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The Agroindustry Development Strategy for Java Ijen-Raung Arabica Coffee, in Bondowoso Regency, East Java

Strategi Pengembangan Agroindustri Hilir Kopi Arabika Java Ijen-Raung, di Kabupaten Bondowoso, Jawa Timur

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Abstract

The potential of Java Ijen-Raung Arabica Coffee in the Bondowoso Regency, East Java needs to be increased by developing the downstream agroindustry. This study aims to determine the location of the downstream coffee agroindustry development area and its potential products, determine the added value of downstream coffee products, analyze its financial feasibility, and formulate a development strategy. Research methods used in this study include factor weighting, exponential comparison method, interpretive structural modeling, Hayami method, and financial feasibility analysis. The results showed that the development of the Java Ijen-Raung Arabica Coffee agroindustry was prioritized in Sumberwringin District as a development center. Downstream coffee products that have the potential to be developed are ground coffee. The added value generated from the processing of ground coffee is IDR 9,320/kg, with a value-added ratio of 48.09%. The results of the financial feasibility analysis show that the downstream coffee agroindustry is financially feasible to be developed by business actors. The downstream agroindustry development strategy formulation for Java Ijen-Raung Arabica Coffee refers to the key development sub-elements, i.e. increasing market area, monitoring product quality, and involving stakeholders in its implementation.
Keywords: Bondowoso Regency, downstream agroindustry, Java Ijen-Raung Arabica Coffee, strategy

Abstrak

Potensi Kopi Arabika Java Ijen-Raung di Kabupaten Bondowoso, Jawa Timur perlu ditingkatkan melalui pengembangan agroindustri hilir. Penelitian ini bertujuan untuk menentukan lokasi wilayah pengembangan agroindustri hilir kopi dan produk potensialnya, menentukan nilai tambah produk hilir kopi, dan menganalisis kelayakannya secara finansial, serta merumuskan strategi pengembangannya. Metode penelitian mencakup pembobotan faktor, metode perbandingan eksponensial, pemodelan struktural interpretatif, metode Hayami, dan analisis kelayakan finansial. Hasil penelitian menunjukkan bahwa pengembangan agroindustri Kopi Arabika Java Ijen-Raung diprioritaskan di Kecamatan Sumberwringin sebagai sentra pengembangan. Produk hilir kopi yang berpotensi untuk dikembangkan adalah kopi bubuk. Nilai tambah yang dihasilkan dari pengolahan kopi bubuk sebesar Rp9.320/kg dengan rasio pertambahan nilai sebesar 48,09%. Hasil analisis kelayakan finansial menunjukkan bahwa agroindustri produk hilir kopi secara finansial layak dikembangkan oleh pelaku usaha. Rumusan strategi pengembangan agroindustri hilir Kopi Arabika Java Ijen-Raung mengacu pada sub elemen kunci pengembangan, yaitu peningkatkan jangkauan pasar, pengawasan kualitas produk, dan melibatkan pemangku kepentingan dalam pelaksanaannya.
Kata kunci: *agroindustri hilir, Kabupaten Bondowoso, Kopi Arabika Java Ijen-Raung, strategi*

INTRODUCTION

Coffee is a commodity that plays an essential role globally (Bae et al., 2013; Craparo et al., 2015) and one of the most important export commodities globally after petroleum (Ariyanti, Suryantini, & Jamhari, 2019). According to the Ministry of Industry of the Republic of Indonesia, coffee production in Indonesia ranks fourth after Brazil, Vietnam, and Colombia, with a total production of more than 600,000 tons or equivalent to 6.60% of world production in 2016-2017 (Kementerian Perindustrian Republik Indonesia, 2017). Coffee is a plantation commodi-

ty that contributes quite a lot to the country's foreign exchange. Coffee is also a source of employment and plays an essential role in increasing people's income. Coffee ranks sixth in producing plantation commodities in Indonesia after palm oil, rubber, sugar/sugar cane, tea, and cocoa (Zakaria, Aditiawati, & Rosmiati, 2017).

Bondowoso Regency is one of the coffee production centers in Indonesia, especially in East Java Province. According to East Java Statistics, coffee production in Bondowoso Regency ranks fourth after Banyuwangi, Jember, and Malang Regency, with a total production of 10,285 tons in 2020 (Badan Pusat Statistik Jawa Timur, 2021). Most of the coffee production in Bondowoso Regency is produced from smallholder coffee estates. Types of coffee cultivated include Arabica coffee and Robusta coffee. The area of Arabica coffee is more than the area of Robusta coffee. Bondowoso Statistics stated that the area of Arabica coffee plantations in Bondowoso in 2020 was recorded at 4,133 ha, while the area for Robusta coffee was 3,914 ha (Badan Pusat Statistik Bondowoso, 2021).

