Consumer's market analysis of products based on cassava

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Abstract

Cassava product has the important role for enhancing household's income in rural. Cassava as raw material food is plentiful as local food in Lampung. Cassava product is one of strategic value addition activities. Value additional activities are a key to create income source enrichment in rural. The householdwas product cassava as a snack or additional food. Their product cassava was operated in small-scale, traditional, and discontinuous production. They have been lacked in technology, capital, and market access. Measurement the sustainability of their business is important. The market has driven the business globally. This research aims to (1) describe the cassava demand to locally product cassava in rural and (2) analysis the consumer's perception of cassava product. Research take placed in Lampung Province, involved Bandar Lampung and Metro City, Pringsewu, Pesawaran, Central Lampung, and East Lampung district. It is held in February until April 2017. Data were analyzed by descriptive statistic and multidimensional scaling. Based on the analysis conclude that (1) the demand of product cassava from rural was massive in volume and regularity with the enormous transaction. This fact is very important to role business cycles. Consumers demand continuously will lead the production of cassava productsustain. Producers of product cassava will consume fresh cassava for the farmer. Consumption of fresh cassava for home industry regularly in rural will develop balancing in fresh cassava price in the farming gate (2) The consumer's perception on cassava product in the different market showed that they prefer much to consume cassava chips as cassava product products than other. Next are crackers, opak, and tiwul rice. Urban consumers prefer product products as snacks (chips, crumbs, and opak), with consumption frequency of 2-5 times per week and volume of 1-3 kg purchases. Consumers in rural were more frequent with daily consumption frequency. Multidimensional scaling analysis performed that price of cassava product was the centre of product attribute.
Keywords: cassava product, market, consumer, perception

1. Introduction

Development of product cassava product could become an alternative as income improvement for fresh cassava producer. Fresh cassava produced dominantly at North of Lampung, Central of Lampung, and East of Lampung districts. Those districts still faced rural poverty alleviation problem. More than 23% population in North of Lampung lived under the poverty line, at Central of Lampung attaint to 17%, and East of Lampung reached 13% (Lampung Statistical Agency, 2015).

Fresh cassava copes with price fluctuation at the farming gate. There has been failure market as a result of the excess supply. The supply was abundant, as well as being easily damaged and not durable were main causes the price of cassava very low. Furthermore, uncertainty price has decreased the income of farmers.An important step needs to reduce poverty in the center of cassava production. Creating superior local production value addition will be important to improve the farmers' income structure. Strengthening the downstream product line of cassava as agro-industry food at production center area will become one of the solutions.

Small-scale cassava-based agroindustry involves more domestic actors. Cassava-based industry have been developed include: tapioca, siger/tiwul/oyek rice, mocaf, klanting, opak, crackers, and chips (Hidayat, 2016; Indiako, dkk., 2014; Sagala, dkk., 2013; Sari, 2011; Surfiana, dkk., 2014; Yunus dan Utami, 2012). Small and medium-sized food agroindustry (SME) plays an important role in increasing the income of rural households. The development of SME food agroindustry supports the concept of equity and economic growth (6)(7).

Food and beverage agroindustry at Lampung's GRDP contributes 12.50%, with the growth of 4.2% year-1. Manpower in large agroindustry enterprises reached 48,735 people in 2014 from 222 existing companies (Lampung BPS, 2015). Food agroindustry provides a multiplier effect on the local economy through increased value added, diversity of sources of income, availability of business, increasing income, and ensuring food security for households, as well as reducing rural poverty. Product product based on cassava has an important role in enhancing household's income in rural. Cassava as raw material food is plentiful as local food in Lampung. Product cassava is one of strategic value addition activities. Value additional activities are a key to create income source enrichment in rural.

Most households are product cassava as a snack or additional food. Their product cassava was operated in small-scale, traditional, and discontinuous production. They have been lacked in technology, capital, and market access. Measurement the sustainability of their business is important. The market has driven the business globally. This research aims to (1) describe the cassava demand to locally product cassava in rural and (2) analysis the consumer's perception of cassava product.

