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THE ADDED VALUE OF BIO-BUSINESS PRODUCT DIVERSIFICATION OF NUTMEG (*Myristica fragrans*) IN NORTH MALUKU PROVINCE

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Abstract

Background: Nutmeg (Myristica fragrans) is a native Indonesian plant that thrives in North Maluku Province. However, as one of the centers of nutmeg production, North Maluku is still lacking in carrying out nutmeg processing industry activities compared to other centers. Bio-business activities in the form of nutmeg product diversification have the potential to provide high economic value.
Purpose: The objectives of this study are: first, to describe the nutmeg bio-business in North Maluku. Second, to analyze the added value obtained from the diversification of nutmeg products in North Maluku.
Design/methodology/approach: The study was conducted from February to March 2024 in North Halmahera Regency and Ternate City, with a sample of 108 nutmeg farmers and 4 business actors. The study used a quantitative approach with a descriptive method from primary data. Furthermore, industrial trees were used in the study to provide an overview of the various types of products that can be produced from nutmeg commodities. Meanwhile, the Hayami method was used to determine the increase in added value from the diversification of nutmeg products.
Finding/Result: The results of the study found that nutmeg bio-business activities in North Maluku Province resulted in product diversification from processed fruit skin, fruit flesh, seeds, and mace. Meanwhile, the highest added value of nutmeg product diversification in North Maluku is obtained from dried nutmeg seeds, nutmeg steam herbal medicine, nutmeg oil, and dried mace.
Conclusion: The production of processed nutmeg products is still carried out as a home industry. There are nineteen (19) processed products that can be produced from nutmeg in North Maluku, as depicted in the industrial tree. The calculation of added value takes into account the proportion of nutmeg fruit to be processed products. Analysis of the added value of processed nutmeg products is carried out by calculating the added value per kilogram of nutmeg raw material for one production process.
Originality/value (State of the art): This study is the first to analyze the added value of nutmeg bio-business product diversification in North Maluku Province.

Keywords: Hayami method, home industry, industrial trees, nutmeg center, nutmeg processing

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INTRODUCTION

Nutmeg (*Myristica fragrans*) is one of the leading commodities of the plantation sub-sector in Indonesia. Nutmeg is a native plant of Indonesia originating from the Maluku and Banda Islands (Jaiswal et al. 2009). The central areas of nutmeg production in Indonesia include North Maluku Province. North Maluku ranks third as the center of nutmeg production. North Maluku has a significant contribution with an average production during the period 2018 to 2022 of around 6,132 tons (Kementan, 2023).

There are nine superior varieties of Indonesian nutmeg commodities released by the Ministry of Agriculture-RI. It is known that five of the varieties belong to North Maluku Province, namely Ternate 1 Variety, Tidore I Variety, Tobelo 1 Variety, Makian Variety, and Patani Variety. Nutmeg varieties from North Maluku have special characteristics that distinguish them from other varieties. Superior varieties of Indonesian nutmeg, including varieties from North Maluku, also play a strategic role as a source of foreign exchange earnings for the country.

Positive growth in the volume and value of nutmeg exports indicates a picture of increasing interest in the nutmeg market share (Kementan, 2022). The nutmeg market share is a great business potential for residents in nutmeg plantation development areas in Indonesia (Harni and Jahroh, 2016). Diversification of nutmeg products has the potential to maximize the use of resources to increase added value. Innovation in the use of nutmeg is not only focused on seeds and mace but also involves the processing of nutmeg fruit flesh (Fibriyanti et al. 2022). North Maluku's superior nutmeg commodity can be managed to have added value.

North Maluku has great potential for nutmeg development. Factors such as the availability of vast land, superior varieties, climate conditions, and geography make this province suitable for growing nutmeg. Regarding the business potential of the benefits of nutmeg which can be processed into various products for residents who develop this commodity, in reality, North Maluku farmers are still focused on on-farm nutmeg plantations. The final result of nutmeg plantations in North Maluku is generally sold by farmers in the form of seeds and nutmeg mace (old-dry). While there is a possibility of getting added value when nutmeg is processed into various bio-business products such as oil and food, farmers' income also increases. The core of bio-business is innovating (Maarif and Nuraisyah, 2021). Commercial bio-business activities in the form of nutmeg processing industries are still minimal in this province.

The diversification of nutmeg products, which is still low in business in the North Maluku region, was stated by Djumadil and Syafie (2019) in their research on nutmeg-based industrial products in Ternate City. Diversification of nutmeg products has the potential to have high economic value. North Maluku as one of the centers of nutmeg production, is still lacking in carrying out nutmeg processing industrial activities compared to other centers, such as Bogor in West Java. Juwita and Tsuchida (2017) in their research in Bogor, noted that the added value of every 1 kg of nutmeg will increase by 2 times if processed into candied nutmeg, and increase 23 times if processed into nutmeg oil. Meanwhile, the research of Khatun et al. (2016), concluded that diversifying products can provide greater benefits than direct sales.

The low diversification of nutmeg products is a classic problem in North Maluku Province. The government has a strategic role in driving and directing the development of nutmeg businesses in North Maluku. Knowing the added value as an indicator of how optimal the processing of a commodity is, can be the basis for nutmeg development. Therefore, research is needed to describe the nutmeg processing industry (bio-business) in North Maluku, and analyze the added value of nutmeg product diversification.

Research analyzing the added value of nutmeg has been reviewed by several researchers. Ruauw et al. (2012) analyzed the added value of candied nutmeg in Bitung City. Meanwhile, Mujiburrahmad et al. (2019) and Nitami et al. (2023), analyzed the added value of nutmeg processing in South Aceh Regency. Kharismawanti dan Soejono (2019) also analyzed the added value of candied products in the agro-industry in Banyuwangi Regency. However, no research has been found that analyzes the added value of nutmeg bio-business product diversification in North Maluku Province.

So this study was conducted with the following objectives: first, to describe the nutmeg bio-business in North Maluku. Second, to analyze the added value obtained from the diversification of nutmeg products in North Maluku. The results of this study are expected to provide information on the added value of nutmeg product diversification in North Maluku, which can be the basis for determining the strategy for developing nutmeg bio-business in North Maluku.

METHODS

The research was conducted in February-March 2024. The research location was in North Maluku Province, in North Halmahera Regency and Ternate City. The location selection was carried out using the purposive method, considering North Halmahera and Ternate are the largest nutmeg production centers at the district and city levels (Kementan, 2023). The research used a quantitative approach with a descriptive method. The research used a quantitative approach with a descriptive method. The data used in the study were primary data obtained from survey interviews using questionnaires aimed at nutmeg farmers and nutmeg-processed product business actors other than spices.

