

***Added Value Analysis of Citronella Oil Processing
using the Hayami Method***

***Analisis Nilai Tambah Pengolahan Minyak Serai Wangi
Menggunakan Metode Hayami***

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ABSTRAK

Penelitian ini bertujuan menganalisis nilai tambah yang dihasilkan dari pengolahan minyak serai wangi menggunakan Metode Hayami. Minyak serai wangi merupakan komoditas penting dalam industri parfum dan kosmetik dengan nilai komersial yang signifikan. Metode Hayami digunakan sebagai alat evaluasi untuk mengukur efisiensi dan dampak ekonomi dari proses pengolahan minyak serai wangi. Melalui survei lapangan, pengumpulan data, dan analisis statistik, penelitian ini mengidentifikasi berbagai tahap dalam proses pengolahan minyak serai wangi dan mengukur nilai tambah yang dihasilkan pada setiap tahap. Hasil penelitian menunjukkan bahwa nilai tambah yang dihasilkan dari pengolahan minyak serai wangi adalah Rp1.000/kg. Marjin yang diperoleh didistribusikan untuk masing-masing faktor, yaitu keuntungan sebesar 88%, tenaga kerja sebesar 12%, dan sumbangan input lain sebesar 0%. Temuan ini memberikan wawasan tentang manfaat ekonomi dari pengolahan minyak serai wangi dan memberikan informasi bagi perencanaan pengembangan industri berbasis serai wangi serta upaya meningkatkan kesejahteraan masyarakat lokal, menciptakan peluang ekonomi baru, serta mendukung pertumbuhan sektor ini secara berkelanjutan.

Kata kunci: Agro-industri serai wangi, Nilai tambah, Metode Hayami

ABSTRACT

This study aims to analyze the value-added generated from citronella oil processing using the Hayami Method. Citronella oil is an important commodity in the perfume and cosmetics industry with significant commercial value. The Hayami Method was used as an evaluation tool to measure the efficiency and economic impact of citronella oil processing. Through field survey, data collection, and statistical analysis, this study identified the various stages in the citronella oil processing stages and measured the value-added generated at each stage. The value-added resulted from citronella oil processing was IDR1,000/kg. The margins obtained were distributed to each factor, namely business profit at 88%, labor wages at 12%, and contribution of other inputs at 0%. The findings of this study provide insight into the economic benefits of citronella oil processing and inform development planning for citronella-based industries as well as efforts to improve the welfare of local communities, create new economic opportunities, and support the sustainable growth of this sector.

Keywords: Citronella agro-industry, Value-added, Hayami Method

INTRODUCTION

The tight global competition that occurs nowadays leaves no choice for business actors but to increase their national competitiveness so as to remain strong and relevant in their field. A national development policy direction with a new paradigm is required to maintain and improve national competitiveness in order to create sustainable development. Nowadays, the current economic development paradigm is more oriented towards the one that emphasizes the people's economy. This paradigm shift has affected the economic recovery process, as it reflected in several economic indicators ([Budiman et al., 2014](#)).

Indeed, efforts to support the success of development in Indonesia cannot be separated from the role of agricultural sector. Beside that, the agricultural sector also plays an important role in generating products that are needed as inputs for other sectors, especially the industrial sector, where the agricultural sector serves as the livelihood of the majority of Indonesian population ([Central Bureau of Statistics, 2020](#)). The development of the agricultural sector in Indonesia is considered very important because this sector is currently directed to create an independent (resilient), modern (advanced), industrialized, and agribusiness-knowledgeable agriculture ([Hariyono & Trihastuti, 2021](#)).