Arabica coffee in Bondowoso Regency is generally grown on the slopes of the Ijen-Raung mountain, so that the coffee is called Java Ijen-Raung Arabica Coffee (Cristanto, Soetriono, & Aji, 2018). The Ijen-Raung mountain area has an altitude between 900-1,500 meters above sea level. According to Gaibor et al. (2020), the optimum height for the ideal Arabica coffee growth is 1,300-1,600 meters above sea level. Bondowoso Statistics stated that the Ijen-Raung mountain area also has climatic conditions suitable for coffee growth with an average air temperature of 15-25 °C and volcanic soil structures of entisols and inceptisols (Badan Pusat Statistik Bondowoso, 2021). Arabica coffee grown in the mountainous region of Ijen-Raung has a distinctive taste (Yılmaz, Acar-Tek, & Sözlü, 2017). It is favored by the world coffee market (Permatasari, Basith, & Mulyati, 2018). Arabica coffee has relatively high acidity, vigorous aroma intensity, medium thickness, and different coffee flavors: sweet, spicy, and bitter (Bunn et al., 2015; Dias & Benassi, 2015; Khapre et al., 2017). This distinctive taste makes Ijen-Raung Arabica Coffee get a geographical indication certificate from the Ministry of Law and Human Rights of the Republic of Indonesia as Java Ijen-Raung Coffee.

According to Bondowoso Statistics, the production of Java Ijen-Raung Arabica Coffee in 2020 was 1,854.94 tons (Badan Pusat Statistik Bondowoso, 2021). This production quantity means that the upstream agroindustry condition of Java Ijen-Raung Arabica Coffee has the potential to be developed. However, this condition is still not balanced with the downstream part. So far, most of the coffee production has only been in the form of wet Hard Skin (HS) coffee and coffee beans that lack added value. Diversification of downstream coffee products has not been performed by the community or business actors in the Ijen-Raung mountain slope area. Only a few business actors have started processing downstream coffee products, although they are still not optimal in developing their business, and the business locations are still scattered. Downstream coffee products that have begun to be widely developed are roasted coffee and ground coffee with limited production and marketing scales that only meet the demand of local markets (make to order) (Handini, 2020).

Research on the development of coffee commodity businesses in Indonesia has been carried out previously (Putri et al., 2018; Perdani et al., 2020). The object of this research is not integrated from upstream to downstream. Several studies were also conducted on developing an integrated coffee commodity business from upstream to downstream (Santoso et al., 2021; Effendi et al., 2021), but these studies were performed on established supply chains. The potential development of Java Ijen-Raung Arabica Coffee in the Bondowoso Regency can be performed optimally based on actual conditions in the field. This study aims to determine the location of agroindustry development areas and potential downstream coffee products, determine the added value of downstream coffee products, and analyze their financial feasibility. This study also aims to design a strategy for developing downstream coffee agroindustry to increase the potential of Java Ijen-Raung Arabica Coffee in the Bondowoso Regency.

METHODS

The formulation of a strategy for developing Java Ijen-Raung Arabica Coffee agroindustry in Bondowoso Regency is carried out systematically and comprehensively with the following stages: (1) determining the location of agroindustry development; (2) determine potential downstream Arabica coffee products; (3) calculating the added-value of downstream Arabica coffee

products; (4) analyzing the financial feasibility of developing downstream Arabica coffee agroindustry; and (5) structuring the agroindustry development strategy of Java Ijen-Raung Arabica Coffee in Bondowoso Regency.

Data Collection

The research data required consists of primary data and secondary data. Primary data were obtained directly through structured interviews with experts using questionnaires and unstructured interviews. Secondary data is obtained by searching documents and collecting information through several written data sources from government documents, statistical data from Statistics Indonesia, and related research results.

Sources of research data and information come from local government agencies in the Bondowoso Regency, consist of the department of agriculture which is called Dinas Pertanian, department of cooperatives, industry and trade which is called Dinas Koperasi, Perindustrian dan Perdagangan and development planning agency at sub-national level of Bondowoso which is called Badan Perencanaan Pembangunan Daerah Kabupaten Bondowoso (BAPPEDA Bondowoso). The study also involved business actors in Bondowoso Regency, namely Bondowoso Tea Company (Bondtea), Matt Coffee, and Ya Hala.