Qistiya et al. (2017) used the Slovin formula to determine the sample. Determination of the number of farmer samples in this study based on the population using the Slovin formula: $n=N/(1+N(e^2))$, where n = sample size, N = population size, and e = real level. The Indonesian Ministry of Agriculture in 2023 recorded the number of nutmeg farmers in North Maluku Province as 41,359 families, so the number of Slovin samples with a real level of 10% = $(41,359/(1+(41,359(0.1^2)))$ = 99.76 = 100. According to Slovin, the sample size was 100 nutmeg farming families. Furthermore, based on the basic data on the number of Slovin samples, the sample from North Halmahera Regency was determined as many as 54 nutmeg farmers and Ternate City as many as 54 nutmeg farmers, so the total sample was 108 nutmeg farmers.

The sample of business actors in this study was determined using the purposive sampling method. The purposive sampling method selects samples according to the research objectives (Lenaini, 2021). In the search for areas during the study and the results of interview visits to the Industry and Trade Service in North Halmahera Regency, no information was found on business actors for nutmeg-processed products other than spices. Meanwhile, in an interview visit to the Industry and Trade Service in Ternate City, information was found on business actors for nutmeg processed products other than spices as many as 27 people, most of whom had similar processed products. So the respondents for business actors for nutmeg processed products other than spices were represented by business actors for nutmeg processed products other than spices in Ternate City. Then the number of samples of business actors was determined by as many as 4 people, to find out the added value of nutmeg from products other than spices, namely business actors for nutmeg drink processed products (1 person), business actors for nutmeg candied processed products (1 person), business actors for nutmeg chocolate processed products, nutmeg powder and spice coffee (1 person), and business actors for nutmeg herbal medicine processed products (1 person).

The nutmeg industry tree is arranged in this study according to Tupan and Nashihuddin (2016), based on the function and benefits of a commodity with economic value, to provide an overview of the various types of products that can be produced from the commodity. Meanwhile, the Hayami method is used in this study to determine the increase in added value from the diversification of nutmeg products. In the Hayami method, added value is the difference between the value of the commodity given a certain treatment and the cost of sacrifice incurred during the process (Suprabowo et al. 2017). Table 1 shows the procedure for calculating the added value of the Hayami Method (Hayami et al. 1987), which can produce information on the nutmeg product processing subsystem, namely added value (IDR), added value ratio (%), labor compensation (IDR) in the form of wages received directly, the percentage of labor from added value (%), profit (IDR), and the percentage of the level of profit from added value (%).

The hypothesis in the study is that nutmeg (*Myristica fragrans*) in North Maluku Province provides significant added value when processed into diversified bio-business products.

Table 1. Hayami value-added method calculation procedure

Variable	Unit	Notation
Output, input, and price		
Output	Kg/ production	A
Raw material	Kg/ production	B
Labor person	person/ production	C
Conversion factor		D = A/B
Labor coefficient		E = C/B
Output price	IDR/Kg	F
Average labor wage	IDR/person	G
Income and value-added		
Raw material price	IDR/Kg	H
Other input contribution	IDR/Kg	I
Output value	IDR/Kg	J = D x F
Value added	IDR/Kg	K = J-H-I
Value added ratio	Percent	L = (K/J) x 100%
Labor reward	IDR/Kg	M = E x G
Labor share	Persen	N = (M/K) x 100%
Profit	IDR/Kg	O = K - M
Profit share	Percent	P = (O/K) x 100%
Reward for production factors		
Profit margin	IDR/Kg	Q = J – H
Labor (%)	Percent	R = (M/Q) x 100%
Other inputs (%)	Percent	S = (I/Q) x 100%
Entrepreneur profit (%)	Percent	T = (O/Q) x 100%

Description: A = total production of processed nutmeg products, B = input of nutmeg fruit to be processed, C = labor (person/production), D = total production of processed nutmeg products compared to raw nutmeg fruit used, E = number of workers divided by raw materials used, F = product price applicable in one analysis period, G = average labor wages per person in one production period, H = price of raw nutmeg fruit per kilogram during the analysis period, I = contribution of other input costs, such as costs of auxiliary raw materials and depreciation costs, J = conversion factor value multiplied by-product prices applicable in one analysis period, K = output value minus contribution of other inputs and raw material prices, L = percentage of value added divided by output value, M = labor coefficient multiplied by average labor wages, N = percentage of labor compensation divided by value-added, O = value added minus labor compensation, P = percentage of profit divided by value-added, Q = output value minus raw material prices, R = percentage of labor compensation divided by profit margin, S = percentage of input contribution others divided by profit margin, T = percentage of profit divided by profit margin.

Source: Hayami et al. (1987)

Therefore, this research framework highlights the potential and challenges in nutmeg bio-business in North Maluku Province, which is known as the center of nutmeg production in Indonesia (Figure 1). The potential includes the availability of large land, superior varieties, and suitable climate and geographical conditions. The study identified the problem of low diversification of nutmeg products. To analyze and understand the nutmeg business in North Maluku, this study will use the industrial tree method and the Hayami method for value-added analysis. The results of this analysis will provide managerial implications that can help improve the diversification and management of the nutmeg bio-business in North Maluku.

RESULTS

Overview of Nutmeg Bio-Business in North Maluku Province

In this study, the description of nutmeg bio-business in North Maluku was identified from 112 respondents. The respondents consisted of 54 nutmeg farmers in North Halmahera Regency, 54 nutmeg farmers in Ternate City, and 4 nutmeg processed product business actors in Ternate City (Table 2). During the research visit, it was found that nutmeg-processed product production activities were still carried out as a home industry.

The bio-business activities of nutmeg farmers in North Halmahera Regency, in addition to selling nutmeg in the form of spices (seeds and mace), 3 farmers diversify products such as nutmeg syrup, nutmeg extract, nutmeg jam, and nutmeg oil. Likewise, farmer respondents in Ternate City, in addition to selling nutmeg in the form of spices, 2 farmers diversify products such as candied nutmeg, nutmeg syrup, nutmeg extract, spice tea, nutmeg stick snacks, nutmeg crisps, nutmeg chili sauce, ebi nutmeg fried chili sauce, nutmeg chips, nutmeg jam, and carbonated drinks. Meanwhile, nutmeg processed products produced by business actors, namely herbal medicine called nutmeg fruit steam, nutmeg extract, nutmeg chocolate, nutmeg powder, and spiced coffee (original, no sugar, and creamer). All of these products are sold as souvenirs from North Maluku.