According to [Novitasari \(2023\)](#), plantations are included in the agricultural sub-sector so that various commodities in plantations have high potential that can be utilized as business opportunities. Essential oil-producing plants have a good market share and are highly competitive in foreign markets and have been regarded as important commodities in the agribusiness sector. [Soediono \(1989\)](#) also argued that the plantation sub-sector has a high attraction for export to several developed countries. Commodities in the plantation sub-sector that can be utilized as high-potential business opportunities are essential oil-producing plants. Indonesia has around 40 types of essential oils that can be produced, 13 of which (eucalyptus, patchouli, cubeb, cinnamon, cloves, vetiver, ginger, pepper, nutmeg, sandalwood, cananga, jasmine, and citronella) have entered the global market of essential oil ([Rizal & Djazuli, 2006](#)). In particular, [Rafi \(2021\)](#) stated that citronella is a type of annual plant with the export development of essential oil (citronella oil) has reached around 9–10%. However, citronella oil processing often faces several problems, namely small yields, unutilized by-products, the quality of raw materials that need to be improved, and inefficient processing techniques.

According to [Yuhono and Shinta \(2006\)](#), the essential oil production centers in Indonesia encompass seven provinces, namely West Java (cananga, vetiver, nutmeg, patchouli), Central Java (patchouli, cloves, ylang-ylang), Yogyakarta (patchouli, cloves), East Java (cloves), Banten (ylang-ylang), West Sumatra (citronella, nutmeg, patchouli), and Maluku (nutmeg, cloves). As for West Sumatra, the essential oil production centers are located in Solok City, Sawahlunto City, Tanah Datar Regency, Padang City, Pasaman Regency, and Mentawai Regency. The centers of citronella production in West Sumatra are Koto Baru Village, South Limau Manis Urban Village, Pauh Subdistrict, and Padang City.

The above description shows that the potential of essential oils in Indonesia in general and West Sumatra Province in particular is very necessary to be developed by providing the value-added through efforts to increase the production, improve the quality, and diversify the products. The distribution of value-added or profit throughout a supply

chain must be fair and agreed upon by all players involved in order to maintain cooperation and sustainability (Hidayat et al., 2012). In particular, the creation of value-added of citronella essential oil begins from the input, cultivation, processing, marketing, and institutional stages. To support the cultivation and processing aspects, the development of appropriate technology to increase the effectiveness of the production process and guarantee stable production capacity is necessary.

This study aims to analyze the value-added in citronella oil processing using the Hayami method. The study was conducted by identifying the citronella agro-industry, calculating and analyzing the value-added in the input, output, and processing stages of citronella oil. In addition, development points for increasing the value-added were also formulated so as to help in supporting the decision-making process in the citronella oil processing industry.

METHODS

Time and Location

This study was conducted in May at CV Asliko Nusantara Group, Koto Baru Village, South Limau Manis Urban Village, Pauh Subdistrict, Padang City. This location was selected through purposive random sampling.

Data Collection Technique

Direct interviews with respondents using questionnaires were conducted to collect primary data, which included 1) respondents' identity data (age, education background, business experience) and 2) production input data, namely the use of raw materials (citronella), labor usage, the amount of firewood usage, and the ownership of production equipment. Next, secondary data were obtained from several publications of agencies related to this study. The basic method used in this study was descriptive method, namely a method that focuses on solving problems that exist in the present. The data collected were then compiled, explained, and analyzed (Surakhmad, 2004).

Data Analysis Technique

The data obtained in this study were analyzed using qualitative and quantitative method. Qualitative method was used to obtain a description of the current business situation of citronella agro-industry. Meanwhile, quantitative method was used to observe business analysis and several calculations carried out in this study. Quantitative analysis was performed in the form of value-added analysis.

Value-Added Analysis

The value-added analysis of citronella agro-industry products adopted the Hayami Method. According to Hayami et al (1987), there are two ways to calculate the value-added, namely value-added for processing and value-added for marketing. The procedure to calculate the value-added using the Hayami Method are displayed in Table 1.

Table 1. The value-added calculation framework based on the Hayami Method.

