CURRENT CONDITIONS AND PROFITABILITY OF THE NUTMEG INDUSTRY IN BOGOR REGENCY, INDONESIA

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ABSTRACT

The Indonesian nutmeg industry has developed extensively from the processing of nutmeg fruit to various types of products. Despite of its growing demand, the nutmeg industry is facing severe quality problems in both raw material and oil products. This paper aimed to clarify and analyze the current conditions and profitability of the nutmeg industry, to examine the importance of nutmeg processing and the prospects of nutmeg industry for rural development in Indonesia. Primary data was collected in 2012 and 2015 through an interview survey of nutmeg producers in Bogor Regency, an important production, processing and distribution market of nutmeg products located near Jakarta, Indonesia. Data analysis focused on 18 selected respondents from three groups of producers: farmers, sweets and oil producers. Profitability analysis revealed that nutmeg cultivation enabled farmers to earn a family income of 10 million IDR per person on an average, despite conducting neither cultivation management nor processing. Processing nutmeg products has brought a higher income and profit. The values added per one-kilogram nutmeg fruit increased by as much as two and by 23 times, when processed into nutmeg sweets and nutmeg oil, respectively. However, the survey revealed that a lack of management during every stage of cultivation and processing, which has led to serious problems, such as shortage of raw material, product rejection, and extreme price fluctuation. Therefore, an awareness of product quality and safety must be emphasized to all concerned parties in order to sustain the nutmeg industry in Bogor Regency.

Key words: processing, production cost, quality management

INTRODUCTION

Since its emergence in late 1512 (Budavari et al. 1996), nutmeg (*Myristica fragrans* Houtt.) production in Indonesia has developed widely from nutmeg fruit production to the processing of various nutmeg products. Nutmeg spices, sweets, and oil are the most common products across the country. In the perspective of a home industry business, nutmeg production has provided job opportunities for locals, particularly for women or housewives working in nutmeg cultivation and/or processing of nutmeg food products. Therefore, the nutmeg industry has become an important source of income for locals. In 2014, Indonesia has exported 11,469 tons of nutmeg, with a total value of more than 80 million USD (UN Data 2014). Moreover, Indonesia supplied 80% of the world's total demand for nutmeg oil in 2015, making the country the largest producer and exporter of nutmeg in the world. Nutmeg oil has been widely used as an essential ingredient in many manufacturing industries related to food, beverages, cosmetics, and pharmaceuticals. With a high demand from these industries, nutmeg oil is currently the country's most expensive nutmeg product, with a price increase of at least 5 times from 2006 to 2014 (Kumar 2016).

However, despite the increasing price and growing demand, the nutmeg industry in Indonesia is facing severe quality control problems for both raw material and oil products. The Netherlands' Centre for the Promotion of Imports from developing countries stated that an import restriction has been issued towards Indonesian nutmeg, due to the occurrence of fungal infection and aflatoxin contamination, mainly on spices and oil products, which are the most traded nutmeg commodities to the international market (CBI 2013). With tons of rejected nutmeg spices, producers and exporters are required to provide a proof of quality check. This issue has made the domestic production and sales of nutmeg unstable, and has created a significant impact on producers. Therefore, it is important to clarify the current state of nutmeg production, as well as its impact on the nutmeg producers in Indonesia. The lack of development in quality control may lead to a loss in competitiveness of Indonesian nutmeg (Besar 2003). Thus, studies were conducted on the identification of nutmeg phytochemical and contaminant content, and on developing methods for improving nutmeg quality (Muchtaridi et al. 2010, Dharmaputra et al. 2015). Studies focusing on the social and economic aspects of the nutmeg industry in Indonesia are limited. Wahyudi and Indrawanto (1995) studied the price of Indonesian nutmeg in the international market, and showed that price was determined by the amount of its export and stock quantities. Moreover, its bargaining position was rather weak due to a surplus in export quantities. The size of cropping land and number of productive trees are the most important factors influencing profitability (Indrawanto and Yuliono 1997). In the past 20 years, nutmeg production and sales in Indonesia have changed completely. The recent development of nutmeg oil has affected its current production and price. The growth of the nutmeg processing industry seems to provide better options for increasing farmer's income.

This study sought to clarify the current conditions and potential of the nutmeg industry, in consideration of recent quality problems and extreme fluctuations in price and sales of nutmeg products in Indonesia. Specifically, this paper aimed to analyze the profitability of the nutmeg industry, to examine the economic importance of nutmeg processing, and to determine the prospects for rural development involving nutmeg production in Indonesia.