2. Methods

2.1 Survey design

Research take placed in Lampung Province, involved Bandar Lampung and Metro City, Pringsewu, Pesawaran, Central Lampung, and East Lampung district. Field survey held in February until April 2017. Snowball sampling methods used to select respondent market trader. Respondents were direct buyers who coming at the market, 5 people for every market. Target market divided three categorize traditional market, cluster, and retail market modern. Traditional market represented by Pasar Tugu, Pasar Koga, and Pasar Tani at Bandar Lampung City and. They also represent the traditional market at Pringsewu, Metro, Punggur, and Way Jepara. Site map location is described at figure1. Target market placed informed as for the table 1 below:

Table 1. Consumer's market

Market	Location	Description
Pasar Tugu, Pasar Koga, and Pasar Tani	Bandar Lampung City	Traditional market
Punggur	Central of Lampung	Traditional market
Metro	Metro City	Traditional market
Way Jepara	East of Lampung	Traditional market
Panjang, PU Chips cluster area	Bandar Lampung City	Cluster market
Sidoarjo	Pringsewu District	Cluster market
Chandra superstore, Fitrinove, dan Surya minimarket	Bandar Lampung City	Modern market

Figure 1. Site research location

2.2 Data analysis

Consumer's perception and demand for cassava product were analyzed by descriptive statistic. The consumer's perception of cassava productwas analyzed by multidimensional scaling (MDS). MDS is an exploratory technique used to identify unrecognized dimensions affecting behavior. MDS is an exploratory data analysis technique that attains this aim by condensing large amounts of data into a relatively simple spatial map that relays important relationships in the most economical manner [8]. MDS provides general solutions to many problems in perception, emotion, and cognition, where the stimuli are too complex to be quantified by other means[8],[9], [10]. The data for MDS was design using Likert-type scales for rating.Distance model will be represented in geometrical space. Most MDS algorithms were employing Euclidean principles. Distance (d_{ij}) between points i and j is defined as (Equation 1).

$$dij = \sqrt{\sum_a (xia - xja)}\,2 \qquad (1)$$

Specify coordinates of points i and j on dimension a respectivelynoted as x_i and x_j. Positive monotone transformation is applied to dissimilarity data for scaling into spatial distances while for metric MDS a linear transformation function is applied[11]. A stress function represented the fit between input proximities and distances. The Likert-type of MDS model in this research was designed in Table 2. The consumer's perception map on the stimuli response toward purchase attributes as follows:

Table 2. Stimuli response toward purchase attributes:

No	Attribute	VD (1)	D (2)	S (4)	VS (5)
1	Price				
2	Flavor				
3	Savor				
4	Package				
5	Texture				