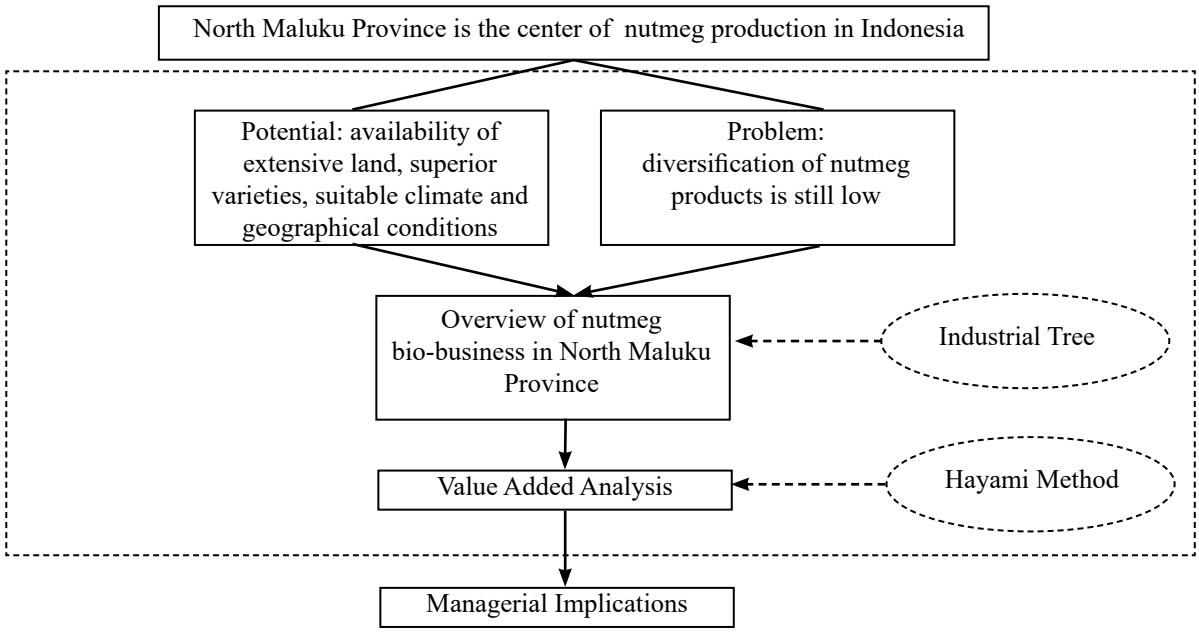

Figure 1. Research framework

Table 2. Types of Research Respondents

Respondent Type	North Halmahera Regency	Ternate City	North Maluku
Nutmeg farmers	54	54	108
Nutmeg spice farmers	51	52	103
Nutmeg farmers who diversify nutmeg processed products other than spices	3	2	5
Nutmeg-processed product business actors	0	4	4
Total	54	54	112

This study found 19 processed products that utilize nutmeg, in the form of fruit skin, fruit flesh, seeds, and mace. Fruit skin and fruit flesh are abundant from the primary nutmeg products, namely seeds and mace. The product that processes nutmeg fruit skin is spice tea. Meanwhile, the products that process nutmeg fruit flesh are nutmeg steam products, nutmeg chili sauce, nutmeg sweets, nutmeg powder, nutmeg crisps, nutmeg syrup, spiced coffee, nutmeg jam, nutmeg chips, nutmeg juice, carbonated drinks, nutmeg sticks, nutmeg fried chili sauce, and nutmeg chocolate. Meanwhile, the product that processes seeds and mace is nutmeg oil.

In addition to processed products, the fruit flesh that is wasted is used by nutmeg farmers as fertilizer. The pruned nutmeg tree trunks are also collected by farmers for firewood. In this study, no use of nutmeg seed shell waste has been found. Nutmeg seed shells can be processed into biomass charcoal briquettes (Kakerissa, 2021).

Based on the benefits of nutmeg, the diversification of nutmeg bio-business products obtained in this study is arranged in an industrial tree. The nutmeg industry tree in North Maluku is visualized in Figure 2. This finding is in line with the nutmeg industry tree compiled by Fibriyanti et al. (2022) in a study by the Maluku Agricultural Technology Assessment Center regarding various processed nutmeg products.

Bio-business provides added value to products made from primary agricultural production materials (Heijman, 2016). All parts of nutmeg can be used to produce various high-value products, thus opening up opportunities for home industries (Kakerissa and Hahury, 2021). The government plays an important role in improving the knowledge and skills of nutmeg farmers in post-harvest handling (Asir and Asir, 2023). The nutmeg industry in Fakfak Regency is growing rapidly thanks to government support, although it is still faced with traditional cultural constraints (Juwita, Tsuchida, and Munarso, 2018). The potential for nutmeg bio-business in North Maluku must receive full support from the government.