METHODOLOGY

Study area

In 2014, nutmeg production in Indonesia covers several locations throughout the archipelago, including a total cultivated area of 158,326 hectares (Agricultural Information System and Data Center 2016). One of the important production sites for nutmeg is Bogor Regency, West Java Province. Cultivation areas are centered mainly in the surrounding mountainous areas of Mt. Salak, Mt. Gede, and Mt. Pangrango. With its good proximity and direct access to Jakarta, Bogor Regency is not only is a key production area, but also plays a strategic role as the center for processing and distribution market for many nutmeg products. Despite this, nutmeg production in Bogor Regency is facing severe problems regarding its sustainability. Therefore, Bogor Regency was chosen as the study area for this paper.

Data collection and selection

Primary data was collected in 2012 and 2015 by interview surveys of several different groups of nutmeg producers in Bogor Regency. The interview survey in 2012 was conducted on 26 producers, through the assistance of the Indonesian Agency for Agricultural Research and Development, while the rest were introduced by those who had been interviewed. It focused on the following: (1) production characteristics, (2) cost and sales conditions, (3) income and profitability, and (4) current problems and future prospects. Due to the recent problems and changes in the industry, the second interview survey was carried out in 2015 on selected respondents in order to further analyze and determine the current condition of nutmeg cultivation and processing in Bogor Regency.

Data analysis

Based on the 26 respondents, five groups of nutmeg producers were identified, namely Group 1 (cultivators only), Group 2 (sweets processors only), Group 3 (cultivators and sweets processors), Group 4 (oil processors), and Group 5 (cultivators and oil processors). Out of the five groups, a number of farmers were selected from Group 1 (nine farmers), Group 3 (four sweets producers), and Group 5 (five oil producers), based on the background of a typical nutmeg farmer.

PROFILE OF THE SELECTED RESPONDENTS

Generally, the important characteristics of the selected respondents were their educational background and level of personal skills (Table 1). Three of the five nutmeg oil producers have at least graduated from high school, while only two nutmeg farmers and no nutmeg sweets producer has graduated from high school. Nutmeg oil producers tend to have a higher educational background than the others. The nutmeg oil producers had more skills and abilities in production management and processing technology. This highlights the need for oil producers to have a certain level of skill and education to operate distillation machines and use modern technology during the production process.

Table 1. Profile of the selected nutmeg producers.

Items	Nutmeg Farmers	Nutmeg Sweets Producers	Nutmeg Oil Producers
Number of respondents [persons]	9	4	5
Sex (M : F) [persons]	5 : 4	1 : 3	4 : 1
Average age [years]	44.1	59.0	47.2
Average number of years engaged in the nutmeg industry [years]	17.2	36.5	11.6
High school graduate [%]	22.2	0	60.0
Personal skills score [points]	5.2	6.8	8.6

Source: Survey data in 2012

Note: The survey respondents were questioned about following personal skills and abilities, and given 1 point for each skill and ability of the respondents: a) Able to write and read, b) Able to speak Indonesian, c) Owns a radio, d) Owns a television, e) Owns a phone or a cellphone, f) Owns a computer, g) Able to use internet, h) Able to use a type-writer, i) Able to use computer software, j) Has some managerial planning skill, k) Has accounting skills, l) Understands the plantation system, m) Understands harvesting skills, n) Understands processing skills, o) Has attended technological training.

PROFITABILITY OF THE NUTMEG INDUSTRY

Nutmeg cultivation

Nutmeg cultivation in Bogor Regency is conducted mostly in family farms. Farmers usually cultivate nutmeg trees in a small land area nearby their homes. The nutmeg cultivation process starts with seed germination and propagation to produce a nutmeg seedling with 3-5 branches (Sunanto 1993) which is usually sold at around 10,000 IDR (1 USD = 13,324 IDR) per tree. Since Bogor Regency has heavy rainfall even during the dry season, nutmeg trees are provided naturally with enough water and humidity and can grow easily without too much maintenance. Thus, most nutmeg farmers do not irrigate trees and barely give fertilizer during cultivation. The harvesting period of nutmeg fruit differs depending on the use for the fruits. Initial fruiting starts at about six years after planting and reaches full production after 25 years (Sunanto 1993**)**. Nutmeg sweets require fruits at the age of 5-6 months, when the fruit is usually at its maximum size. On the other hand, young fruits at an age of three or four months are the best ingredients for nutmeg oil due to its high oil content. Harvesting is usually done using a pole with a hook to cut off fruits one by one. To make