VD=Very dissatisfied; D=dissatisfied; S=Satisfied; VS=Very satisfied

3. Results and Discussions

3.1 Cassava demand

Cassava production in Indonesia was broadly cultivated as afood, feed, and bioenergy material. Cassava as food and feed have been supporting the food security, especially in rural livelihood. Cassava also will become an alternative feedstock strategy for several rural biogas providing opportunities for decentralized cheaper fuel and electricity systems in rural areas (12). Cassava biomass potentially offers multiple benefits for producing biofuels (13).The expansion of cassava production in Indonesia 1993-2015 seen in figure 2. Figure 2 described the production center of cassava in Indonesia. The best three regions were Lampung, Central Java, and East of Java. Lampung holds astrategical position in fulfilling domestic and international cassava demand.   Lampung contributed 35% of the total national cassava production.Cassava productivity during 2007-2014 was 20.1 ton.ha$^{-1.}$
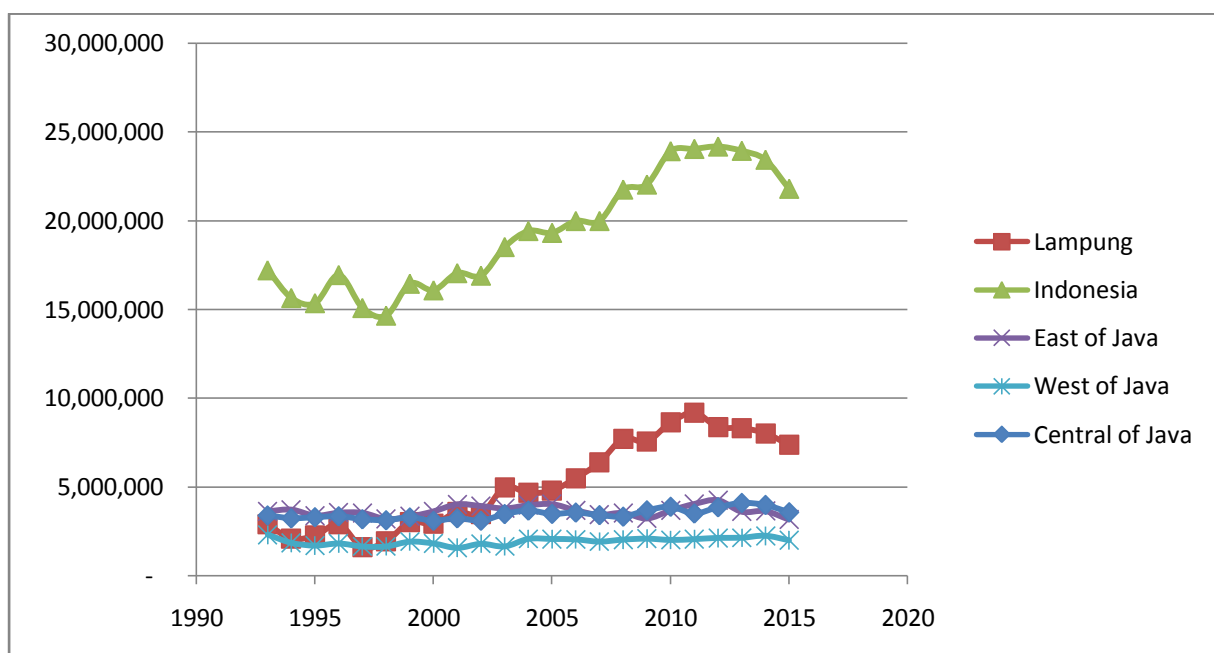

Figure 2. Indonesia cassava production 1993-2015
Sources: Indonesia Statistical Board, 2016

Development the cassava economic is strategic in rural farmer empowerment. Especially on improving the smallholding nature of production, processing, marketing and utilization persist (14). Unfortunately, price volatility as the main problem was always come up. The moving condition of price data forthe main food commodities in Indonesia 2000-2014 seen in figure 3.
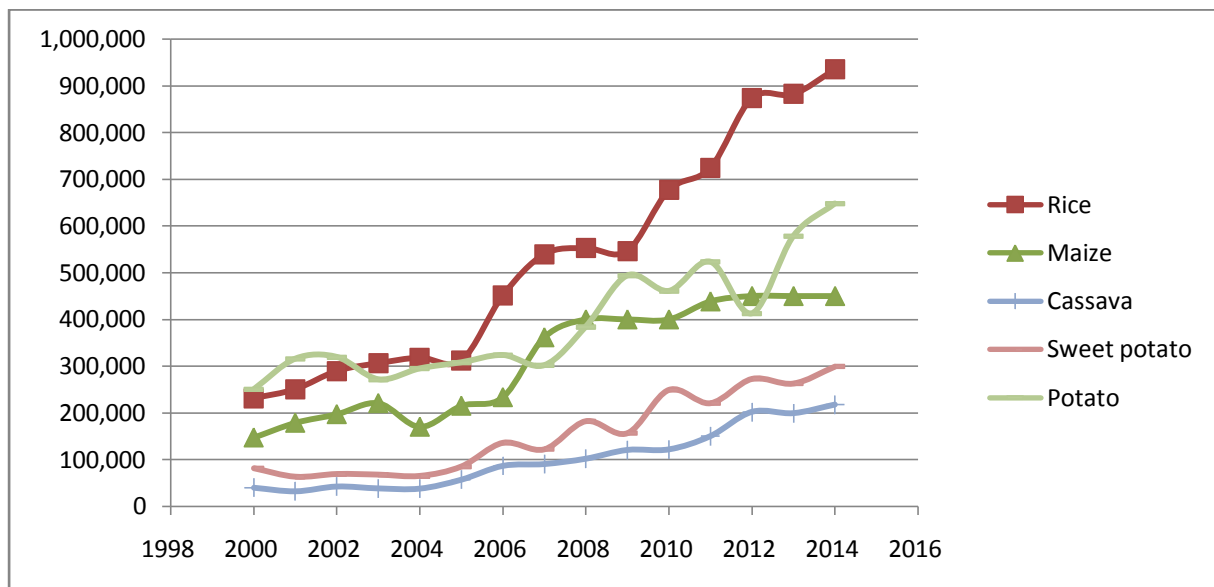
Figure 3. Grocery price of primary agricultural product in Indonesia 2000-2014
Sources: Indonesia Statistical Board, 2016

