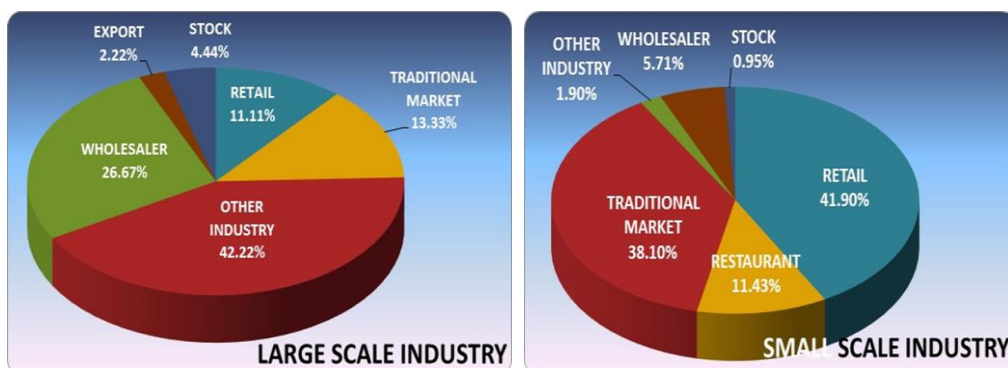


Figure 3.20. Marketing Mechanism at IBS and IMK

7) Profit Margin

Based on the survey results in Central Lampung and Sumedang, the cassava industry produces several products, such as tapioca starch, tape, chips, kecipring/ comring, tiwul and kelanting. The following analysis presents profit margins by type of industry.

a. Tapioca Starch Industries

Tapioca starch industry (IBS) are mostly found in Central Lampung, whereas in Sumedang there are only 3 IBS companies. Based on the survey results, it is only able to obtain information on the cost of purchasing cassava. Prices of cassava in Central Lampung was Rp. 597/kg and in Sumedang was Rp. 750/kg. The cassava in Central Lampung is derived by the varieties of cassava with a high HCN, such as: varieties of Kasetsart (UJ-5), Thailand (UJ-3) and Adira 5. On the other hand, cassava used for starch in Sumedang turned out to contain a low HCN, so the price is relatively more expensive than in Central Lampung.

The purchase price set by the company taking into the refraction, that is a cut price for cassava from farmers selling which is not in accordance with the standards (levels of dirt, moisture, etc.). From 1 ton of cassava can be obtained 250 kg of starch with a conversion factor of 25%, so that the actual purchase price of cassava is Rp 2,388/kg for flour (at Central Lampung) and Rp. 3,000/kg flour (at Sumedang).

Production costs and other expenses can not be obtained from this survey because most IBS companies visited is a subsidiary which only perform production and packaging process, while for the fixed costs (salaries of employees, marketing costs, etc.), transaction costs, regulatory fees, and the cost of the investment were made by the central office which are not located in Central Lampung.

Tapioca flour produced is sold to the food processing industries and other industries. Tapioca flour sold at an average price of Rp. 4,355/kg in the region of Central Lampung and Rp. 6,333/kg in Sumedang areas.

The value of the selling price minus the total cost is the margin price received by the company/business. The results of this survey show margin of tapioca flour price in Sumedang Rp. 3,333/kg, or nearly double of that the price margins in Central Lampung Rp 1,967/kg. However, this price is still in gross margin because data on production costs other than raw cassava can not be obtained.

b. Fermented Cassava Industries

Fermented cassava industries located in Central Lampung and Sumedang, but most of them are IMK. Only one company which included IBS in Sumedang. The production costs are used to buy raw cassava, yeast, fuel and packaging, while the salary of workers are not paid in cash. The workers are paid with residual of cassava tubers and peel.