harvesting faster, some farmers shake the tree. However, this random harvesting method requires additional sorting (selection by age and size) in accordance with the requirements for the succeeding processing stage. Meanwhile, it is also important to note that nutmeg harvesting in Bogor Regency is usually done directly by buyers, who are mostly rural assemblers or other nutmeg producers, including producers of nutmeg sweets and oil, because farmers mainly sell nutmeg fruit as their end-product. Post-harvesting processes, such as sorting and drying of fruits for raw material for the processing of sweets or oil, are mostly conducted by the buyers themselves.

Nutmeg farmers in Bogor Regency earned 10 million IDR per year on average. On the other hand, production costs of 31,000 IDR were for seedlings, labor, transportation, and taxes (Table 2). Since nutmeg cultivation can be easily done, and farmers only need 23,000 IDR to start planting a tree, nutmeg farming can be a steady source of income. Although the amount of profit can only be considered as an additional source of income, farmers in Bogor Regency still favor nutmeg cultivation because of their lack in skill or because of the funds needed for nutmeg processing.

Nutmeg sweets processing

Overall, nutmeg producers who cultivated and processed fruits into sweets earned a higher income and profit than nutmeg farmers (Table 3). Making nutmeg sweets requires the use of sugar and nutmeg fruit, and the cost of sugar accounted for most of the production costs. Production also required more laborers than other means of nutmeg production. The production cost of one kg of nutmeg sweets of four producers ranged from 17,200 and 22,100 IDR, and had no decreasing trend following scale expansion. In other words, the economies of scale did not appear in the processing of nutmeg sweets. However, the family income per member increased with an increase in sales. The value added on one kg of nutmeg fruit processed into sweets ranged from 6,600 to 8,700 IDR, which is about two times as much as one kg nutmeg fruits sold just as is (Table 2 and Table 3). Although the development of the nutmeg sweets processing industry needs more funds and labor input than nutmeg cultivation only, it can provide a higher added value, as well as job opportunities for locals, which are mostly women and housewives from surrounding areas.

Nutmeg oil processing

Unlike nutmeg sweets, material for processing nutmeg oil is only the fruit, particularly its seeds and mace. Since most producers from Bogor Regency only possess large distillation machines,

Table 2. Profitability of nutmeg farmers (1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017).

Items			A	B	C	D	E	F	G	H	I	Average
Laborer	**Number of Family Laborers [persons]**		**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
Sales	Annual Sales Quantity (A) [kg]	Seeds	15	20	45	-	120	150	200	-	-	61
		Fruits	-	-	-	750	-	-	-	5,000	12,000	1,972
	Year 2012 Selling Price [1,000 IDR/kg]	Seeds	16.0	17.0	24.0	-	25.0	25.0	25.0	-	-	24.4
		Fruits	-	-	-	3.0	-	-	-	3.5	4.8	4.4
	Total Sales (B) [1,000 IDR/year]		240.0	340.0	1,080.0	2,250.0	3,000.0	3,750.0	5,000.0	17,500.0	57,600.0	10,084.4
Production Cost	Material Cost [1,000 IDR/year]		4.7	0.3	1.3	2.7	0.7	1.0	10.7	0.7	5.7	3.1
	Family Labor Cost (C) [1,000 IDR/year]		0.7	0.1	0.2	0.4	0.1	0.2	1.6	0.1	0.9	0.5
	Transportation Cost [1,000 IDR/year]		40.0	40.0	0	0	0	0	0	0	0	8.9
	Taxes [1,000 IDR/year]		49.5	3.5	8.9	15.8	8.5	3.5	59.3	6.4	11.8	18.6
	Total Production Cost (D) [1,000 IDR/year]		94.9	43.9	10.4	18.9	9.3	4.7	71.6	7.2	18.3	31.0
Net Profit (B-D) [1,000 IDR/year]			145.1	296.1	1,069.6	2,231.1	2,990.7	3,745.4	4,928.4	17,492.8	57,581.7	10,053.4
Family Income (B-D+C) [1,000 IDR/year]			145.8	296.2	1,069.8	2,231.5	2,990.8	3,745.5	4,930.0	17,492.9	57,582.5	10,053.9
Production Cost of 1 kg product (D)/(A) [1,000 IDR]		Seeds	6.324	2.194	0.232	-	0.077	0.031	0.358	-	-	1.536
		Fruits	-	-	-	0.025	-	-	-	0.001	0.002	0.009
Profit of 1 kg product (B-D)/(A) [1,000 IDR]		Seeds	9.7	14.8	23.8	-	24.9	25.0	24.6	-	-	20.5
		Fruits	-	-	-	3.0	-	-	-	3.5	4.8	3.8
Value-added of 1 kg nutmeg fruits when production is completely self-supplied [1,000 IDR]			1.7	2.0	3.1	3.0	3.3	3.3	3.3	3.5	4.8	4.1

