

Research Article

Analysis on the Added Value of Excelsa Coffee (*Coffea liberica* var. *dewevrei*) in Wonosalam, Jombang

Rif'an Hariri^{a,1,*}, Noor Harini^{b,2}, Sutawi^{c,3}

^a Master of Agribusiness, University of Muhammadiyah Malang, Malang, Indonesia

^b Food Technology Department, Faculty of Agriculture - Animal Science, University of Muhammadiyah Malang, Malang, Indonesia

^c Animal Science Department, Faculty of Agriculture - Animal Science, University of Muhammadiyah Malang, Malang, Indonesia

¹ rifan.hariri8@gmail.com*; ² harini@umm.ac.id; ³ sutawi@umm.ac.id

* corresponding author

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ABSTRACT

The district of Wonosalam in Jombang, Indonesia, harbors significant potential in the agribusiness sector, with a particular focus on Excelsa coffee. Excelsa coffee is currently being cultivated with the vision of establishing it as a signature commodity of Wonosalam. This study is dedicated to analyzing the value transformation that occurs during the conversion of coffee cherries into green beans, further processing of green beans into roasted beans, and providing recommendations for enhancing added value. The study employed a purposive sampling technique, with data analysis conducted using the Hayami method. Nineteen respondents engaged in Excelsa coffee processing participated in the study. The findings of this study demonstrate that the conversion of cherries into Excelsa coffee green beans and the subsequent transformation of green beans into roasted beans indeed contribute to increased value. Specifically, the added value of green beans for Excelsa coffee amounts to IDR 1,153 per kilogram, while the added value for red-picked Excelsa coffee reaches IDR 4,458 per kilogram. Furthermore, the added value of Random Excelsa coffee roast beans is calculated at IDR 12,525 per kilogram, with red-picked Excelsa coffee roast beans achieving an added value of IDR 35,525 per kilogram. To further enhance the added value of Excelsa coffee, improvements can be made in post-harvest quality and downstream processing of coffee.

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INTRODUCTION

The agricultural sector plays a pivotal role in the economic landscape of Jombang's community. An analysis utilizing the Location Quotient (LQ) method has revealed that nine out of the seventeen key sectors in Jombang exhibit strong economic potential (Nadhiroh & Qurrata, 2020). Specifically, the agriculture, forestry, and fisheries sector emerge as the foundational sectors in Jombang, boasting an LQ value of 1.57 and contributing significantly to the Gross Regional Domestic Product (GRDP) at 17.44% (Huda & Cahyono, 2021). Among these sectors, agriculture stands out as a catalyst for enhancing economic growth in Jombang (Maghfiroh, 2021). One sub-district within Jombang that holds considerable promise the agricultural sector is Wonosalam,

particularly in the domain of coffee cultivation. Wonosalam's geographical features are conducive to coffee production, as it is situated at an altitude exceeding 500 meters above sea level, enjoying temperatures ranging from 17 to 30 degrees Celsius (Agastya & Ariyani, 2023). Coffee cultivation in Jombang presents a comparative advantage, as affirmed by Saifullah et al. (2021). The coffee varieties cultivated in Wonosalam encompass Arabica, Robusta, and Excelsa, offering a diverse range of options within this promising agricultural commodity.

Liberica coffee comprises two distinct varieties, namely *Coffea liberica* var *liberica* and *Coffea liberica* var *dewevrei*. Among the general public, the variety *Coffea liberica* var *dewevrei* is more commonly recognized as Excelsa coffee (Herawati et al., 2022). Excelsa coffee offers the advantage of being relatively easy to cultivate, thriving in a range of environments, including peatlands and lowlands (Amalia et al., 2023). The distinctive characteristics of Excelsa coffee in Wonosalam are its unique blend of bitter, sweet, and sour flavors (Yunas, 2019).

Excelsa coffee boasts the advantage of having a lower caffeine content. Its caffeine level stands at 0.94%, which is notably lower than Liberica coffee at 1.2%, Arabica coffee at 1.2%, and Robusta coffee at 2.6% (Davis et al., 2022). While Excelsa coffee may not enjoy the same popularity as Arabica or Robusta coffee, it holds substantial development potential. In Wonosalam, Excelsa Coffee is actively pursued, with the aim of establishing it as a distinctive commodity for the region's future.