Primary data was also collected based on direct information from key informants through interviews and observations of 13 small and medium enterprises (SMEs) agroindustry based on Java Ijen-Raung Arabica Coffee located in Sumberwringin, Sukosari, Curahdami, and Bondowoso Districts. The selection of SMEs was determined by purposive sampling.

Location Determination

This stage aims to determine the most potential location for the center of downstream Arabica coffee agroindustry development in the Ijen-Raung area in the Bondowoso Regency. Determination of potential locations for the development of downstream coffee agroindustry using factor weighting method. The factors used for determining the location include the availability of raw materials, market location, land availability, labor availability, transportation facilities, infrastructure, community support, government regulations, and development costs. The location determination is calculated based on the multiplication between the weight of each factor and the rating value for each alternative location with the following equation (Sharma, Phanden, & Baser, 2012):

$$NA_i = \sum_{i=1}^{m,n} (B_j)(R_k) \quad (1)$$

where,
NA_i = i-th alternative value
B_j = weight of importance factor j
R_k = k-th rating score (scale 1-9, the higher the score, the better)
m = number of decision factors
n = number of decision alternative choices

Determination of Arabica Coffee Downstream Products

Determination of superior coffee downstream products is performed using the exponential comparison method. The criteria used to determine downstream coffee products include market potential, product added-value, uniqueness and distinctiveness, technological convenience, investment needs, and product quality. The determination of downstream coffee products is using the equation as follows (Marimin, 2004):

$$TN_i = \sum_{j=1}^{m,n} (RK_{ij})^{TKKj} \quad (2)$$

where,
TN_i = total value of the i-th alternative
RK_{ij} = jth criterion score on decision choice i (scale 1-9, the higher the score the better)
TKK_j = weight of importance of the jth decision criteria; TKKj > 0 (integer)
n = number of decision choices
m = number of decision criteria

Product Added-Value Calculation

Calculation of the downstream products added-value of Java Ijen-Raung Arabica Coffee was performed using the Hayami method. The Hayami method calculates added-value by combining the added-value method for processing and added-value for marketing (Hayami et al., 1987). The calculation of added-value using the Hayami method can determine conversion factors, labor coefficients, product value, added-value, added-value ratio, labor benefits, other input contributions, and profit levels and margins (Hidayat et al., 2012). The variables values used in the calculations are based on the values prevailing at the time of the study and information from one of the agroindustry, which represents the coffee agro-

Table 1. Calculation of the Hayami method

Variable	Value
I. Output, Input and Price	
1. Output (kg)	(1)
2. Input (kg)	(2)
3. Labor (days of labor)	(3)
4. Conversion factor	(4) = (1) / (2)
5. Labor coefficient (days of labor/kg)	(5) = (3) / (2)
6. Output price (IDR)	(6)
7. Labor wages (IDR/days of labor)	(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. Added-value (IDR/kg)	(11a) = (10) – (9) – (8)
b. Added-value ratio (%)	(11b) = (11a/10) x 100%
12. a. Labor income (IDR/kg)	(12a) = (5) x (7)
b. Labor share (%)	(12b) = (12a/11a) x 100%
13. a. Profit (IDR/kg)	(13a) = 11a – 12 a
b. Profit rate (%)	(13b) = (13a/11a) x 100%
III. Retribution for the Factors of Production Owner	
14. Margin (IDR/kg)	(14) = (10) – (8)
Labor Income (%)	(14a) = (12a/14) x 100%
Other Input Contribution (%)	(14b) = (9/14) x 100%
Entrepreneur Profit (%)	(14c) = (13a/14) x 100%

industry in general. The calculation of the Hayami method is shown in Table 1.