Source: Author's calculation based on survey data, 2012

Notes: 1) There was no hired labor reported.
2) Average of annual sales is the sum of annual quantities of each product (seeds and fruits) divided by nine farmers.
3) Average selling price for 2012 and the value-added of 1 kg nutmeg fruit were calculated using weighted average method.
4) Other averages were calculated using arithmetic average method.
5) Added Value = Net profit + Labor Cost + Taxes. One kg nutmeg fruit contains 0.131 kg nutmeg seeds on average.

Table 3. Profitability of nutmeg sweets producers (1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017).

Items			J	K	L	M	Average
Laborer	Number of Family Laborers (A) [Persons]		2	2	3	3	2.5
	Number of Hired Labor [Persons]		0	5	47	17	17.3
Sales	Fresh Sweets	Annual Sales Quantity (B) [kg]	6,000.0	864.0	22,000.0	1,200.0	7,516.0
		Year 2012 Selling Price [1,000 IDR/kg] *	24.0	22.0	20.0	22.0	20.9
	Dried Sweets	Annual Sales Quantity (C) [kg]	0	14,400.0	50,000.0	76,800.0	35,300.0
		Year 2012 Selling Price [1,000 IDR/kg] *	0	21.0	20.0	25.0	22.8
	Total Sales (D) [1,000 IDR/year]		144,000.0	321,408.0	1,440,000.0	1,946,400.0	962,952.0
Production Cost	Material Self-Supplied Cost (E) [1,000 IDR/year]		0	2,188.0	0	0	547.0
	Material Purchased Cost	Nutmeg Fruits [1,000 IDR/year]	27,000.0	57,600.0	216,000.0	216,000.0	129,150.0
		Sugar [1,000 IDR/year]	86,400.0	178,560.0	864,000.0	1,296,000.0	606,240.0
		Other Material [1,000 IDR/year]	0	0	4,800.0	0	1,200.0
	Family Labor Cost (F) [1,000 IDR/year]		864.0	3,840.0	22,800.0	15,120.0	10,656.0
	Hired Labor Cost [1,000 IDR/year]		0	9,600.0	128,400.0	85,680.0	55,920.0
	Packaging Cost [1,000 IDR/year]		3,750.0	8,352.0	45,000.0	90,000.0	36,775.5
	Transportation Cost [1,000 IDR/year]		0	0	9,600.0	0	2,400.0
	Tools & Machinery [1,000 IDR/year]		311.0	418.8	21,690.6	930.9	5,837.9
	Utility Cost [1,000 IDR/year]		5,808.0	2,460.0	20,352.0	21,432.0	12,513.0
	Service Fee [1,000 IDR/year]		0	0	17.0	0	4.3
	Taxes [1,000 IDR/year]		90.0	15.0	486.8	60.0	163.0
	Interest [1,000 IDR/year]		0	0	12,000.0	135.0	3,033.8
	Total Production Cost (G) [1,000 IDR/year]		124,223.0	263,033.8	1,345,146.4	1,725,357.9	864,440.3
Net Profit (D-G) [1,000 IDR/year]			19,777.0	58,374.2	94,853.6	221,042.1	98,511.7
Family Income (D-G+E+F) [1,000 IDR/year] *			20,641.0	64,402.2	117,653.6	236,162.1	109,714.7
Family Income Per Member (D-G+E+F)/(A) [1,000 IDR/year] *			10,320.5	32,201.1	39,217.9	78,720.7	43,885.9
Production Cost of 1 kg product (G)/(B+C) [1,000 IDR] *			20.7	17.2	18.7	22.1	20.2
Profit of 1 kg product (D-G)/(B+C) [1,000 IDR] *			3.3	3.8	1.3	2.8	2.3
Value-added of 1 kg fruit when production is self-supplied [1,000 IDR] *			8.0	8.7	6.6	7.5	7.2

Source: Author's calculation based on survey data, 2012

Notes: 1) * calculated using weighted average method. Other averages were calculated using arithmetic average method.