The harvest of Excelsa coffee in Wonosalam often remains unprocessed, with some being sold in its raw cherry form. This practice of selling unripe cherries represents a missed opportunity for added value and results in losses. Processing Excelsa coffee can significantly enhance its value, contributing to the economic well-being of both coffee farmers and processors. Analyzing this added value is critical, given that Excelsa coffee serves as a vital income source for the local community. Added value, in this context, refers to the increase in value a commodity experiences through various treatments such as processing, transportation, or storage (Simatupang et al., 2022). It can be calculated as the difference between the resulting output and the costs incurred for raw material procurement and other input expenses (Hidayat et al., 2020). Furthermore, added value serves as a metric for assessing the compensation derived from processing activities (Rahmalia et al., 2023).

Processing coffee cherries results in semi-finished products, typically in the form of dried coffee beans (green beans) or final products ready for consumption as roasted beans. This processing not only extends the shelf life of coffee but also adds significant economic value. Similar research on the added value of post-harvest coffee processing has been conducted in various regions. For instance, the added value of dry Robusta coffee beans in Tabanan amounts to IDR 4,066 per kilogram (Nugraha et al., 2019). In Central Aceh, green Arabica coffee beans have an added value of IDR 17,000 per kilogram (Hasni et al., 2022). Additionally, processing semi-finished green beans into the final product of roasted beans can generate further added value. This transformation positively impacts the economy. For instance, the added value of roasted Arabica coffee beans in Banjarnegara is IDR 94,361 per kilogram (Zain & Nurrochmat, 2021), while in Bener Meriah, Aceh, it is IDR 145,449 per kilogram (Waknate et al., 2022). It's important to note that the added value of roasted Arabica coffee beans differs from that of roasted Robusta coffee beans, with the latter having an added value of IDR 58,500 per kilogram in Jember (Yekti et al., 2022). The research on Excelsa coffee in Wonosalam is particularly significant because, to date, no studies have explored the added value of coffee in this region, especially concerning Excelsa coffee.

This study is dedicated to analyzing the value transformation that occurs during the processing of Excelsa coffee cherries into green beans and further into roasted beans. Additionally, it aims to offer recommendations for enhancing the added value of Excelsa coffee. A distinctive aspect of this research lies in its exploration of the added value of Excelsa coffee, a subject that has remained unexplored in prior studies. Previous research predominantly focused on assessing the added value arising from post-harvest processing of Arabica or Robusta coffee. The outcomes of this study also serve to enrich public knowledge and awareness by highlighting the existence of alternative coffee varieties, such as Excelsa coffee, alongside the more commonly known Robusta and Arabica coffee types.

METHOD

The research was carried out during the period from October to December 2022, with data analysis conducted between January and February 2023. The study took place in Wonosalam, Jombang, Indonesia. The research employed a purposive sampling technique, chosen due to the specific nature of the research focus, which centered on assessing the added value resulting from post-harvest processing of Excelsa coffee. Purposive sampling is a non-probability method where participants are selected based on specific criteria

defined by the researcher. These participants are typically chosen for their relevance and suitability to research objectives. In this case, the respondents included individuals involved in processing Excelsa coffee cherries into green beans and those processing green beans into roasted beans. To identify these processors, Excelsa coffee processors located in various areas of Wonosalam, including Carangwulung, Distance, Wonosalam, Sumber, and Notorejo, were included in the study, as these regions are known for their Excelsa coffee production. Respondents among Excelsa coffee processors, specifically those involved in the transformation of green beans into roasted beans, were selected from small and medium-sized enterprises (SMEs) situated in the heart of Jombang. The criteria for selecting respondents for this study encompassed the following:

1. The respondents must be Excelsa coffee processors engaged in either the processing of cherries into green beans or the subsequent processing of green beans into roasted beans.
2. The Excelsa coffee being processed must be authentic Excelsa coffee, cultivated and processed within the Wonosalam region.
3. The processing of Excelsa coffee should be conducted with the intent of generating profit or as part of a business endeavor.

A total of 29 Excelsa coffee processors from the Wonosalam region participated in this study, encompassing both household-scale processors and small to medium-sized enterprises (SMEs). Further details regarding the respondents can be found in Table 1.

Table 1. Research Respondents

No	Output	Total	Scale	Percentage
1	Random excelsa coffee green beans	13	household-scale	44,82 %
2	Green beans from red-picked Excelsa coffee	8	household-scale	27,59 %
3	Roasted bean	8	SMEs	27,59 %
Total		29		100 %

Source: Primary data processed, 2022

The data analysis employed the Hayami method, along with descriptive statistics. The analysis of the added value using the Hayami method is presented in Table 2.