The purchase price of raw cassava in the average was Rp. 1,257/kg. From 100 kg of cassava can be obtained about 48 kg fermented cassava. With that conversion rate, the price of raw cassava per kg product was Rp 2.618. The average of the other production cost was calculated of Rp 2,142/kg. Therefore, the total cost of production was obtained Rp. 4,760/kg. Cassava was sold at an average price of Rp. 5,646/kg, so the margin of prices received by employers was Rp 886 per kilogram fermented cassava which was sold. This margin rates will also be the net profit that can be gained by the entrepreneurs.

c. Tiwul Industries

Tiwul industry includes in IMK category and only found in Central Lampung. The purchase price of cassava an average of Rp. 1,034/kg. Conversion rate is 0.26 which means that from 100 kg of cassava can produce 26 kg of tiwul. Based on the conversion rate, then the purchase price of cassava per kg of product can be calculated and get the result of Rp. 3,977. The results of this survey can not give information on other production costs, so the total cost of production is assumed to be equal to the purchasing

cost of cassava per unit of product. Tiwul sold at an average price of Rp 10,000/kg. Thus, the margin gross price earned of Rp. 6,023/kg, where the price margin is still includes production costs other than the cost of cassava itself.

d. Raw Kecimpring Industry

Kecimpring is a kind of cracker made of cassava. Raw kecimpring industries are only found in Sumedang, most of them are IMK. The production costs are used for the purchasing of raw cassava, spices, fuel, packaging, and labor costs.

The purchasing price of raw cassava in the average of Rp. 2,000/kg. From 100 kg of cassava can be obtained about 40 kg of raw kecimpring. With that conversion rate, the price of raw cassava per kilogram of product is about R. 5,000. The price of other production costs are an average of Rp. 4,895/kg, therefore the total cost of production is Rp. 9,895/kg. Raw kecimpring sold at an average price of Rp. 12,500/kg, so the margin of prices received by employers is Rp. 2,605/kg for every kilogram of product sold. The price margin is the net profit that can be gained by entrepreneurs.

e. Chips, Cooked Kecimpring/Comring, and Kelanting Industry

These three types industries are mostly included in the IMK categories. Kecimpring or comring is only found in Sumedang, while chips and kelanting are found both in Sumedang and Central Lampung. The average purchasing price of raw cassava is

between Rp. 1,248/kg to Rp. 1,786/kg. The highest conversion rate of raw cassava into processed food products is in the industry of cooked kecipring/comring, amounting of 0.76, while the conversion rate of kelanting is 0.55 and chips is 0.39.

In addition to the purchase of cassava, companies/businesses also have to pay for other cost of production, such as spices, cooking oil and packaging. The highest production costs is to buy cooking oil. It can be seen from the amount of the total production cost, more than Rp. 15,000/kg of product. The high costs can be compensated with the selling price that reached more than Rp. 18,000/kg. By calculating the selling price of product and production costs, the average price margin per kilogram product for chips is Rp 3,060 per kg, Rp. 1,943/kg for cooked kecipring/ comring and Rp. 2,340/kg for kelanting.

Table. 3.13. Profit Margin by Products

Product	Selling Price (Rp/Kg)	Buying Price (Rp/Kg)	Convert Rate	Price for cassava (Rp/Kg product)	Cost of Production	Total Cost prod (Rp/Kg Product)	Profit Margin
	(1)	(2)	(3)	(4)=(2)/(3)	(5)	(6)=(4)+(5)	(7)=(1)-(6)
Fermented Cassava (Tape)	5,646	1,257	0.48	2,618	2,142	4,760	886
Chips (Keripik)	18,554	1,786	0.39	4,579	10,915	15,494	3,060
Flour (Sumedang)	6,333	750	0.25	3,000	n.a	3,000	3,333
Flour (Central Lampung)	4,355	597	0.25	2,388	n.a	2,388	1,967
Raw Cracker (Kecimpring mentah)	12,500	2,000	0.40	5,000	4,895	9,895	2,605
Comring, Kecimpring matang	18,400	1,746	0.76	2,297	14,160	16,457	1,943
'Tiwul'	10,000	1,034	0.26	3,977	n.a	3,977	6,023
'Klanting'	20,000	1,248	0.55	2,269	15,391	17,660	2,340

3.3. Problems

Problems encountered during the implementation of activities are as follows:

- 1) Enumerators have difficulties to conduct interviews with several companies in large and medium industry (IBS). The difficulties are in the form of refusal of some IBS respondents. While in the micro and small industry (IMK) is generally more easier to conduct interviews with the respondents.
- 2) Respondents at tapioca starch companies in Central Lampung can not provide information about production costs, marketing costs, investment costs and others because detailed records of such costs were at headquarters that are not located in Central Lampung.
- 3) Enumerators have to be cautious and careful in doing interviews, especially in the calculation of product prices and production costs incurred by the company/ business.
- 4) Some respondents produce various types of food that the raw materials are not only from cassava, which it can not be obtained specialized information for products made only from cassava. Some of them have difficulties to calculate the cost of labor, cost of packaging and marketing costs.
- 5) The results of the pilot survey have not been able to describe thoroughly about the cassava value chain. This is because it covers only one chain, that is the processing industry only, while the other chains have not been surveyed, i.e. at the farmers, traders and end customers level.



**Summary Result of Cassava
Processing and Distribution Survey in Indonesia**

CHAPTER IV. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

- 1) Cassava is a high potential as an alternative staple food substitution, because it potential to develop in Indonesia and could grow in marginal areas. Cassava is one of the highly nutritious food as a source of carbohydrates and low in cholesterol at an affordable price.
- 2) In Indonesia, cassava is the third primary food source after rice and maize. Cassava is grown by 2,8 million of farm households. Cassava can be processed into tapioca, mocaf, or processed food such as fermented cassava, chips, crackers, tiwul, cireng, etc.
- 3) Lampung Province is the largest cassava producer with share of production of 34%, followed by Central Java and East Java with the share of 17% and 16% respectively.
- 4) Cassava production in Lampung is mostly processed into tapioca flour, whereas in Sumedang cassava is mostly processed directly into a variety of foods. Therefore, varieties of cassava grown in Lampung are toxic cassava with a fairly high starch content, whereas in Sumedang generally from the varieties of the cassava for consumption (non-toxic cassava).
- 5) Based on the survey results, it showed that 93% of IBS processed cassava into tapioca flour and the rest of 7% processed into chips or fermented cassava. Otherwise, the

IMK processed cassava into chips about 46%, tiwul 13%, fermented cassava 12%, kemplang and opak 12%, kelanting 9% and comring 8%.

- 6) Based on the number of processed cassava, from 29 samples of IBS, there were 17 samples that processed cassava more than 100 tons per day, 7 samples processed cassava 10-100 tons per day and 5 samples processed less than 10 tons cassava per day. From 65 samples of IMK, there were 6 samples processed cassava more than 500 kg per day, 28 samples processed between 100-500 kg per day, and 31 samples processed less than 100 kg per day.
- 7) The price of raw cassava in IBS is cheaper than IMK. During the survey, the average price of the cassava in IBS was around Rp. 637/kg, while the average price for the IMK was Rp. 1,311/kg.
- 8) The average usage of cassava by IBS was 144.5 tons per day. They produced tapioca starch around 400 thousand tons per year by a conversion rate of 25%. Tapioca price at producer level was around Rp. 4,355/kg (at Lampung) and Rp. 6,333/kg (at Sumedang).
- 9) The average usage of cassava by IMK was 203 kg per day with various types of food products.
- 10) The average profit margins for tapioca industries in Lampung was Rp. 1,967/kg, while in Sumedang was Rp. 3,333/kg. This price margin was still in gross margin because production costs other than raw cassava can not be obtained. The margin rates in Sumedang was higher than that in Lampung because

the industries are the medium scale and their products directly sold to the food industries.

- 11) In general, the profit margins of the food products made from raw cassava ranged between Rp. 1,943/kg (for comring and cooked kecimpring) to Rp. 3,060/kg (for chips).

4.2. Recommendations

- 1) In order to get comprehensive results of the cassava value chain, the survey should be carried out starting from the producers (farmers), traders, wholesalers, retailers, processing industries up to consumers of processed cassava products.
- 2) Problem encountered in this survey is the difficulty to obtain the data or calculate the cost of production for each product. Therefore, it is suggested to conduct a special survey which carried out a more detailed analysis of the product's profit margin.
- 3) Hopefully this survey can be forwarded to the wider coverage area or covers all the cassava central areas in Indonesia, so that the results can give the overview of the entire cassava value chain in Indonesia.