Variable	Formulation
I. Output, Input, and Price	
1. Output (kg/day)	(1)
2. Input (kg/day)	(2)
3. Labor (man's days)	(3)
4. Conversion factor	(4) = (1)/(2)
5. Labor coefficient (man's days/kg)	(5) = (3)/(2)
6. Output price (IDR)	(6)
7. Labor wages (IDR/man's days)	(7)
II. Revenue and Profit	
8. Price of raw materials (IDR/kg)	(8)
9. Contribution of other inputs (IDR/kg)	(9)
10. Output value (IDR/kg)	(10) = (4) x (6)
11. a. Value-added (IDR/kg)	(11a) = (10) - (9) - (8)
b. Value-added ratio (%)	(11b) = (11a/10) x 100%
12. a. Labor wages (IDR/kg)	(12a) = (5) x (7)
b. Labor share (%)	(12b) = (12a/11a) x 100%
13. a. Profit (IDR/kg)	(13a) = 11a - 12a
b. Profit rate (%)	(13b) = (13a/11a) x 100%
III. Remuneration of the Owner of the Production Factors	
14. Margin (IDR/kg)	(14) = (10) - (8)
a. Labor wages (%)	(14a) = (12a/14) x 100%
b. Contribution of other inputs (%)	(14b) = (9/14) x 100%
c. Business profit (%)	(14c) = (13a/14) x 100%

Source: Hayami (1990)

RESULTS AND DISCUSSION

Identification of Citronella Oil Agro-industry

CV Asliko Nusantara Group is one of the essential oil producers in Indonesia, located in Koto Baru Village, South Limau Manis Urban Village, Pauh Subdistrict, Padang City, and has the potential to develop a citronella distillation business. This is because this company has a distillation plant and the majority of the local community own private land and work as citronella farmer. CV Asliko Nusantara Group has also collaborated with many institutions, one of which is Andalas University, which facilitated a place as a tenant and helped with the development of citronella distillation equipment.

The existing institutions around CV Asliko Nusantara Group are organized in an integrated manner and link multi-party cooperation, and have carried out various activities related to the functions of farmer institutions. Until the end of 2022, various activities have been carried out to transform community-based micro-scale businesses into community-based industrial-scale businesses, namely agro-industry (Asful, 2022).

CV Asliko Nusantara Group has had experience in developing business since 2015 by producing essential oils and has conducted processing and marketing trials in the form of various derivative products. The leading innovation is the modification of appropriate technology from distillation equipment under the registered name of continuous distillation equipment (Asliko), of which 50 units have been marketed to several regions in Indonesia. During 2019–2021, 59 inventions from this company have been registered at the Ministry of Law and Human Rights of the Republic of Indonesia and are currently in the process of obtaining patent certificates. Since 2020, several MBKM (Merdeka Belajar Kuliah Merdeka : *Freedom to Learn to Study Independently*) ecosystem pilots have been carried out through collaboration with several faculties at Andalas University and other universities in West Sumatra to support business scale-up. Since November 2021, various eco-tourism destinations have been developed entitled Organic Farm Essentials Ecotourisms, with a number of facilities built independently. Along with that, citronella-based downstream production has also been developed, such as soap, aslikomah necklaces, candles, and aromatherapy, all of which were made from citronella.

The production of citronella oil at CV Asliko Nusantara Group in one day is carried out by distilling 400 kg of citronella leaves, resulted in approximately 4 kg of citronella oil, with one worker operating two distillation equipment. Annually, CV Asliko Nusantara Group can produce 360 kg/year of citronella oil at a sales price of IDR 150,000/kg.

Value-Added Analysis

Value-added is the difference between commodities that receive treatment in certain parts and the value used during the process. The method of estimating raw materials that receive special treatment to generate the value-added is referred to as value-added analysis (Artika & Marini, 2016). This analysis is used to describe the production flow based on the contribution of each production factor. In this study, the calculation basis of the value-added analysis was by looking at the amount (kg) of citronella raw materials. Then, the value-added of citronella oil was determined based on the amount of citronella oil produced, as it is the final result of processing in citronella agro-industry. Table 2 displays the detail calculation.

Table 2. The value-added of citronella oil processing at CV Asliko Nusantara Group.