Table 2. Value Added Analysis using the Hayami Method

No	Output, Input, Price	Unit	Formula
1.	Output	Kg	(1)
2.	Input	Kg	(2)
3.	Labor	Working hours / HOK	(3)
4.	Conversion Factor		$4 = (1) : (2)$
5.	Worker Coefficient	working hours / HOK	$5 = (3) / (2)$
6.	Output Price	IDR / Kg	(6)
7.	labors' Wages	IDR	(7)
Income and Profits			
8.	Raw material prices	IDR / Kg	(8)
9.	Other input contributions	IDR / Kg	(9)
10.	Product value	IDR / Kg	$10 = (4) \times (6)$
11.	Value-added	IDR / Kg	$11a = (10) - (8) - (9)$
11.	Ratio of Value-added	%	$11b = (11a) : (10) \times 100\%$
12 a.	Labor income	IDR	$12a = (5) \times (7)$
b.	Labor share	%	$12b = (12a) : (11a) \times 100$
13 a.	Profit	IDR / Kg	$13a = (11a) - (12a)$
b.	profit rate	%	$13b = (13a) : (10) \times 100$
Remuneration for Production Factors			
14	margins	IDR / Kg	$14 = (10) - (8)$
14 a.	Labor income	%	$14a = (12a) : (14) \times 100\%$
14 b.	Other input contributions	%	$14b = (9) : (14) \times 100\%$
14 c.	Company profit	%	$14c = (13a) : (14) \times 100\%$

Source: (Hayami, 1987 in Rizkiawan et al., 2023)

Data collection encompassed direct field observations and structured interviews involving open-ended questions with Excelsa coffee processors. The utilization of the Hayami method offers the advantage of assessing not only the added value acquired through processing but also the added value generated through marketing efforts (Muzkiyah et al., 2022).

RESULTS AND DISCUSSION

Excelsa coffee processing starts with the utilization of raw materials in the form of cherries, which are typically harvested between July and September in Wonosalam. These cherries, collected during the harvest season, undergo processing to become semi-finished products referred to as green beans. The primary objective of this processing stage is to prolong the shelf life of the coffee. Green beans represent a semi-finished product not intended for immediate consumption, and the process itself typically spans 1 to 2 months. These Excelsa green beans serve to meet the demand for coffee outside of the harvest season. Subsequently, the acquired green beans are subjected to the roasting phase, transforming them into roasted beans. Roasted beans, the final product, are ready for marketing and are available in either seed or powder form. The entire process, from raw materials to the ultimate product of roasted beans, is depicted in Figure 1.

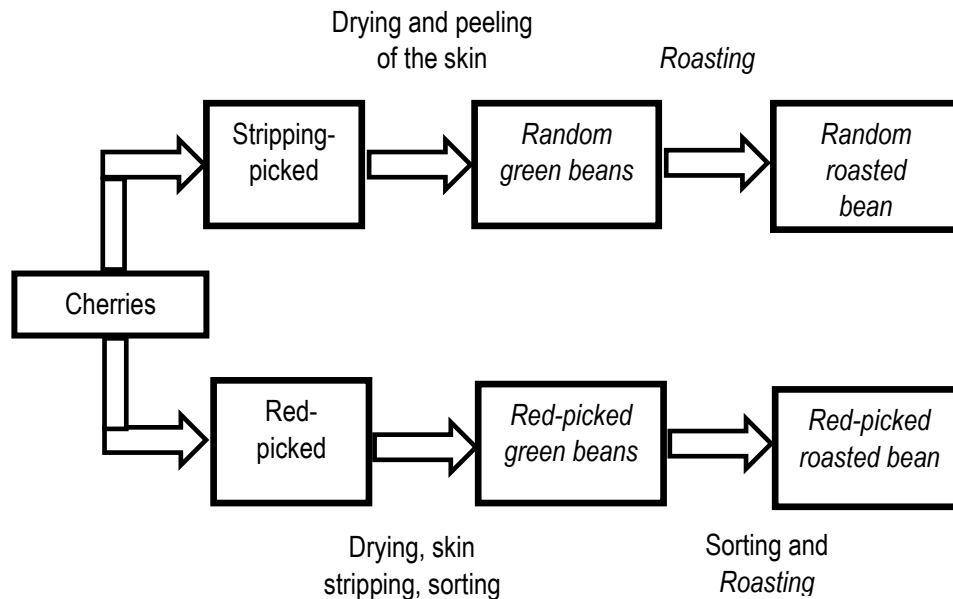


Figure 1. Process flow for Excelsa coffee processing
 Source: Primary data processed, 2022

The processing of Excelsa coffee involves both upstream and downstream phases. Upstream processing entails the conversion of cherries into green beans, a task typically undertaken by coffee processing households. In contrast, downstream processing involves the transformation of green beans into roasted beans and is carried out by roasteries. Both stages of processing contribute to the creation of added value. Table 3 presents the average added value generated from green beans and roasted beans across the 29 Excelsa coffee processors surveyed.