Determination of Downstream Coffee Agroindustry Financial Feasibility

Financial feasibility analysis of downstream agroindustry uses financial feasibility criteria which include Break-Even Point (BEP), Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit-Cost Ratio (Net B/C), and Payback Period (PP). The feasibility calculation data is based on information from one agroindustry considered representative and other generally accepted information. The equation used to calculate the eligibility criteria is as follows (Sunaryo et al., 2019; Dellarosawati, 2020):

$$\text{BEP unit} = \frac{\text{FC}}{\text{P}-\text{VC}} \text{ or IDR BEP} = \frac{\text{FC}}{1-\text{VC/P}} \quad (3)$$

$$\text{NPV} = \sum_{t=0}^{n} \frac{B_t - C_t}{(1+i)^t} \quad (4)$$

$$\text{IRR} = i_1 + \frac{\text{NPV}_1}{\text{NPV}_1 - \text{NPV}_2} \text{x} (i_1 - i_2) \quad (5)$$

$$\text{Net B/C} = \frac{\sum_{t=0}^{n} \frac{B_t}{(1+i)^t}}{\sum_{t=0}^{n} \frac{C_t}{(1+i)^t}} \quad (6)$$

$$\text{PP} = \frac{\text{initial investment}}{\text{net cash flow}} \text{x 1 year} \quad (7)$$

where,
BEP = break-even point
FC = fixed cost
VC = variable cost
P = price
NPV = net present value
B_t = benefit in year t
C_t = cost in year t
I = interest rate
IRR = internal rate of return
i_1 = interest rate that produces a positive NPV (NPV_1)
i_2 = interest rate that produces negative NPV (NPV_2)
PP = payback period

Determination of Coffee Downstream Development Strategy

Structuring the development strategy of the downstream coffee agroindustry using the Interpretive Structural Modeling (ISM) method developed by Saxena, Sushil, & Vrat (1992). Structuring is performed on four system elements: objectives, constraints, institutions, and program activities. The ISM method produces a hierarchy of system elements and their classification, which

includes four sectors: autonomous, dependent, linkage, and independent sectors. The system element hierarchy and classification are generated based on the contextual relationships between elements that make up the Structural Self Interaction Matrix (SSIM) and Reachability Matrix (RM). Determination of contextual relationships between elements using the following symbols:

V = there is a contextual relationship between the elements Ei and Ej, but not vice versa.
A = there is a contextual relationship between the elements of Ej and Ei, but not vice versa.
X = there is a reciprocal contextual relationship between the elements of Ei and Ej.
O = there is no contextual relationship between the elements of Ei and Ej.

RESULTS AND DISCUSSION

Results of Determining the Location of Agroindustry

The Ijen-Raung area in Bondowoso Regency is located on the Ijen and Raung mountains slopes, including the Districts of Sumberwringin, Ijen, Tlogosari Sukosari, Cermee, and Botolinggo. Determining the right location can significantly impact the agroindustry to gain profits and increase its competitiveness (Tavakolnia & Makrani, 2016; Ferreira et al., 2017).

The assessment results of the determination of the potential location for the downstream Arabica coffee agroindustry development in the Ijen-Raung area in Bondowoso Regency are presented in Table 2.

Table 2 shows that the potential location for the development of downstream Arabica coffee agroindustry is Sumberwringin District. Sumberwringin District is the leading coffee production center in the Ijen-Raung area. According to Bondowoso Statistics, the coffee area in Sumberwringin District in 2020 was 2,622 ha with 1,258.56 tons or about 60% of the total Arabica coffee production in Bondowoso Regency (Badan Pusat Statistik Bondowoso, 2021). There is quite a lot of coffee processing or agroindustry business units in Sumberwringin District. The number of Arabica coffee-based agroindustry SMEs in the Ijen-Raung mountainous region in 2020 is 25 units with 16 units located in Sumberwringin District. The institutional system in the sub-district has also been running well with the existence of farmer groups which is called Kelompok Tani (Poktan), village owned enterprises which is called Badan Usaha Milik Desa (BUMDes), and cooperatives that support each other.

Table 2. Priority order of potential locations for the downstream Arabica coffee agroindustry development

Order of Priority	Alternative Location	Total Score
1	Sumberwringin District	243
2	Sukosari District	228
3	Tlogosari District	210
4	Ijen District	175

Table 3. Priority order of superior products

Order of Priority	Superior Product Alternative	Total Score
1	Ground Coffee	71,252,711
2	Roasted Coffee	28,397,943
3	Green Beans	20,477,924

Arabica Coffee Downstream Products

Determination of downstream coffee products that can become a priority or superior products is needed to optimize the area's potential in the downstream agroindustry development location. Determination of outstanding coffee downstream products aims to find downstream coffee products that can encourage investment in the region (Susanto, 2014). Most of the downstream Arabica coffee agroindustry SMEs located on the slopes of the Ijen-Raung mountains produce 3 (three) main products: green beans, roasted coffee, and ground coffee. The determination of superior products among the three products is carried out to provide infrastructure, facilities, and infrastructure for agroindustry development.