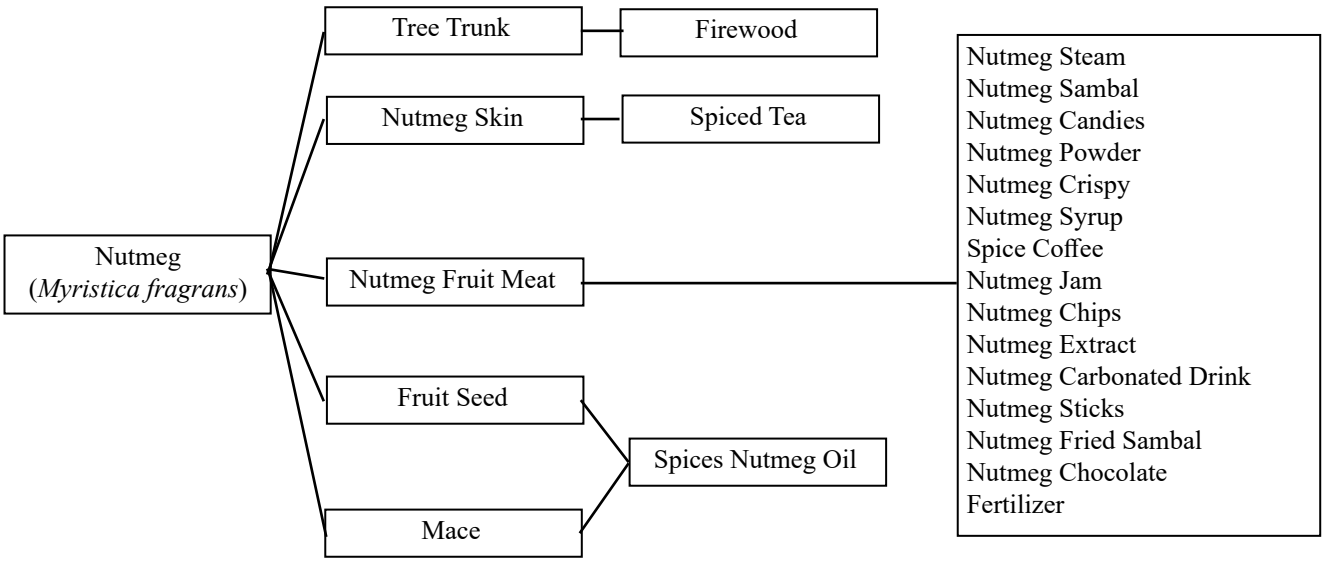

Figure 2. Nutmeg industrial trees in North Maluku

Analysis of Added Value from Nutmeg Product Diversification in North Maluku

Agricultural business opportunities in North Maluku Province provide greater added value with nutmeg plantations, not enough to just produce primary products, but processing and marketing activities must be carried out. The added value capability can be measured by the Reyne indicator, which is low if <15%, moderate if 15%–40%, and high if >40% (Hubeis, 1997). In this study, the calculation of added value using the Hayami Method has taken into account the proportion of nutmeg fruit in its processed products. Analysis of the added value of processed nutmeg products is carried out by calculating the added value of one kilogram of nutmeg raw material for one production process. The results of the calculation of the nutmeg value-added ratio show how optimal nutmeg processing is in producing value-added products. Table 3 displays the diversification of nutmeg bio-business products arranged in order from the highest to the lowest added value ratio.

Dried Nutmeg Seeds

Dried nutmeg seeds in North Maluku are processed raw nutmeg traditionally dried by drying it in the sun. Drying can also be done using oven technology like the nutmeg industry in Bogor Regency (Harni and Jahroh, 2016). Of the 108 nutmeg farmer respondents in North Maluku, one production from a harvest of 2,676.70 kg of nutmeg, was processed to produce 91.14 kg of dried nutmeg seeds. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 0.03 kg of dried nutmeg seeds. Labor is needed during the harvest process, with an average wage received of IDR96,105/person.

The cost of supporting materials for processing dried nutmeg seeds is obtained from the contribution of other inputs per production divided by the total input of raw materials for nutmeg. So from 1 kg of dried nutmeg seeds, supporting materials are needed for IDR181/kg. The output value of dried nutmeg seed products produced from 1 kg of nutmeg is IDR3,057/kg. Every 1 kg of dry seed output produced from the processing of nutmeg raw materials and supporting materials obtained an added value of IDR2,876/kg, with a high added value ratio of 94.09%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into dry seeds reached IDR2,737/kg or 89.53%. Furthermore, the margin is the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 4.55%, other input contributions of 5.91%, and the profit of dried nutmeg seeds product entrepreneurs of 89.53% or reaching IDR3,057/kg.

Nutmeg Steam

Nutmeg Steam is an herbal medicine that is useful as a medicine for diabetic wounds, preventing and neutralizing blood sugar and pancreatic function, eliminating chronic itching, and neutralizing cholesterol and uric acid. According to Suwarda et al. (2021),

Table 3. Added Value of Nutmeg Product Diversification in North Maluku Province

Variable	Unit	Dried Nutmeg Seeds	Nutmeg Steam	Nutmeg Oil	Dried Mace	Nutmeg Chili Sauce	Dry Candied Nutmeg	Wet Candied Nutmeg	Spice Tea	Nutmeg Powder	Nutmeg Crispy
Output, input, and price											
Output	Kg/ production	91.14	5.41	30.00	9.74	12.00	16.88	22.50	1.12	10.00	2.25
Raw material	Kg/ production	2,676.70	77.12	1,762.24	2,676.70	2.57	40.17	57.84	1.29	6.43	3.86
Labor person	person/ production	4	2	1	4	1	2	2	1	2	1
Conversion factor		0.03	0.07	0.02	0.004	4.67	0.47	0.39	0.87	1.56	0.58
Labor coefficient		0.001	0.03	0.001	0.001	0.39	0.08	0.04	0.78	0.31	0.26
Output price	IDR/Kg	89,785	1,071,429	1,416,667	205,421	200,000	180,000	120,000	683,060	280,000	333,333
Average labor wage	IDR/person	96,105	400,000	100,000	96,105	50,000	50,000	45,000	50,000	80,000	50,000
Income and value-added											
Raw material price	IDR/Kg	0	500	2,000	0	1,000	1,500	1,000	0	2,000	1,000
Other input contribution	IDR/Kg	181	6,924	3,074	181	279,424	24,295	10,613	293,738	217,921	97,716
Output value	IDR/Kg	3,057	75,091	24,117	747	933,600	82,468	46,680	596,688	435,680	194,500
Value added	IDR/Kg	2,876	67,667	19,043	567	653,176	56,673	35,067	302,950	215,759	95,784
Value added ratio	Percent	94.09%	90.11%	78.96%	75.81%	69.96%	69.35%	64.39%	50.77%	49.52%	49.25%
Labor reward	IDR/Kg	139	10,373	57	139	19,450	3,890	1,556	38,900	24,896	12,967
Labor share	Persen	4.84%	15.33%	0.30%	24.58%	2.98%	7.38%	11.59%	12.84%	11.54%	13.54%
Profit	IDR/Kg	2,737	57,293	18,986	427	633,726	52,783	33,511	264,050	190,863	82,817
Profit share	Percent	89.53%	76.30%	78.73%	57.18%	67.88%	64.78%	58.39%	44.25%	43.81%	42.58%
Reward for production factors											
Profit margin	IDR/Kg	3,057	74,591	22,117	747	932,600	80,968	45,680	596,688	433,680	193,500
Labor (%)	Percent	4.55%	13.91%	0.26%	18.63%	2.09%	4.67%	6.36%	6.52%	5.74%	6.70%
Other inputs (%)	Percent	5.91%	9.28%	13.90%	24.19%	29.96%	29.44%	33.42%	49.23%	50.25%	50.50%
Entrepreneur profit (%)	Percent	89.53%	76.81%	85.84%	57.18%	67.95%	65.89%	60.22%	44.25%	44.01%	42.80%

nutmeg extract can treat diabetes and obesity. Nutmeg steam herbal medicine is made from processed nutmeg flesh, noni fruit, and jamlang skin. The raw materials for one production use 60.00 kg of nutmeg flesh which is equivalent to 77.12 kg of nutmeg, processed to produce 5.41 kg of nutmeg steam herbal medicine. The conversion factor shows that every 1 kg of nutmeg input will produce 0.07 kg of nutmeg steam output. The average wage for labor is IDR400,000/person.