2) Added Value=Net profit + Labor Cost + Raw Material Cost (Excluding Seedlings Cost) + Taxes + Interest. Purchased raw materials are assumed to be self-supplied.

Table 4. Profitability of nutmeg oil producers (1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017).

Items			N	O	P	Q	R	Average
Laborer	Number of Family Laborers (A) [Persons]		1	4	1	1	7	2.8
	Number of Hired Labor [Persons]		3	0	8	10	6	5.4
Sales	Nutmeg Oil	Annual Sales Quantity (B) [kg]	3,360.0	3,600.0	3,840.0	6,000.0	15,600.0	6,480.0
		Year 2012 Selling Price [1,000 IDR/kg] *	900.0	840.0	850.0	800.0	950.0	893.0
	Total Sales (C) [1,000 IDR/year]		3,024,000.0	3,024,000.0	3,264,000.0	4,800,000.0	14,820,000.0	5,786,400.0
Production Cost	Material Self-Supplied Cost (D) [1,000 IDR/year]		50,000.0	26,400.0	0	0	124,800.0	40,240.0
	Material Purchased Cost [1,000 IDR/year]		1,099,200.0	739,200.0	800,000.0	1,440,000.0	1,872,000.0	1,190,080.0
	Family Labor Cost (E) [1,000 IDR/year]		16,800.0	40,320.0	8,400.0	9,600.0	56,840.0	26,392.0
	Hired Labor Cost [1,000 IDR/year]		50,400.0	0	67,200.0	96,000.0	48,720.0	52,464.0
	Tools & Machinery [1,000 IDR/year]		1,020,000.0	146,423.1	6,217.5	3,570.0	49,482.8	245,138.7
	Transportation Cost [1,000 IDR/year]		0	0	0	0	21,600.0	4,320.0
	Utility Cost [1,000 IDR/year]		4,800.0	960.0	213,600.0	230,400.0	480.0	90,048.0
	Taxes [1,000 IDR/year]		1,700.0	62.0	400.0	1,150.0	50.0	672.4
	Interest [1,000 IDR/year]		18,000.0	0	0	0	0	3,600.0
	Total Production Cost (F) [1,000 IDR/year]		2,260,900.0	953,365.1	1,095,817.5	1,780,720.0	2,173,972.8	1,652,955.1
Net Profit (C-F) [1,000 IDR/year]			763,100.0	2,070,634.9	2,168,182.5	3,019,280.0	12,646,027.2	4,133,444.9
Family Income (C-F+D+E) [1,000 IDR/year]			829,900.0	2,137,354.9	2,176,582.5	3,028,880.0	12,827,667.2	4,200,076.9
Family Income Per Member (C-F+D+E)/(A) [1,000 IDR/year] *			829,900.0	534,338.7	2,176,582.5	3,028,880.0	1,832,523.9	1,500,027.5
Production Cost of 1 kg product (F/B) [1,000 IDR] *			672.9	264.8	285.4	296.8	139.4	255.1
Profit of 1 kg product (C-F)/(B) [1,000 IDR] *			227.1	575.2	564.6	503.2	810.6	637.9
Value-added of 1 kg nutmeg fruits when production is completely self-supplied [1,000 IDR] *			65.5	87.9	87.2	83.7	104.0	92.5

Source: Author's calculation based on survey data, 2012

Notes: 1) * calculated using weighted average method. Other averages were calculated using arithmetic average method.

2) Added Value = Net profit + Labor Cost + Nutmeg Raw Material Cost (Excluding Seedlings Cost) + Taxes + Interest. One kg nutmeg fruit contains 0.11 kg nutmeg oil on average. Purchased nutmeg raw materials are assumed to be self-supplied.

with an average capacity of 200 kg, there is a need to purchase sufficient raw material. Thus, the total cost for processing nutmeg oil, which includes expenditures for materials, tools, and machinery, turn out to be higher than processing sweets (Table 3 and Table 4). From Table 4, it is clear that nutmeg oil producers earned the highest total sales compared to other nutmeg producers. The high price of nutmeg oil, which in 2012 was 892,297 IDR per kilogram on average, played an important role for its high sales. Moreover, the production cost for one kg nutmeg oil for a relatively large-scale producer was lower than a relatively small-scale one. The economies of scale seem to appear in nutmeg oil processing, meaning that by increasing production quantity, the costs decrease, while net profit and family income increase. Therefore, the family income for a large-scale oil producer was higher than that of a small-scale producer per family member, and higher than that of other nutmeg producers. Furthermore, results also showed that the value added per one kg nutmeg fruit processed into oil was about 23 times as much as that of the fruit itself.