Based on figure 3 showed that the cassava groceries gate price was the slowest and the lowest compare with others food commodities. This condition affected the farmer income in rural. Cassava processing and marketing in rural have developed bysmallscale business (micro/small medium enteprises = SME). Price volatility could become threat their farmer income and rural food security. Strenghthen the farmers with additional activities on processing cassava is very important. Enhancing the SME medium to large scale enterprises is necessary by taking up the activities using improved semi-mechanized technology (ISMT) and Improved Fully Mechanized Technology (IFMT) (14).

Farming market facilities for farmers are important. The existence of the market of agricultural and agro-industries products requires not only physical facilities, the main is the network and the integrated market linkage between the line of producer farmers with other market institutions, to the final consumer. The market becomes an indicator of guarantee of price incentive and certainty of the sale of farmer producer yield (15). Consumer's purchase based ofproduct cassava product categorize as follows:

Table 3. Purchase volume of product cassava product

Nu	Cassava product product	Purchase Max (kg)	Purchase Min (kg)
1	Cassava rice (Beras siger/tiwul/oyek)	95	60
2	Chips	2452	2079
3	Crackers	100	162
4	Opak	30	56
5	Kelanting	300	190
6	Cassava modified flour/mocav	16	24
	Total	2993	2571

Consumer's purchase frequency is described in Table 4 below:

Table 4. Consumer's purchase frequency

Consumption Time	Frequency	(%)
Daily	13	21.66
2-5 times a week	24	40
6-10 times a week	1	1.66
>10 times a week	22	36.66
Total	60	

The demand for product cassava that appears per month based on the data was ammount 24,716.56 kg until 28,773.5 kg. Urban consumers prefer productcassava as snacks (chips, crumbs, and opak), withconsumption frequency of 2-5 times per week and volume of 1-3 kg purchases. Consumers in rural were more frequent with daily consumption frequency. Based on aNational survey on consumption of fresh cassava product, each person consumed attaint to 3.598 kg.person^{-1}.year^{-1}.The consumption of cassava chips reached 0.209, then tapioca flour 0.039 kg.person^{-1}.year^{-1}. The cassava consumption in Lampung could be predicted as follows (Table 5):

Table 5. The cassava consumption in Lampung, 2015

Consumption of Cassava Product	(kg/person/year)	Ton
Fresh cassava	3.589	27,398.44
Cassava chips	0.209	1,595.51
Tapioca flour	0.034	259.56
Lampung people based on census 2010	7,634,005	
Total cassava consumption		29,253.51
Lampung cassava production in 2015		8,034,016
Rasio input-output cassava (100:30)		26,780,053
(%) Cassava production		0.11%

Based on the value of forwarding linkage indexes of cassava, the value was less than one (0.779). This condition shows that one rupiah output issued by food crop sectors, impacted the multiplier effect generated less than one rupiah. This condition also shows that food production in Lampung is still weaker due to its downstream processing line. Agroindustry with the raw material of food crop not yet optimal developed. Most food production is still consumed as a final product. On the others side, backward index of cassava was greater than 1. It indicates that the presence of food crop sub-sectors provides a growth effect for other sectors of the economy, in this case directly related to the agricultural input industry sector. Cassava gives the highest impact on growth. The index value of 1.2131 means the demand for one rupiah of cassava sector creates a multiplier value of 1,2131 rupiahs for the agricultural input industry sector.

Ratio input-output fresh cassava and product cassava on average was 100:30. It means that minimum fresh cassava for food cassava home industry could reach triple. The fresh cassava not only market as raw material for tapioca industries but could broadly process by household in rural. Furthermore, it will become income enlargement, for minimized poverty alleviation in rural. This condition also reveals at HQCF (high-quality cassava flour) industries in Tanzania (16). Most of cassava productindustries in Lampung work on thesmall-scale business, small manpower, main raw material mostly from local, with small scope marketing spreading (17).