The cost of supporting materials for processing nutmeg steam herbal medicine is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg steam requires supporting materials for IDR6,924/kg. The output value of nutmeg steam products produced from 1 kg of nutmeg is IDR75,091/kg. Every 1 kg of nutmeg steam output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR67,667/kg, with a high added value ratio of 90.11%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into nutmeg steam reaches IDR57,293/kg or 76,30%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 13.91%, other input contributions of 9.28%, and the profit of nutmeg steam product entrepreneurs of 76.81% or reaching IDR74,591/kg.

Table 3. Added Value of Nutmeg Product Diversification in North Maluku Province (Continuation)

Variable	Unit	Nutmeg Syrup	Spiced Cof-fee	Nutmeg Jam	Nutmeg Chips	Nutmeg Juice	Nutmeg Carbonated Drink	Nutmeg Sticks	Nutmeg Fried Chili Sauce	Nutmeg Chocolate
Output, input, and price										
Output	Kg/production	25.53	79.44	2.00	2.00	22.76	19.89	4.50	3.75	6.00
Raw material	Kg/production	16.40	6.43	2.57	3.86	9.21	13.50	2.57	2.57	0.64
Labor person	person/production	2	6	1	1	1	1	1	1	1
Conversion factor		1.17	12.36	0.78	0.52	2.39	1.47	1.75	1.46	9.34
Labor coefficient		0.20	0.93	0.39	0.26	0.14	0.07	0.39	0.39	1.56
Output price	IDR/Kg	60,496	134,819	97,500	200,000	38,360	38,711	133,333	233,333	200,000
Average labor wage	IDR/person	39,167	80,000	50,000	50,000	44,167	50,000	50,000	50,000	80,000
Income and value-added										
Raw material price	IDR/Kg	333	2,000	500	1,000	800	1,000	1,000	1,000	2,000
Other input contribution	IDR/Kg	30,782	926,653	46,706	66,087	58,471	37,478	160,973	251,416	1,575,869
Output value	IDR/Kg	71,688	1,666,476	75,855	103,733	90,607	57,053	233,400	340,375	1,867,200
Value added	IDR/Kg	40,572	737,823	28,649	36,646	31,336	18,575	71,427	87,959	289,331
Value added ratio	Percent	48.86%	44.27%	37.83%	35.33%	34.70%	32.56%	30.60%	25.84%	15.50%
Labor reward	IDR/Kg	7,590	74,688	19,450	12,967	6,483	3,705	19,450	19,450	124,480
Labor share	Persen	33.59%	10.12%	69.93%	35.38%	21.82%	19.94%	27.23%	22.11%	43.02%
Profit	IDR/Kg	32,982	663,135	9,199	23,680	24,852	14,870	51,977	68,509	164,851
Profit share	Percent	36.64%	39.79%	11.33%	22.83%	27.15%	26.06%	22.27%	20.13%	8.83%
Reward for production factors										
Profit margin	IDR/Kg	71,354	1,664,476	75,355	102,733	89,807	56,053	232,400	339,375	1,865,200
Labor (%)	Percent	12.24%	4.49%	26.62%	12.62%	7.59%	6.61%	8.37%	5.73%	6.67%
Other inputs (%)	Percent	50.88%	55.67%	61.96%	64.33%	65.05%	66.86%	69.27%	74.08%	84.49%
Entrepreneur profit (%)	Percent	36.89%	39.84%	11.42%	23.05%	27.35%	26.53%	22.37%	20.19%	8.84%

Nutmeg Oil

Nutmeg oil is an essential oil processed from young nutmeg seeds by distillation. The raw material for one production uses 200.00 kg of young nutmeg seeds obtained from 1,762.24 kg of nutmeg fruit, processed to produce 30 kg of nutmeg oil. The conversion factor shows that every 1 kg of nutmeg fruit input will produce 0.02 kg of nutmeg oil output. The average wage of labor is IDR100,000/person.

The cost of supporting materials for nutmeg oil processing is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg oil requires supporting materials for IDR3,074/kg. The output value of nutmeg oil products produced from 1 kg of nutmeg fruit is IDR24,117/kg. Every 1 kg of nutmeg oil output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR19,043/kg, with a high added value ratio of 78.96%. Another study in Bogor by Juwita and Tsuchida (2017), found the added value of 1 kg of nutmeg when processed into nutmeg oil of IDR92,500/kg. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg fruit processed into nutmeg oil reached IDR18,986/kg or 78.73%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 0.26%, other input contributions of 13.90%, and the profit of nutmeg oil product entrepreneurs of 85.84% or reaching IDR22,117/kg.

Dried Mace

Mace is the skin that covers nutmeg seeds, is red, and contains essential oils, tannins, and starch (Sarman et al. 2023). Similar to nutmeg seeds, raw mace is also dried by drying it in the sun. Of the 108 nutmeg farmer respondents in North Maluku, one production from a harvest of 2,676.70 kg of nutmeg, was processed to produce 9.74 kg of dried mace. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 0.004 kg of dried mace. Labor is needed during the harvest process, with an average wage received of IDR96,105/person.

The cost of supporting materials for processing dried mace is obtained from the contribution of other inputs per production divided by the total input of raw materials for nutmeg. So 1 kg of dried mace requires supporting materials for IDR181/kg. The output value of dried mace products produced from 1 kg of nutmeg is IDR747/kg. Every 1 kg of dried mace output produced from processing nutmeg and supporting materials obtained an added value of IDR567/kg, with a high added value ratio of 75.81%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into dried mace reached IDR427/kg or 57.18%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 18.63%, other input contributions of 24.19%, and the profit of dried mace product entrepreneurs of 57.18% or reaching IDR747/kg.