IMPACTS OF QUALITY PROBLEMS ON PROFITABILITY OF NUTMEG PRODUCTS

Price change of nutmeg products in Bogor Regency

Despite its high profitability, the sustainability of the nutmeg processing industry has been confronted with several challenges, with scarcity of raw materials was the initial problem. Because of the high price and growing demand for nutmeg oil, oil producers were eager to keep on expanding and has reached maximum production until 2013. Meanwhile, with an average capacity of 200 kg for one distillation machine, tons of nutmeg fruit were needed. Although it has not been statistically ascertained, interviewed respondents reported that nutmeg cultivation in Bogor Regency has gradually reached a point of not meeting the high demand for raw material which worsened between 2012 and 2015. The shortage was due to the conversion of cultivation areas into housing land. The lack of proper farm management was a constraint on nutmeg production. Hence, the unbalanced supply and demand of raw materials has brought a significant impact on the price of nutmeg fruit, which rose following an increase in nutmeg oil price from 2010 to 2013 (Table 5). These changes were followed by an increase in the price of nutmeg sweets. Since oil price was high, nutmeg oil producers had a stronger bargaining power to buy more nutmeg fruit than other producers. The competitive situation between oil producers and other nutmeg producers in securing raw material gave farmers the benefit of selling at higher price.

In spite of the increasing price and demand of raw material, this favorable condition for farmers did not last long. Quality issues concerning nutmeg oil occurred in early 2014. Nutmeg seeds and mace contain 12% and 15% oil, respectively. To make good quality nutmeg oil, only nutmeg seeds and mace are used. However, if only seeds and mace are used, then oil producers need to secure more fruits. Thus, many producers resort to using whole fruits, regardless of the quality of their oil components. In addition, it is suspected that some producers might have used nutmeg from eastern Indonesia, where oil processing is considered as unsuitable. The lack of quality awareness has led oil processors to face severe problems in quality and in terms of gaining trust from consumers. Many nutmeg oil producers have received product rejections, because of failed to meet the requirements, especially by the manufacturing and export companies.

The price of nutmeg oil dropped significantly to one third from 2013 to 2015. A price change also occurred in other products. The selling price of nutmeg seeds dropped from 31,353 IDR to 9,135 IDR in a couple of years. Although the gap was smaller, the change in price was also seen in nutmeg sweets. As clarified above, it was confirmed that the price of nutmeg oil influenced the price of nutmeg fruit and sweets (the correlation coefficients between the price of nutmeg oil and other nutmeg products in Table 5 are high). To analyze above mentioned phenomenon in detail, another interview survey was conducted in 2015.

Table 5. Price change of nutmeg products
(1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017)

Year	Nutmeg Oil Producers	Nutmeg Farmers		Nutmeg Sweets Producers		Consumer Price Index (CPI) (*)
	Nutmeg Oil	Seeds	Fruits	Fresh Sweets	Dried Sweets	
2010	631,687	20,375	2,665	16,796	16,796	91.3
2011	715,746	22,252	3,189	17,677	18,023	96.2
2012	892,297	22,000	3,767	22,000	22,000	100.0
2013	943,161	31,353	4,805	28,829	28,829	106.4
2014	518,732	18,863	3,301	23,579	23,579	113.2
2015	332,171	9,135	2,491	20,761	20,761	120.4
Average	669,972	20,663	3,370	21,607	21,665	
Correlation coefficient between prices of nutmeg products and raw materials		**Oil & Seeds**	**Oil & Fruits**	**Sweets & Fruits**		-
		0.92	0.84	0.84		

Sources: Survey data in 2012 and 2015.
* IMF - World Economic Outlook Databases (2016)
Notes: 1) Price unit: IDR/kg
2) All prices are real prices deflated by CPI (Year 2012 = 100.0).

Profitability change of nutmeg industry in Bogor Regency

Three nutmeg producers were interviewed in 2012 and 2015, as oil producer P, sweets producer L and X. Sweets producer X was initially omitted from data analysis because he was under a group of non-cultivating producers of nutmeg sweets (Group 2). However, because of his impressive performance between 2012 and 2015, producer X was included in this section to provide a broader perspective on how nutmeg sweets producers respond to the current trend of the nutmeg industry in Bogor Regency. In this section, their financial conditions during the years 2012 and 2015 were compared to analyze how the current price fluctuation affected production.