Table 3. The average added value derived from green beans and roasted beans in the case of Excelsa coffee processing.

No	Types of Coffee	Average Added Value
1	Random Excelsa green beans	IDR 2,080 per kilogram
2	Red-picked Excelsa green beans	IDR 5,515 per kilogram
3	Roasted bean Excelsa	IDR 46,230 per kilogram

Source: Primary data processed, 2022

Analysis on Added Value

Processing Excelsa coffee cherries into green beans and subsequently processing green beans into roasted beans have a notable impact on the added value. The added value of green Excelsa coffee beans results from various treatments, including sorting, drying, and peeling the cherries' skin. On the other hand, the added value of roasted Excelsa coffee beans arises from the roasting process. These value changes due to processing were assessed using the Hayami method, and the results are presented in Table 4.

Table 4. Analysis on Added Value of Excelsa Coffee Processing

No	Output, Input, Price	Formula	Green bean		Roasted Bean	
			Random	Red-picked	Random	Red-picked
1	Output (Kg)	1	105	87.5	0.94	0.94
2	Raw material input (Kg)	2	700	700	1.17	1.17
3	Labor (HOK)	3	7	11.81	0.03	0.03
4	Conversion factor	4=1:2	0.15	0.125	0.80	0.80
5	Labor coefficient (HOK)	5=3:2	0.01	0.0168	0.0256	0.0256
6	Output price (IDR/Kg)	6	35,000	65,000	70,000	130,000
7	Labors' wages (IDR)	7	50,000	100,000	20,000	20,000
Income and Profit						
8	Price of raw materials (IDR/Kg)	8	4,000	3,500	35,000	60,000
9	Contribution of other inputs (IDR/Kg)	9	97	167	8,475	8,475
10	Output value (IDR/Kg)	10 = 4 x 6	5,250	8,125	56,000	104,000
11a	Added-value (IDR/Kg)	11a = 10 - 8 - 9	1,153	4,458	12,525	35,525
11b	Ratio of Added-value	11b = (11a:10) x 100 %	21.96	54.87	22.37	34.16
12a	Labor income (IDR/Kg)	12 a = 5 x 7	500	1,688	512	512
12b	Labor share (%)	12b = (12a : 11a) x 100%	43.37	37.85	4.087	1.441
13	Profit (IDR/Kg)	13a = 11a - 12a	653	2,771	12,013	35,013
	Profit rate (%)	13b = (13a :10) x 100 %	12.44	34.10	21.45	33.65
Remuneration for Production Factors						
14	Margin (IDR/Kg)	14 = 10 - 8	1,250	4,625	21,000	44,000
14a	Labor income	14 a = (12 a : 14) x 100	40	36.49	2.438	1.16
14b	Other contributions	14 b = (9:14) x 100	7.76	3.61	40.36	19.26
14c	Company profit	14 c = (13a : 14) x 100	52.24	59.90	57.20	79.57

Source: Primary data processed, 2022

Added value of Green Excelsa Coffee Bean

a. Input, Output, Price

The input utilized in this study includes Excelsa coffee cherries, priced at IDR 4,000 per kilogram for immature cherries and IDR 3,500 per kilogram for ripe cherries. Green Excelsa coffee beans are categorized into two types: random and red-picked. Random green Excelsa coffee beans are those that do not adhere to the established coffee processing standards, while red-picked green Excelsa coffee beans are produced following the proper coffee processing procedure, albeit without specific quality standards (such as a cupping score) specifically designed for Excelsa coffee. Consequently, they cannot be classified as premium or specialty coffee, as long as the raw material used consists of cherries that are a mixture of ripe and half-ripe cherries. The green Excelsa coffee beans used in this research are exclusively derived from perfectly ripe cherries, exhibiting distinct red cherry characteristics. Ripe cherries are chosen due to their capacity to yield the most desirable taste, attributed to the optimal sugar content within the cherries.