Nutmeg Chili Sauce

Nutmeg chili sauce is a mixture of processed nutmeg fruit flesh and chili sauce spices. The raw materials for one production use 2.00 kg of fruit flesh which is equivalent to 2.57 kg of nutmeg, processed to produce 12.00 kg of chili sauce. The conversion factor shows that every 1 kg of nutmeg input will produce 4.67 kg of nutmeg chili sauce output. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing nutmeg chili sauce is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg chili sauce requires supporting materials for IDR279,424/kg. The output value of nutmeg chili sauce products produced from 1 kg of nutmeg is IDR933,600/kg. Every 1 kg of nutmeg chili sauce output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR653,176/kg, with a high added value ratio of 69.96%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into nutmeg sauce reaches IDR633,726/kg or 67.88%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 2.09%, other input contributions of 29.96%, and the profit of nutmeg sauce product entrepreneurs of 67.95% or reaching IDR932,600/kg.

Dry Candied Nutmeg

Dry sweets are nutmeg sweets in dry form, which are processed from nutmeg fruit flesh. The raw materials for one production use 31.25 kg of fruit flesh which is equivalent to 40.17 kg of nutmeg, processed to produce 16.88 kg of dry sweets. The conversion factor shows that every 1 kg of nutmeg input will produce 0.47 kg of dry sweets output. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing dry sweets is obtained from the contribution of other inputs per production divided by the total input of raw materials of nutmeg. So from 1 kg of dry sweets, supporting materials are needed for IDR24,295/kg. The output value of dry sweets products produced from 1 kg of nutmeg is IDR82,468/kg. Every 1 kg of dry sweets output produced from the processing of raw materials of nutmeg and supporting materials obtained an added value of IDR56,673/kg, with a high added value ratio of 69.35%. The high ratio of the added value of candied nutmeg is also shown in the research of Ruauw et al. (2012), which is 75%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into dry candied fruit reaches IDR52,783/kg or 64.78%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 4.67%, other input contributions of 29.44%, and the profit of dry candied product entrepreneurs of 65.89% or reaching IDR80,968/kg.

Wet Nutmeg Candies

Wet sweets are nutmeg sweets in wet form, which are processed from nutmeg fruit flesh. The raw materials for one production use 45.00 kg of fruit flesh which is equivalent to 57.84 kg of nutmeg, processed to produce 22.50 kg of wet sweets. The conversion factor shows that every 1 kg of nutmeg input will produce 0.39 kg of wet sweets output. The average wage of labor is IDR45,000/person.

The cost of supporting materials for processing wet sweets is obtained from the contribution of other inputs per production divided by the total input of raw materials of nutmeg. So from 1 kg of wet sweets, supporting materials are needed for IDR10,613/kg. The output value of wet sweets products produced from 1 kg of nutmeg is IDR46,680/kg. Every 1 kg of wet sweets output produced from the processing of raw materials of nutmeg and supporting materials obtained an added value of IDR35,067/kg, with a high added value ratio of 64.39%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into wet candy reaches IDR33,511/kg or 58.39%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 6.36%, other input contributions of 33.42%, and entrepreneur profits of 60.22% or reaching IDR45,680/kg. In a study conducted by Arief, AB, and Asnawi (2015), it was found that from 6 kg of nutmeg candy, a profit margin of IDR150,000 or IDR25,000/kg was obtained.

Spice Tea

Spice tea is useful for warming the body and relieving stress because it contains antioxidants (Palijama et al. 2024). Spiced tea uses the main raw material, namely dried nutmeg skin which is then mixed with tea leaves and spices that have been ground from dried nutmeg and cloves. The raw material for one production uses 1.00 kg of nutmeg skin which is equivalent to 1.29 kg of nutmeg, processed to produce 1.12 kg of spiced tea. The conversion factor shows that every 1 kg of nutmeg input will produce 0.87 kg of spiced tea output. The average wage for labor is IDR50,000/person.

The cost of supporting materials for processing spiced tea is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of spiced tea requires supporting materials for IDR293,738/kg. The output value of spiced tea products produced from 1 kg of nutmeg is IDR596,688/kg. Every 1 kg of spice tea output produced from processing raw materials of nutmeg and supporting materials obtained an added value of IDR302,950/kg, with a high added value ratio of 50.77%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into spice tea reached IDR264,050/kg or 44.25%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 6.52%, other input contributions of 49.23%, and the profit of spice tea product entrepreneurs of 44.25% or reaching IDR596,688/kg.

Nutmeg Powder

Nutmeg powder is a post-harvest processed product, similar to dried nutmeg seeds (Samhina et al. 2023). Nutmeg powder is made from processed dried and ground nutmeg fruit flesh, mixed with dried nutmeg seed powder and dried mace powder. The raw material for one production uses 5.00 kg of nutmeg fruit flesh which is equivalent to 6.43 kg of nutmeg, processed to produce 10.00 kg of nutmeg powder. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 1.56 kg of nutmeg powder. The average wage for labor is IDR80,000/person.

The cost of supporting materials for processing nutmeg powder is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg powder requires supporting materials for IDR217,921/kg. The output value of nutmeg powder products produced from 1 kg of nutmeg is IDR435,680/kg. Every 1 kg of nutmeg powder output produced from processing nutmeg and supporting materials obtained an added value of IDR215,759/kg, with a high added value ratio of 49.52%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into nutmeg powder reached IDR190,863/kg or 43.81%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 5.74%, other

input contributions of 50.25%, and the profit of nutmeg powder product entrepreneurs of 44.01% or reaching IDR433,680/kg.

Nutmeg Crispy

Nutmeg crispy is a crispy crumb snack made from a mixture of nutmeg flesh with tapioca flour, crispy flour, and spices. The raw materials for one production use 3.00 kg of fruit flesh which is equivalent to 3.86 kg of nutmeg, processed to produce 2.25 kg of nutmeg crispy. The conversion factor shows that every 1 kg of nutmeg input will produce 0.58 kg of nutmeg crispy output. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing nutmeg crispy is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So from 1 kg of nutmeg crispy, supporting materials are needed for IDR97,716/kg. The output value of nutmeg crispy products produced from 1 kg of nutmeg is IDR194,500/kg. Every 1 kg of nutmeg crispy output produced from processing nutmeg and supporting materials obtained an added value of IDR95,784/kg, with a high added value ratio of 49.25%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into nutmeg crisps reaches IDR82,817/kg or 42.58%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 6.70%, other input contributions of 50.50%, and the profit of nutmeg crispy product entrepreneurs of 42.80% or reaching IDR193,500/kg.

Nutmeg Syrup

Nutmeg syrup is a syrup made from processed nutmeg fruit flesh. The raw material for one production uses an average of 12.76 kg of fruit flesh which is equivalent to 16.40 kg of nutmeg, processed to produce 25.53 kg of syrup. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 1.17 kg of nutmeg syrup. The average wage of labor is IDR39,167/person.