Based on the analysis result it could explain that the demand ofproduct cassava from rural was massive in volume and regularity with the enormous transaction. This fact is very important to role business cycles. Consumers demand continuously will lead the product cassava production sustain. Producers of product cassava will consume fresh cassava for the farmer. Consumption of fresh cassava for home industry regularly in rural will develop balancing in fresh cassava price in farming gate

3.2 Consumer's perception of cassava product

Multidimensional scaling analysis performed that price of cassava product product was the centre of product attribute. The preferred product chosen by consumers was display at Table 6 and Figure 4.

Table 6. Cassava product preferred product

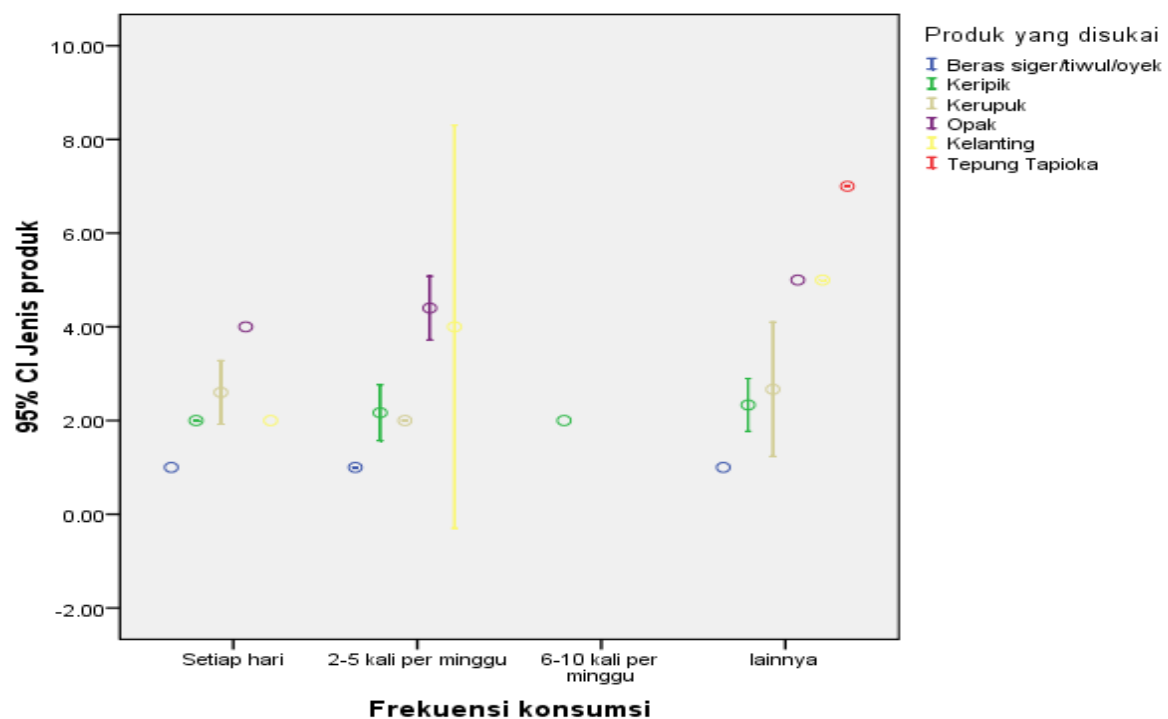|		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cassava rice (Beras siger/tiwul/oyek)	4	6.7	6.7	6.7
	Chips	30	50.0	50.0	56.7
	Crackers	10	16.7	16.7	73.3
	Opak	7	11.7	11.7	85.0
	Kelanting	7	11.7	11.7	96.7
	Cassava modified flour/mocav	2	3.3	3.3	100.0
	Total	60	100.0	100.0	

Figure 4. Cross tabulation between consumption frequency and preferred products

The consumer's perception on cassava product in the different market showed that they prefer much to consume cassava chips as cassava product products than other. Next are crackers, opak, and tiwul rice. The goodness of fit MDS analysis performed as follows (Table 7).