During the harvest season, an average of 700 kilograms of Excelsa coffee cherries are utilized as input for the production of green beans. Processing these 700 kilograms of cherries into green Excelsa coffee beans yields an output of 105 kilograms, whereas processing them into red-picked green Excelsa coffee beans results in an output of 87.5 kilograms. This discrepancy in output is attributed to the higher water content of green Excelsa coffee beans, which is approximately 15%, compared to the water content of approximately 12% in red-picked green Excelsa coffee beans. It's worth noting that random green Excelsa coffee beans do not undergo a sorting process, whereas red-picked green Excelsa coffee beans have undergone a sorting process to separate defective green beans from those that meet the desired quality standards. Sorting is a critical step as it serves to segregate defective green beans from their higher-quality counterparts. This process is particularly important in maintaining overall quality, especially in terms of flavor.

The selling price for random green Excelsa coffee beans is notably lower at IDR 35,000 per kilogram, whereas red-picked green Excelsa coffee beans command a higher price of IDR 65,000 per kilogram. This significant price disparity can be attributed to the longer processing time required for red-picked green Excelsa coffee beans compared to random green Excelsa coffee beans. Furthermore, the divergence in selling prices is influenced by the use of higher-quality raw materials in the production of red-picked green Excelsa coffee beans in contrast to the raw materials used for random green Excelsa coffee beans. These distinctions in

post-harvest processes and raw material quality contribute to differences in overall quality, with random green Excelsa coffee beans generally exhibiting lower quality compared to their red-picked counterparts.

Labor is a vital component in the production process, involving activities such as cherry picking, cherry sorting, and green bean sorting. Labor inputs are quantified in terms of labor hours or HOK, with one HOK equivalent to 8 hours of work (Siregar & Oktaviana, 2020). The production of random green Excelsa coffee beans requires 7 HOK of labor, whereas producing red-picked green Excelsa coffee beans necessitates 11.81 HOK. This disparity in HOK signifies that the processing of cherries into red-picked green Excelsa coffee beans is a lengthier and more labor-intensive procedure. The labor required for processing cherries into green beans is limited to cherry picking, whereas the labor input for processing cherries into red-picked green Excelsa coffee beans encompasses cherry picking, cherry sorting, and green bean sorting.

Another significant input in the processing of Excelsa coffee cherries into green beans is the diesel fuel used to operate the huller machine, which is employed to remove the dried cherry husks. The input cost for producing green Excelsa coffee beans is IDR 97 per kilogram, while for red-picked green Excelsa coffee beans, it's IDR 167 per kilogram. The discrepancy in input costs can be attributed to the longer duration of cherry hulling required for red-picked Excelsa coffee, resulting in greater diesel fuel consumption.

b. Income and Profit

As depicted in Table 4, the added value of green beans for random Excelsa coffee amounts to IDR 1,153 per kilogram, which is lower than the added value of green beans for red-picked Excelsa coffee, totaling IDR 4,458 per kilogram. This discrepancy in added value highlights that red-picked green Excelsa coffee beans undergo a more substantial increase in value. The primary factor contributing to this difference is the selling price. The selling price of random green Excelsa coffee beans consistently lags behind that of red-picked green Excelsa coffee beans. This variation in selling prices consequently leads to lower profits for random green Excelsa coffee beans, with profits amounting to IDR 653 per kilogram compared to IDR 2,771 per kilogram for red-picked green Excelsa coffee beans.

The added value of green Excelsa coffee beans is observed to be lower in comparison to green Arabica coffee beans from other regions. For instance, the added value of green Arabica coffee beans for Marmomulyo coffee producers stands at IDR 7,440.75 per kilogram (Hidayat, 2022). Similarly, the added value of green Arabica coffee beans in Sumbermalang, Situbondo, amounts to IDR 14,920 per kilogram (Hariyanto & Achmar, 2019). This disparity can be attributed to the general trend of higher selling prices for green beans in the Arabica coffee market as compared to green beans in the Excelsa coffee market. Arabica coffee is known for its more intricate flavor profile, contributing to its elevated selling price. Consequently, these variations in green bean selling prices play a pivotal role in determining the added value.