The cost of supporting materials for processing nutmeg syrup is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg syrup requires supporting materials for IDR30,782/kg. The output value of nutmeg syrup products produced from 1 kg of nutmeg is IDR71,688/kg. Every 1 kg of nutmeg syrup output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR40,572/kg, with a high added value ratio of 48.86%. The high ratio of the added value of nutmeg syrup is also shown in the research of Nitami et al. (2023), Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into nutmeg syrup reaches IDR32,982/kg or 36.64%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 12.24%, other input contributions of 50.88%, and the profit of nutmeg syrup product entrepreneurs of 36.89% or reaching IDR71,534/kg. In a study conducted by Kaplale et al. (2022), the profit margin for nutmeg syrup sales was 8.3%.

Spiced Coffee

Spice coffee is coffee made from nutmeg powder, cloves, and red ginger. The raw materials for one production use 5 kg of nutmeg flesh which is equivalent to 6.43 kg of nutmeg, processed to produce 79.44 kg of spiced coffee. The conversion factor shows that every 1 kg of nutmeg input will produce 12.36 kg of spiced coffee output. The average wage of labor is IDR80,000/person.

The cost of supporting materials for processing spiced coffee is obtained from the contribution of other inputs per production divided by the total input of raw materials of nutmeg. So 1 kg of spiced coffee requires supporting materials for IDR926,653/kg. The output value of spiced coffee products produced from 1 kg of nutmeg is IDR1,666,476/kg. Every 1 kg of spiced coffee output produced from the processing of raw materials of nutmeg and supporting materials obtains an added value of IDR737,823/kg, with a high added value ratio of 44.27%. The high ratio of the added value of spiced coffee is also shown in the research of Sari et al. (2022), which is 52.22%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg processed into spiced coffee reaches IDR663,135/kg or 39.79%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors),

is distributed for labor compensation of 4.49%, other input contributions of 55.67%, and the profit of spiced coffee product entrepreneurs of 39.84% or reaching IDR1,664,476/kg.

Nutmeg Jam

Nutmeg jam is a jam made from nutmeg fruit flesh. The raw material for one production uses an average of 2.00 kg of fruit flesh which is equivalent to 2.57 kg of nutmeg, processed to produce 2.00 kg of jam. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 0.78 kg of nutmeg jam. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing nutmeg jam is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg jam requires supporting materials for IDR46,706/kg. The output value of nutmeg jam products produced from 1 kg of nutmeg is IDR75,855/kg. Every 1 kg of nutmeg jam output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR28,649/kg, with a medium added value ratio of 37.83%. When compared to the research of Rawis et al. (2016), the output of 82.5 kg of nutmeg jam has an added value of IDR76,900. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg jam reaches IDR9,199/kg or 11.33%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 26.62%, other input contributions of 61.96%, and the profit of nutmeg jam product entrepreneurs of 11.42% or reaching IDR 75,355/kg. In a study conducted by (Arief et al. 2015), from 6 kg of nutmeg jam, a profit margin of IDR105,000 or IDR17,500/kg was obtained.

Nutmeg Chips

Nutmeg chips are chips processed from nutmeg fruit flesh with tapioca flour, rice flour, and spices. The raw materials for one production use 3.00 kg of fruit flesh which is equivalent to 3.86 kg of nutmeg, and produces 2.00 kg of chips. The conversion factor shows that every 1 kg of nutmeg input will produce an output of 0.52 kg of nutmeg chips. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing nutmeg chips is obtained from the contribution of other inputs per production divided by the total input of raw materials for nutmeg. So 1 kg of nutmeg chips requires supporting materials for IDR66,087/kg. The output value of nutmeg chip products produced from 1 kg of nutmeg is IDR103,733/kg. Every 1 kg of nutmeg chips output produced from the processing of raw materials for nutmeg and supporting materials obtains an added value of IDR36,646/kg, with a medium added value ratio of 35.33%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg chips reaches IDR23,680/kg or 22.83%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 12.62%, other input contributions of 64.33%, and the profit of nutmeg chip product entrepreneurs of 23.05% or reaching IDR102,733/kg.

Nutmeg Juice

Nutmeg juice is a drink made from processed nutmeg fruit flesh. The raw material for one production uses an average of 7.17 kg of fruit flesh which is equivalent to 9.21 kg of nutmeg, processed to produce 22.76 kg of juice. The conversion factor shows that every 1 kg of input of nutmeg fruit raw material will produce an output of 2.39 kg of nutmeg juice. The average wage of labor is IDR44,167/person.

The cost of supporting materials for processing nutmeg juice is obtained from the contribution of other inputs per production divided by the total input of nutmeg fruit raw materials. So 1 kg of nutmeg juice requires supporting materials for IDR58,471/kg. The output value of nutmeg juice products produced from 1 kg of nutmeg fruit is IDR90,607/kg. Every 1 kg of nutmeg juice output produced from the processing of nutmeg fruit raw materials and supporting materials obtains an added value of IDR31,336/kg with a medium added value ratio of 34.70%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg juice reaches IDR24,852/kg or 27.15%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 7.59%, other

input contributions of 65.05%, and the profit of nutmeg product entrepreneurs of 27.35% or reaching IDR89,807/kg. In a study conducted by Aulia and Suseno (2020), from 100 liters of nutmeg juice, a profit margin of IDR1,952,880 or IDR19,529/liter was obtained.

Nutmeg Carbonated Drink

Nutmeg carbonated drink is a carbonated drink made from nutmeg fruit flesh. The raw material for one production uses 10.50 kg of fruit flesh which is equivalent to 13.50 kg of nutmeg, processed to produce 19.89 kg of carbonated drink. The conversion factor shows that every 1 kg of nutmeg input will produce 1.47 kg of nutmeg carbonated drink output. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing carbonated drinks is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of carbonated drink requires supporting materials with a cost of IDR37,478/kg. The output value of carbonated drink products produced from 1 kg of nutmeg is IDR57,053/kg. Every 1 kg of carbonated beverage output produced from the processing of nutmeg raw materials and supporting materials obtained an added value of IDR18,575/kg, with a medium added value ratio of 32.56%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw materials processed into carbonated drinks reached IDR14,870/kg or 26.06%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 6.61%, other input contributions of 66.86%, and the profit of carbonated beverage product entrepreneurs of 26.53% or reaching IDR56,053/kg.