The profitability of nutmeg oil producer P showed a drop in total sales from 3.3 billion IDR to 698 million IDR, due to a drastic decrease in oil price by 559,350 IDR per kg in three years (Table 6). The other reason was difficulty over securing sufficient good raw material. Although producer P has been cultivating nutmeg, the nutmeg trees were just planted and have not started bearing fruit. Thus, he had to compete with other nutmeg producers in purchasing raw material from local farmers. Dealing with the fall of nutmeg oil price and the scarcity of good raw material, producer P had to reduce production from twice a week to twice a month on a non-regular basis. Total production cost (i.e. materials and labor cost) decreased significantly by 79% in three years. Since nutmeg oil can be preserved longer than food and beverages, producer P intended to sell when the price rose in the market. This strategy helped him secure his income. Thus, producer P was able to have a positive return in 2015.

Table 6. Change in profitability of nutmeg oil producer
(1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017)

Items		Nutmeg Oil Producer P	
		2012	2015
Laborer	Number of Family Labor (A) [Persons]	1	1
	Number of Hired Labor [Persons]	8	1
Sales	Nutmeg Oil Annual Sales Quantity (B) [kg]	3,840.0	2,400.0
	Nutmeg Oil Selling Price [1,000 IDR/kg]	850.0	290.6
	Total Sales (C) [1,000 IDR/year]	3,264,000.0	697,558.5
Production Cost	Material Self-Supplied Cost (D) [1,000 IDR/year]	0	0
	Material Purchased Cost [1,000 IDR/year]	800,000.0	175,386.1
	Family Labor Cost (E) [1,000 IDR/year]	8,400.0	1,993.0
	Hired Labor Cost [1,000 IDR/year]	67,200.0	1,993.0
	Tools & Machinery [1,000 IDR/year]	6,217.5	5,379.1
	Transportation Cost [1,000 IDR/year]	0	0
	Utility Cost [1,000 IDR/year]	213,600.0	45,839.6
	Taxes [1,000 IDR/year]	400.0	332.2
	Interest [1,000 IDR/year]	0	0
	Total Production Cost (F) [1,000 IDR/year]	1,095,817.5	230,923.0
Net Profit (C-F) [1,000 IDR/year]		2,168,182.5	466,635.5
Family Income (C-F+D+E) [1,000 IDR/year]		2,176,582.5	468,628.6
Family Income Per Member (C-F+D+E)/(A) [1,000 IDR/year]		2,176,582.5	468,628.6
Production Cost of 1 kg product (F/B) [1,000 IDR]		285.4	96.2
Profit of 1 kg product (C-F)/(B) [1,000 IDR]		564.6	194.4
Value-added of 1 kg nutmeg fruits when production is completely self-supplied [1,000 IDR]		87.2	29.6

Source: Author's calculation based on survey data in 2012 and 2015.
Notes: 1) Added Value = Net profit + Labor Cost + Nutmeg Raw Materials Cost (Excluding Seedlings Cost) + Taxes +Interest. One kg nutmeg fruits contain 0.11 kg nutmeg oil on average. Purchased nutmeg raw materials are assumed to be self-supplied materials.
2) All monetary values are real prices deflated by CPI (Year 2012 = 100.0).

Changes in profitability of producer L and producer X in 2012 and 2015 are shown in Table 7. Total sales of producer L, a relatively large-scale producer of nutmeg sweets in 2012 (Table 3), decreased by 38% in 2015. Production had to be reduced due to the following reasons, (1) the nutmeg trees were still not bearing fruit, and (2) difficulty in purchasing a sufficient supply of good nutmeg fruits. Producer L also decided to reduce costs (especially for materials and labor cost) and raise the selling price of nutmeg sweets in order to maintain profitability in 2015. On the other hand, producer X showed impressive performance in 2015 although he was a middle-scale producer with limited access to the market in 2012. The competitive Bogor Regency market encouraged him to expand target markets to cities outside of Bogor Regency. This strategy worked very well and led to a larger scale in sales and production. The rising demand from several wholesalers in surrounding areas, such as Cianjur and Sukabumi, played an important role in bringing a positive return to their production in 2015.