The added value of green Excelsa coffee beans appears to be relatively similar to that of green Robusta coffee beans from other regions. For instance, in the Cibulau Hijau farmer group, Cisarua, green Robusta coffee beans exhibit an added value of IDR 5,510 per kilogram (Tamaradewi et al., 2019). This similarity in added value arises from the comparable selling prices of green Robusta coffee beans and green Excelsa coffee beans. In terms of classification, the green bean added value ratio for random Excelsa coffee is considered moderate at 21.96%, while the green bean added value ratio for red-picked Excelsa coffee is categorized as high, standing at 54.87%. In accordance with the classification criteria, added value is deemed moderate if the value added ratio falls within the range of 15% to 40%, and high if the ratio surpasses 40% (Sinaga et al., 2022).

c. Margin

The profit margin for random green Excelsa coffee beans is notably lower than that for red-picked green Excelsa coffee beans. For both random and red-picked green Excelsa coffee beans, the primary contribution to the margin is derived from profits, with labor income and other input contributions constituting the remaining components.

Added value of Roasted Excelsa Coffee Bean

a. Input, Output, Price

The production of roasted Excelsa coffee beans requires the use of green beans. Random green Excelsa coffee beans are utilized in the production of random roasted Excelsa coffee beans, whereas red-picked

green Excelsa coffee beans are employed for making red-picked roasted Excelsa coffee beans. The cost of green beans for Excelsa coffee stands at Rp. 35,000 per kilogram, while the price for green beans intended for red-picked Excelsa coffee is Rp. 60,000 per kilogram. This price differential is influenced by the quality disparity between the two types of green beans. Red-picked green Excelsa coffee beans are of superior quality compared to random green Excelsa coffee beans, hence the higher selling price.

Roasting Excelsa coffee, derived from green beans, entails an approximate 20% reduction in weight due to the dehydration of these beans during the roasting procedure. Roasted Excelsa coffee is available in two varieties: random roasted Excelsa coffee beans are priced at IDR 70,000 per kilogram, whereas red-picked roasted Excelsa coffee beans command a higher price of IDR 130,000 per kilogram. The superior taste profile of red-picked Excelsa coffee stems from its processing method, which involves the use of fully ripened coffee cherries, commonly referred to as "red-picked" coffee. Ripe coffee cherries have been shown to yield enhanced flavor and aroma in the final product (Wibowo & Palupi, 2022). Research by Adri et al. (2022) reinforces the notion that high-quality coffee with superior taste characteristics can be consistently achieved through red picking. The roasting process for Excelsa coffee, transitioning from green beans to roasted beans, necessitates a measure of labor input. Fortunately, the use of a roasting machine streamlines this process, minimizing labor requirements to a modest extent. On average, each batch of roasting consumes approximately 15 minutes. Labor time in the roasting process is quantified in working hours (HOK), allowing for efficient management of resources.

b. Income and Profit

Referring to the data presented in Table 4, it becomes evident that the profitability of random roasted Excelsa coffee beans stands at IDR 12,013 per kilogram, while the corresponding figure for red-picked roasted Excelsa coffee beans reaches IDR 35,013 per kilogram. This notable variance in profitability is directly attributable to the higher market price commanded by red-picked roasted Excelsa coffee beans as compared to their random roasted counterparts. This disparity in market pricing is rooted in divergent target demographics. Red-picked roasted Excelsa coffee beans primarily cater to coffee connoisseurs and individuals possessing substantial purchasing power, often classified as the upper middle class. Conversely, the original market segmentation for roasted Excelsa coffee beans predominantly encompasses individuals with more limited purchasing capacity, colloquially termed the lower middle class. This segmentation divergence is closely linked to the prevailing pricing strategies. Moreover, empirical evidence underscores the pivotal role of price in consumer decisions regarding Excelsa coffee purchases. Statistical analysis, employing the t-test, demonstrates a compelling and statistically significant correlation between price and consumer choices, with a significance level of 0.05 or lower (Wahyuni, 2019).

The value addition achieved through the production of red-picked roasted Excelsa coffee beans is notably higher, amounting to IDR 35,525 per kilogram, in contrast to the IDR 12,525 per kilogram value addition observed in random roasted Excelsa coffee beans. This substantial discrepancy underscores that the transformation of green Excelsa coffee beans into red-picked roasted beans significantly enhances value. It is worth noting that the added value of roasted Excelsa coffee beans, as ascertained in this study, aligns closely with the added value observed in roasted Robusta coffee beans sourced from regions beyond Wonosalam, Jombang. Specifically, roasted Robusta coffee beans in Grabag, Magelang, yield an added value of IDR 16,000 per kilogram (Adji et al., 2021), while in the Kalipucang area, Pasuruan, this figure stands at IDR 33,871 per kilogram (Hidayanti et al., 2021). However, when juxtaposed with the added value of Arabica coffee beans cultivated in the Cisarua area, Bogor, Excelsa coffee's value addition in Wonosalam appears comparatively lower. For instance, the added value of roasted Arabica coffee beans within the Cibulau Hijau farmer group, Cisarua, is notably higher, at IDR 163,035 per kilogram (Tamaradewi et al., 2019). This differential in added value can be attributed primarily to variations in selling prices. In a broader context, it is noteworthy that roasted Arabica coffee beans tend to command the highest selling prices across all coffee types.