The determination of superior coffee products uses the criteria developed by Herdhiansyah et al. (2013), including market potential, product added-value, product uniqueness and distinctiveness, ease of technology development, investment needs, and product quality. The results of determining the downstream agroindustry of Arabica coffee based on superior products are shown in Table 3.

Table 3 shows that the most superior downstream product of Arabica coffee is ground coffee. Ground coffee was chosen as a superior product because it has a high score on most criteria: product quality, uniqueness and distinctiveness, and market potential. Java Ijen-Raung Arabica ground coffee is a high-quality ground coffee. Java Ijen-Raung Arabica coffee products have standards that have been issued by the government following recommendations from the Health Office and are supported by quality raw materials so that the

quality is guaranteed (Lukodono, Setyanto, & Izzulhaq, 2018). Java Ijen-Raung Arabica ground coffee has unique and distinctive characteristics, such as a soft and lighter texture with a low acidity level, intense taste, aroma, and favored by the world coffee market (Permatasari et al., 2018). These characteristics can be leveraged to develop a strong Bondowoso coffee brand. The brand can affect the development of the regional economy in a sustainable manner (Azizah & Kriswibowo, 2020).

Agroindustry SMEs have processed coffee beans with various methods to meet diverse market needs. The methods are a full wash, semi wash, honey, and natural. The process was applied to remove mucilage and reduce seed moisture content (Pimenta et al., 2018; Poltronieri & Rossi, 2016). Coffee processing methods can drastically change the quality and taste of the final product (Kleinwächter, Bytof, & Selmar, 2015). Arabica ground coffee produced from coffee beans processed using several methods also strengthens the characteristics of the Java-Ijen Raung Arabica Coffee product. Several ground coffee products produced by coffee agroindustry SMEs in the Sumberwringin District have trademarks, including *Coffee*, *Sahabat Tiga Bintang*, *Kijang*, *Nurijen*, *Jago*, and *Jalak*. The Java Ijen-Raung Arabica ground coffee market is quite potential, including the domestic market. Some coffee agroindustry MSMEs have started to reach a broader market to foreign markets. The market potential of the Java Ijen-Raung Arabica Coffee powder is increasing along with the development of the Java Ijen-Raung Arabica Coffee brand (Suradi, Murdyastuti, & Patriadi, 2017). Ground coffee has the lowest score on the ease of investment criteria because ground coffee requires the highest investment compared to other products.

Products Added-Value

Downstream coffee products are processed coffee fruit products that have added-value. The added-value of downstream Arabica coffee products analyzed in this study includes green beans, roasted coffee, and ground coffee. The basis for calculating the three downstream coffee products uses coffee red cherry. The results of the added-value calculation using the Hayami method on the three types of downstream coffee products are shown in Table 4.

Table 4 shows that the downstream Arabica coffee product with the highest added-value and the ratio of added-value is ground coffee. Added-value from coffee red cherry processing into ground coffee is IDR 9,320/kg with an added-value ratio of 48.09%. This value indicates that ground coffee can be the primary choice for the coffee agroindustry to obtain higher added-value.

Table 4. The analysis results of the downstream Arabica coffee products added-value

No.	Variable	Added-Value of Products		
		Green Bean	Roasted Coffee	Ground Coffee
1.	Output (kg)	4,500	4,305	3,990
2.	Input (kg)	30,000	35,000	35,000
3.	Labor (days of labor)	156	156	156
4.	Conversion factor	0.15	0.12	0.11
5.	Labor coefficient (days of labor/kg)	0.005200	0.004457	0.004457
6.	Output price (IDR)	90,000	125,000	170,000
7.	Labor wages (IDR/days of labor)	60,000	60,000	60,000
8.	Price of raw materials (IDR/kg)	8,000	8,000	8,000
9.	Contribution of other inputs (IDR/kg)	277	742	2,060
10.	Output value (IDR/kg)	13,500	15,375	19,380
11.	a. Added-value (IDR/kg)	5,223	6,633	9,320
	b. Added-value ratio (%)	38.69	43.14	48.09
12.	a. Labor income (IDR/kg)	312	267.42	267.42
	b. Labor share (%)	5.97	4.03	2.87
13.	a. Profit (IDR/kg)	4,911	6,366	9,053
	b. Profit rate (%)	94.03	95.97	97.13
14.	Margin (IDR/kg)	5,500	7,375	11,380
	a. Labor Income (%)	5.67	3.63	2.35
	b. Other Input Contribution (%)	5.04	10.06	18.10
	c. Entrepreneur Profit (%)	89.29	86.31	79.55

All downstream coffee products in ground coffee, green beans, and sangria coffee provide high added-value. A financial feasibility analysis is needed to determine the downstream product exploitation feasibility as a profitable agroindustry business. A business feasibility analysis was performed for the downstream agroindustry of Java Ijen-Raung Arabica Coffee, which produces three products: green beans, roasted coffee, and ground coffee. Most of the object agroindustry in this research produce these three downstream products.