ID	Variable	Value
I. Output, Input, and Prices		
1.	Output (kg/day)	4
2.	Input (kg/day)	400
3.	Labor (man's day)	1
4.	Conversion factor	0.01
5.	Labor coefficient (man's day/kg)	0.0025
6.	Output price (IDR)	IDR 150,000
7.	Labor wages (IDR/man's day)	IDR 50,000
II. Revenue and Profit		
8.	Price of raw materials (IDR/kg)	IDR 500
9.	Contribution of other inputs (IDR/kg)	IDR 0

ID	Variable	Value
10.	Output value (IDR/kg)	IDR 1,500
11.	a. Value-added (IDR/kg)	IDR 1,000
	b. Value-added ratio (%)	67%
12.	a. Labor wages (IDR/kg)	IDR 125
	b. Labor share (%)	13%
13.	a. Profit (IDR/kg)	IDR 875
	b. Profit rate (%)	88%
III Remuneration of the Owner of the Production Factors		
	Margin (IDR/kg)	IDR 1,000
14.	a. Labor wages (%)	12%
	b. Contribution of other inputs (%)	0%
	c. Business profit (%)	88%

Source: Primary Data (2023)

Based on Table 2, value-added was obtained from processing citronella into citronella oil. In one working day, 4 kg of citronella oil was obtained at a price of IDR 600,000. The average amount of output produced in one production was 4 kg of citronella oil. The labor used was one person in one-time production day so that the labor coefficient obtained was 0.0025 kg/man's day. This means every 1 kg of citronella processed requires 0.0025 hours/man's day. This result was obtained by dividing the amount of labor and the amount of citronella processed during one-time production.

The value-added obtained from processing 1 kg of citronella into citronella oil was IDR 1,000/kg. This was obtained from reducing the value of the product by the price of raw materials and the value of other inputs. However, the value-added obtained is still referred to as the gross value-added, because it has not yet been reduced by labor wages. The value-added ratio is the ratio between the value-added and production value. The ratio obtained in this study was 67%, meaning that in processing citronella into citronella oil, the value-added obtained was 67% of the production value.

Sudiyono (2004) stated a theory about value-added analysis, namely when the value-added generated by an industry is more than 50%, it is said to be large; conversely, if the value-added obtained is less than 50%, it is said to be small. Based on this criterion, the value-added obtained in the citronella oil processing at CV Asliko Nusantara Group is still relatively large as the percentage exceeds 50%.

The margin from citronella raw materials to citronella oil, which is distributed to labor wages, contributions of other inputs, and business profits, can also be determined through the value-added analysis. The percentage of business profit, labor wages, and contribution of other input are 88%, 12%, and 0%, respectively. Thus, it is revealed that business profit has the highest margin percentage, while the contribution of other inputs is 0%, meaning that there was no other input contribution at all throughout citronella distillation process.

Profit margins in the citronella oil business (IDR 1,000/kg) can be increased by increasing production output and increasing sales and processing downstream products. The option to increase sales can be taken by expanding the market, because citronella oil

products are currently only sold offline through direct selling or entrusting to several local stores. Market expansion through marketing in several online marketplaces can be conducted by CV Asliko Nusantara Group. Moreover, it is also necessary to consider processing citronella oil into more diverse and valuable downstream products, such as aromatherapy, citronella soap, and balsam, so as to further increase the value-added of citronella products.

Currently, the use of simple technology in SMEs generally causes the value-added of the products tend to be low. This is supported by a study by Dewanti (2016), which compared two SME businesses, one use manual techniques, while the other use semi-modern equipment. It was revealed that the value-added generated was greater in the SME business that use semi-modern equipment.

CONCLUSIONS

Based on the analysis results using the Hayami Method, the value-added obtained from citronella oil processing was IDR 1,000/kg. The margin obtained was distributed to each factor, namely business profit at 88%, labor wages at 12%, and contribution of other inputs at 0%. The value added in citronella oil processing can be increased through several measures, such as by increasing production output using the advanced distillation technology, processing by-products into high valuable products, and establishing collaborative relationships with citronella farmers to obtain raw materials with the best quality.

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