Additional cost components encompass expenses related to LPG and packaging, which collectively amount to IDR 8,475 per kilogram. Comparatively, the profit margin associated with roasted Excelsa coffee beans trails behind that of red-picked roasted Excelsa coffee beans. This margin predominantly originates from profits, with supplementary contributions from labor income and other input expenditures. Upon applying the Hayami method for computation, it becomes evident that the transformation of Excelsa coffee from its

green bean form into roasted beans generates a notably higher economic value when contrasted with the process of converting Excelsa coffee cherries into green beans. Several factors underpin this discrepancy in added value between roasted beans and green beans:

1. Output

The roasting process incurs a shrinkage of approximately 20%, signifying a relatively modest disparity between input and output subsequent to roasting. In stark contrast, the transformation of cherries into green beans involves a considerably larger shrinkage. The substantial shrinkage observed during the process of cherries becoming green beans stems from the necessity of removing the cherry skins and reducing water content through drying. This results in a pronounced reduction in mass. The ratio between the initial raw material in the form of cherries and the eventual yield of green beans typically ranges from 8:1, and in some cases, even contracts to 9:1.

2. Selling price

The market value of roasted Excelsa coffee beans surpasses that of their green counterparts, thus yielding a notable impact on value addition. This correlation between selling price and added value indicates that higher selling prices correspond to augmented value. However, it is noteworthy that alterations in the selling price of roasted beans exhibit a relatively modest magnitude when juxtaposed with the fluctuations in the selling price of green beans. The fluctuations in the selling prices of green Excelsa coffee beans are intrinsically tied to variations in product availability. Diminishing availability, particularly in the green bean form, invariably triggers price escalations. The concomitant reduction in coffee availability, coupled with escalating prices, has culminated in a constricting effect on demand, with instances of stagnation or even decline.

One additional determinant influencing the escalation of selling prices pertains to natural factors. Excessive rainfall, for instance, can lead to crop failure or reduced crop yields. This decline in harvest output translates into a constrained supply of Excelsa coffee, thereby exerting upward pressure on selling prices. In addition to the availability of goods and the impact of natural variables, another determinant influencing selling prices is plant productivity. The Excelsa coffee plants in the Wonosalam region are currently experiencing a decline in productivity. As these coffee plants age, their capacity to absorb essential nutrients diminishes. In the case of the Excelsa coffee plants in Wonosalam, they have surpassed their productive phase, resulting in a discernible reduction in yield levels.

3. Production cost

The expenses associated with transforming Excelsa coffee cherries into green beans outweigh those incurred in the conversion of green beans into roasted beans. These costs encompass labor expenditures for harvesting, cherry sorting, and green bean sorting. The procedure for converting Excelsa coffee cherries into green beans relies heavily on manual labor performed by household workers. However, it is important to acknowledge that this approach carries a potential risk: the fixed labor costs remain constant even as worker productivity diminishes over time.

To enhance the value proposition of Excelsa coffee, a strategic framework must be devised. Heightened added value will lead to more significant economic advantages. Economic benefits for dry coffee (green beans) sales are readily apparent through elevated selling prices (Rosiana, 2020). The correlation between higher green bean prices and augmented income is well-established. Price dynamics significantly influence the income of coffee farmers in Wonosalam (Ningtyas et al., 2022). Therefore, the overarching goal of our value enhancement strategy is to bolster the competitiveness of Excelsa coffee, enabling it to rival Arabica and Robusta coffee varieties. Several strategies can be employed to achieve this goal:

1. Post-harvest quality improvement

Quality indeed constitutes a pivotal factor influencing the added value of Excelsa coffee. Specifically, the quality differentials are discernible between red-picked green Excelsa coffee beans and red-picked roast Excelsa coffee beans when contrasted with randomly selected green and roasted Excelsa coffee beans. A detailed comparative analysis of the added value associated with green and roasted Excelsa coffee beans is meticulously documented in Table 5.