Nutmeg Sticks

Nutmeg sticks are stick-shaped snacks made from a mixture of nutmeg fruit flesh with wheat flour, rice flour, and spices. The raw materials for one production use 2.00 kg of fruit flesh which is equivalent to 2.57 kg of nutmeg, processed to produce 4.50 kg of nutmeg stick snacks. The conversion factor shows that every 1 kg of nutmeg input will produce 1.75 kg of nutmeg stick output. The average wage of labor is IDR50,000/person.

The cost of supporting materials for processing nutmeg sticks is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg sticks requires supporting materials for IDR160,973/kg. The output value of nutmeg stick products produced from 1 kg of nutmeg is IDR233,400/kg. Every 1 kg of nutmeg stick output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR71,427/kg, with an added value ratio of 30.60%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg sticks reached IDR51,977/kg or 22.27%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), was distributed for labor compensation of 8.37%, other input contributions of 69.27%, and the profit of nutmeg stick product entrepreneurs of 22.37% or reaching IDR232,400/kg.

Ebi Nutmeg Fried Chili Sauce

Ebi nutmeg fried chili sauce is processed from nutmeg fruit flesh, fried chili sauce seasoning, and ebi. The raw materials for one production use 2.00 kg of nutmeg fruit flesh which is equivalent to 2.57 kg of nutmeg and produces 3.75 kg of nutmeg fried chili sauce. The conversion factor shows that every 1 kg of nutmeg input will produce 1.46 kg of nutmeg-fried chili sauce output. The average wage of labor is IDR50,000/person.

The cost of auxiliary materials for processing nutmeg fried chili sauce is obtained from the contribution of other inputs per production divided by the total input of raw material nutmeg. So 1 kg of nutmeg fried chili sauce requires auxiliary materials of IDR251,416/kg. The output value of the nutmeg fried chili sauce product produced from 1 kg of nutmeg is IDR340,375/kg. Every 1 kg of nutmeg fried chili sauce output produced from processing raw materials of nutmeg and auxiliary materials obtains an added value of IDR87,959/kg, with a medium added value ratio of 25.84%. Meanwhile, the net added value profit (excluding employee benefits) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg fried chili sauce reaches IDR68,509/kg or 20.13%. Furthermore, the margin as the difference between the output value and the price of raw materials (total profit for owners of production factors), is distributed for employee benefits

of 5.73%, other input contributions of 74.08%, and the profit of nutmeg fried chili sauce product entrepreneurs of 20.19% or reaching IDR 339,375/kg.

Nutmeg Chocolate

Nutmeg chocolate is a chocolate bar filled with nutmeg jam. The raw material for one production uses 0.50 kg of fruit flesh which is equivalent to 0.64 kg of nutmeg, processed into nutmeg jam filling to produce 6.00 kg of nutmeg chocolate. The conversion factor shows that every 1 kg of nutmeg input will produce 9.34 kg of nutmeg chocolate output. The average wage of labor is IDR80,000/person.

The cost of supporting materials for processing nutmeg chocolate is obtained from the contribution of other inputs per production divided by the total input of nutmeg raw materials. So 1 kg of nutmeg chocolate requires supporting materials for IDR1,575,869/kg. The output value of nutmeg chocolate products produced from 1 kg of nutmeg is IDR1,867,200/kg. Every 1 kg of nutmeg chocolate output produced from the processing of nutmeg raw materials and supporting materials obtains an added value of IDR289,331/kg, with a medium added value ratio of 15.50%. Meanwhile, the net added value profit (excluding labor compensation) received by entrepreneurs for every 1 kg of nutmeg raw material processed into nutmeg chocolate reaches IDR164,851/kg or 8.83%. Furthermore, the margin as the difference between the output value and the price of raw materials (total compensation for owners of production factors), is distributed for labor compensation of 6.67%, other input contributions of 84.49%, and the profit of nutmeg chocolate product entrepreneurs of 8.84% or reaching IDR1,865,200/kg.

Hypothesis Discussion

In this study, it was found that the ratio of added value of processed nutmeg products in North Maluku, none of which had a low value of <15% (Table 3). The results of the added value analysis inform that optimal nutmeg processing produces the highest added value products with a ratio of > 75% when processed into four products, namely dry nutmeg (94.09%), herbal medicine from nutmeg steam (90.11), nutmeg oil (78.96%), and dry mace (75.81%). The percentage of entrepreneurs' profits from the four products is also more than 50%. It is known that the profits obtained by entrepreneurs from dry nutmeg products are 89.53%, nutmeg steam products are 76.81%, nutmeg oil products are 85.84%, and dry mace products are 57.18%. So the hypothesis in this study is fulfilled that nutmeg (*Myristica fragrans*) in North Maluku Province provides significant added value when processed into diversified bio-business products.

Managerial Implication

The managerial implications of this study are to recommend steps for developing nutmeg (*Myristica fragrans*) bio-business as a proposal for the RPJMD of the North Maluku Provincial Government for the period 2024–2029. First, allocate funds for processing technology for products with high added value, namely dry seeds, nutmeg steam herbal medicine, nutmeg oil, and dry mace, such as distillation machines, drying equipment, and modern packaging (implementing stakeholders: Department of Industry and Trade). Second, target the premium market for products with high added value, namely dry seeds, nutmeg steam herbal medicine, nutmeg oil, and dry mace, focusing on the international market (implementing stakeholders: Department of Industry and Trade). Third, hold a training program for processing techniques for products with high added value, namely dry seeds, nutmeg steam herbal medicine, nutmeg oil, and dry mace (implementing stakeholders: Department of Industry and Trade, Department of Cooperatives, and UMKM).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Nutmeg (*Myristica fragrans*) bio-business activities in North Maluku Province include processing fruit skin, fruit flesh, seeds, and mace into diversified processed nutmeg products. The production of processed nutmeg products is still carried out as a home industry. There are 19 processed products that can be produced from nutmeg in North Maluku, as shown in the industrial tree. The calculation of added value takes into account the proportion of nutmeg fruit in its processed products. Analysis of the added value of processed nutmeg products is carried out by calculating the added value per kilogram of raw nutmeg material for one production process. The ratio of added value of processed nutmeg products based on the Hayami method calculation shows that the highest are dry nutmeg seeds, nutmeg steam herbal medicine, nutmeg oil, and dry mace.

Recommendations

Based on the results of this study, it is recommended to conduct further research to design a more effective and sustainable development strategy for nutmeg bio-business in North Maluku Province. With the right strategy and adequate support, the development of nutmeg bio-business in North Maluku will provide significant economic benefits to the region and contribute to the growth of the agricultural sector as a whole. So that North Maluku as a center for nutmeg production can maximize the management of its native commodities.

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