From the above analysis, it was noted that a decrease in nutmeg oil price and the scarcity of raw material lowered the profitability of nutmeg oil producer P. Nutmeg sweets producer L and X also succeeded in gaining a higher profit by raising their selling price and cutting off costs, or by expanding their market and increasing production. Despite the decrease in profits, results showed that nutmeg oil producer P can still earn a higher family income per member, as well as a higher value added for one kg nutmeg fruit compared to nutmeg sweets producer L and X (Table 6 and 7).

Table 7. Change of profitability in nutmeg sweets producers
(1 USD = 13,324 IDR (Central Bank of Indonesia as of 9 August 2017)

Items			Producer L		Producer X	
			2012	2015	2012	2015
Laborer	Number of Family Labor (A) [Persons]		3	1	3	3
	Number of Hired Labor [Persons]		47	22	21	9
Sales	Fresh Sweets	Annual Sales Quantity (B) [kg]	22,000	13,000	0	7,320.0
		Selling Price [1,000 IDR/kg]	20.0	20.8	0	16.6
	Dried Sweets	Annual Sales Quantity (C) (kg)	50,000	30,000	19,200	37,350.0
		Selling Price [1,000 IDR/kg]	20.0	20.8	24.0	19.1
	Total Sales (D) [1,000 IDR/year]		1,440,000.0	892,708.9	460,800.0	834,952.7
Production Cost	Material Self-Supplied Cost (E) [1,000 IDR/year]		0	0	0	0
	Material Purchased Cost [1,000 IDR/year]		1,084,800.0	526,573.7	216,000.0	428,528.5
	Family Labor Cost (F) [1,000 IDR/year]		22,800.0	11,958.1	14,400.0	58,457.9
	Hired Labor Cost [1,000 IDR/year]		128,400.0	61,435.0	100,800.0	67,451.4
	Packaging Cost [1,000 IDR/year]		45,000.0	22,421.5	21,120.0	15,709.2
	Transportation Cost [1,000 IDR/year]		9,600.0	4,783.3	31,200.0	5,729.9
	Tools & Machinery [1,000 IDR/year]		21,690.6	18,012.5	1,944.4	7,583.8
	Utility Cost [1,000 IDR/year]		20,352.0	14,449.4	4,960.0	8,167.2
	Service Fee [1,000 IDR/year]		17.0	14.1	0	1,993.0
	Taxes [1,000 IDR/year]		486.8	404.3	50.0	83.0
	Interest [1,000 IDR/year]		12,000.0	0	0	2,882.5
	Total Production Cost (G) [1,000 IDR/year]		1,345,146.4	660,051.8	390,474.4	596,586.5
Net Profit (D-G) [1,000 IDR/year]			94,853.6	232,657.0	70,325.6	238,366.1
Family Income (D-G+E+F) [1,000 IDR/year]			117,653.6	244,615.2	84,725.6	296,824.0
Family Income Per Member (D-G+E+F)/(A) [1,000 IDR/year]			39,217.9	244,615.2	28,241.9	98,941.3
Production Cost of 1 kg product (G)/(B+C) [1,000 IDR]			18.7	15.4	20.3	13.4
Profit of 1 kg product (D-G)/(B+C) [1,000 IDR]			1.3	5.4	3.7	5.3
Value-added of 1 kg nutmeg fruits when production is completely self-supplied [1,000 IDR]			6.6	6.3	10.7	13.8

Source: Author's calculation based on survey data in 2012 and 2015.
Notes: 1) Added Value = Net profit + Labor Cost + Nutmeg Raw Materials Cost (Excluding Seedlings Cost) + Taxes +Interest. Purchased nutmeg raw materials are assumed to be self-supplied materials.
2) All monetary values are real prices deflated by CPI (Year 2012 = 100.0).

CONCLUSIONS AND RECOMMENDATIONS

To promote rural development in the nutmeg industry, nutmeg farmers will need more support for skills and technology concerning cultivation to ensure a stable supply of fruits. Producers should also expand the market and realize optimal size of production to enhance their profits and income. To prevent further damage and preserve the sustainability of the industry in Bogor Regency, quality awareness must be emphasized to all concerned stakeholders, from farmers, producers and buyers. Hence, the quality of nutmeg oil as a high price export commodity is extremely important. Government involvement becomes necessary, especially in enacting legal and formal regulation as well as policy enforcement for quality assessment of nutmeg products in Bogor Regency. Lastly, due to the small number of respondents in this study, it is necessary to broaden the scope of this research and conduct further analysis, with consideration of the above conclusions as reference information.

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