Table 7. Stress and Fit Measures

S-Stress	.05443[b]
Dispersion Accounted For (D.A.F.)	.97793
Tucker's Coefficient of Congruence	.98890
PROXSCAL minimizes Normalized Raw Stress.	
a. Optimal scaling factor = 1.023.	
b. Optimal scaling factor = .968.	

The measure of goodness of fit in multidimensional scaling is called S(called)-Stress. Dimensions are similar to factors as they give the number of facets of the relationships between stimuli and may be plotted. S-Stress was standardized to take values between 0 and 1. The rules of thumb for what values of S-Stress make a good fit (8,9). Based on the Table 7, S-Stress value was 0.05443. It means that the MDS fulfil the goodness of fit model. Dispersion Accounted For (DAF) and Tucker's Coefficient of Congruence also have values 'close to 1' (18).

Table 8. Discrimination Measures

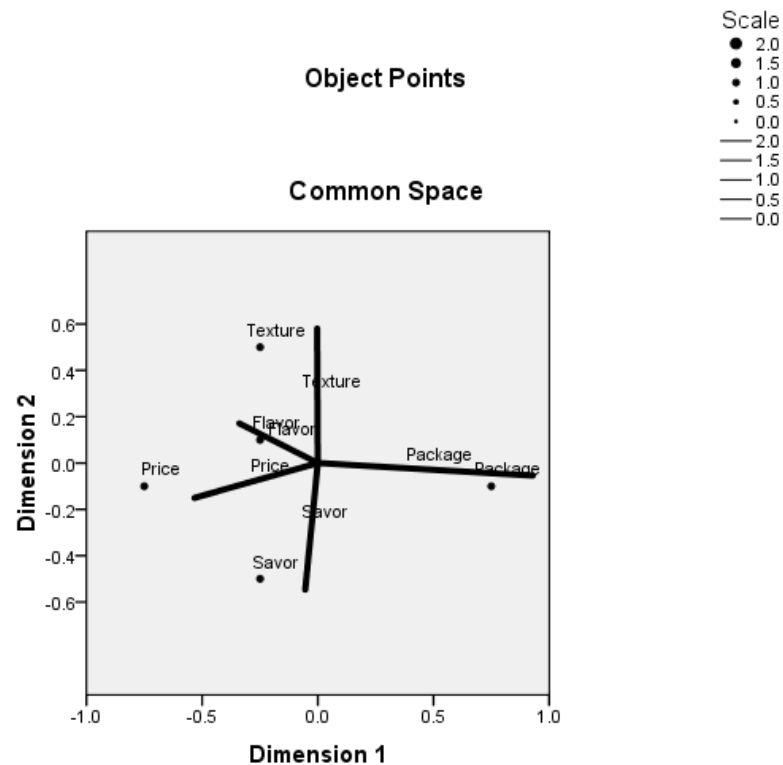|	Dimension		
Atribute	1	2	Mean
Price	.337	.338	.338
Flavor	.615	.000	.308
Savor	.822	.116	.469
Package	.776	.657	.717
Texture	.627	.197	.412
Active Total	3.177	1.310	2.243
% of Variance	63.540	26.192	44.866

Figure 5. Common space of consumer's perception toward response stimuli

Based on Figure 5, explained that price and flavour were centre stimuli to impulse buying consumers. Convenience and lower relative prices of food items purchased at supermarkets, in comparison to other food stores, are relevant to explain higher share of purchases of ultra-product foods and beverages at supermarkets (19).

On the other hand, design package product was also important. Package design development is a process for creating new products to meet market needs, which focuses on creating effectiveness, efficiency, and idea development. High competitive products will also create the image of Indonesian products as high quality, creative, and environmentally friendly products. With the development of these designs, can produce quality products, unique, and original and well-received by the market (20)

4. Conclusions

Based on the analysis conclude that (1) the demand of product cassava from rural was massive in volume and regularity with the enormous transaction. This fact is very important to role business cycles. Consumers demand continuously will lead the product cassava production sustain. Producers of product cassava will consume fresh cassava for the farmer. Consumption of fresh cassava for home industry regularly in rural will develop balancing in fresh cassava price in the farming gate (2) The consumer's perception on cassava product in the different market showed that they prefer much to consume cassava chips as cassava product products than other. The next products are crackers, opak, and tiwul rice.

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