Table 5. Comparison of the Added Value of Green Bean and Roasted Bean from Excelsa Coffee

No.	Type of Coffee	Added Value
1	Random green Excelsa coffee beans	IDR 1,153 per kilogram
2	Random roasted Excelsa coffee beans	IDR 12,525 per kilogram
3	Red picked bean Excelsa green coffee	IDR 4,458 per kilogram
4	Red picked roasted Excelsa coffee beans	IDR 35,525 per kilogram

Source: Primary data processed, 2022

Table 5 underscores a conspicuous disparity in the added value between green beans and roasted beans of red-picked Excelsa coffee when juxtaposed with their randomly selected counterparts. This variance in added value can be unequivocally attributed to the discernible discrepancy in quality. The superior quality exhibited by the red-picked green and roast beans of Excelsa coffee, in contrast to the randomly selected green and roasted beans of Excelsa coffee, is indisputable. Such enhancements in quality inherently translate into heightened bargaining power for Excelsa coffee within the consumer market.

The process of converting red-picked Excelsa coffee into green beans and roasted beans is notably protracted and entails higher expenditures; however, these investments are justified by the commensurate economic gains. This meticulous approach encompasses a stringent selection of raw materials to ensure the attainment of exceptional taste profiles. The target market segment for these premium products comprises individuals with greater purchasing power, specifically the upper middle class. In contrast, green beans and roasted beans derived from random Excelsa coffee tend to cater to a market segment composed of individuals from the lower middle class. These disparities in market segmentation are fundamentally underpinned by variations in product quality. Consequently, distinct market segments warrant disparate treatments and levels of coffee quality (Hamzah et al., 2021).

The findings from the analysis of added value underscore the pivotal role played by quality in influencing economic gains. Quality enhancement, as demonstrated, serves as a catalyst for augmenting economic value. However, the pursuit of quality improvement for green beans and roasted beans of Excelsa coffee necessitates access to robust facilities and infrastructure. Unfortunately, in the context of Wonosalam, the advancement of quality in green beans and roasted beans for Excelsa coffee encounters obstacles due to the inadequate distribution of production facilities and infrastructure. Furthermore, the quest for improved quality mandates intensive support aimed at enhancing coffee processing competencies. Coffee processors in Wonosalam possess rudimentary skills, which require refinement given the evolving landscape of coffee processing technology. This aligns with prior research that underscores the significance of production facilities and labor in impacting added value. Consequently, the endeavor to elevate the added value of coffee can be effectively pursued through stringent control and enhancement of production facilities and labor (Wibowo & Palupi, 2022).

2. Downstream processing of coffee

Downstream processing in the coffee industry represents a concerted effort to transition from the production of green Excelsa coffee beans to the production of roasted Excelsa coffee beans. Analysis employing the Hayami method unequivocally demonstrates that the added value of roasted Excelsa coffee beans surpasses that of their green counterparts. This increase in added value promises to yield favorable economic outcomes. However, the journey toward downstream processing of Excelsa coffee necessitates comprehensive assistance and support. The objective is to empower coffee processors in Wonosalam not only to produce green beans but also to master the art of producing roasted beans. Such an undertaking holds the potential to significantly truncate the marketing chain. As it is widely recognized, the length of the marketing chain for Excelsa coffee invariably correlates with higher selling prices at the consumer level. The downstream processing of Excelsa coffee stands as a mutually beneficial proposition. Excelsa coffee processors can unlock the potential to produce roasted Excelsa coffee beans, endowed with substantially augmented added value compared to green Excelsa coffee beans. Meanwhile, consumers stand to gain by accessing Excelsa coffee at price points that remain within a reasonable range, thus enjoying the product without incurring exorbitant costs.

CONCLUSION

The process of transforming cherries into green beans and subsequently converting green beans into roasted beans bears a significant impact on value addition. To provide a clearer perspective, the added value

for green beans of Excelsa coffee is IDR 1,153 per kilogram, whereas the added value for green beans of red-picked Excelsa coffee is notably higher at IDR 4,458 per kilogram. Similarly, the added value for randomly selected roasted Excelsa coffee beans is IDR 12,525 per kilogram, whereas the added value for red-picked roasted Excelsa coffee beans is impressively elevated to IDR 35,525 per kilogram. Elevating the added value of Excelsa coffee warrants a concerted effort towards enhancing post-harvest quality and the downstream processing of coffee. This approach advocates diversifying Excelsa coffee into more appealing products, thereby substantially augmenting its added value. One illustrative example is the creation of coffee bags or coffee variants devoid of sediments, which have the potential to captivate consumer interest and bolster the added value of Excelsa coffee.

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