Feasibility of Downstream Coffee Agroindustry

Data Input for the Analysis of the Downstream Coffee Agroindustry Financial Feasibility

Financial data is used as input in conducting a financial feasibility analysis. Table 5 shows the input data for the financial feasibility of downstream Arabica coffee agroindustry in the Ijen-Raung area, Bondowoso Regency. The bank interest used in this financial feasibility analysis is adjusted to the bank loan interest in December 2020. The project period as the basis for the calculation is assumed to be the same as the equipment's economic life.

Cost Structure

The cost structure of the downstream agroindustry for Java Ijen-Raung Arabica Coffee consists of investment costs and operational costs. Investment costs consist of plant investment and investment in tools and machinery. Factory investment costs include land and building purchases, permits, water and electricity installations, and office infrastructure. The tools and machines used include all equipment for processing red cherry coffee into green beans, roasted coffee, and ground coffee.

Operational costs or production costs consist of fixed costs and variable costs. Operational costs

Table 5. Financial feasibility analysis input data

No.	Description	Unit	Total
1.	Production capacity	kg/year	100,000
2.	Yield		
	a. Green beans	%	15
	b. Roasted coffee	%	12
	c. Ground Coffee	%	11
3.	Production Percentage		
	a. Green beans	%	30
	b. Roasted coffee	%	35
	c. Ground Coffee	%	35
4.	Price of red cherry coffee	IDR/kg	8.000
5.	Green beans price	IDR/kg	90,000
6.	Roasted coffee price	IDR/kg	125,000
7.	Price of ground coffee	IDR/kg	170,000
8.	Number of working days/year	day/year	156
9.	Number of working seasons in 1 year	month	12
10.	Project period	year	10
11.	Discount rate	%	12
12.	income tax	%	10
13.	Bank loan	%	80

Table 6. The cost structure of downstream Arabica coffee agroindustry

No.	Cost component	Cost (IDR)	Total Cost (IDR)
1.	Investment		
	a. Factory investment	480,200,000	
	b. Tools and machines investment	174,300,000	
	Total Investment		654,500,000
2.	Operating costs		
	a. Total fixed costs (in one year)	118,622,000	
	b. Total variable costs (in one year)	936,406,000	
	Total operating costs		1,055,028,000
	Capital requirement		1,709,528,000

are calculated for one year of production. Fixed costs include the cost of electricity, maintenance, depreciation, labor, and building taxes. Variable costs consist of the cost of raw materials, fuel, and packaging. Table 6 shows the cost structure of the downstream agroindustry of Java Ijen-Raung Arabica Coffee.

Operating Revenues

The downstream agroindustry revenue for Java Ijen-Raung Arabica Coffee comes from the products sale: green beans, roasted coffee, and ground coffee. The value of downstream agroindustry income for Java Ijen-Raung Arabica Coffee for one year of production is presented in Table 7.

Financial Feasibility Analysis Results

Financial feasibility analysis consists of several eligibility criteria: Break-Even Point (BEP), Net Present Value (NPV), Internal Rate of Return (IRR), Benefit-Cost Ratio (B/C Ratio), and Payback Period (PP). The financial feasibility analysis results of the downstream coffee agroindustry are presented in Table 8. The feasibility analysis results show that the downstream agroindustry of Java-Ijen Raung Arabica Coffee with downstream products including green beans, roasted coffee, and ground coffee is feasible to develop. The feasibility analysis results will be better if the agroindustry only seeks ground coffee as superior because it has the highest added value. This result indicates that the development of the downstream coffee agroindustry can benefit the community of downstream coffee agroindustry entrepreneurs in the Bondowoso Regency. If the agroindustry only cultivates ground coffee as a superior product, the financial feasibility analysis is shown in Table 9.

Coffee Downstream Development Strategy

Program Objectives

The elements of the development program objectives consist of 6 sub-elements, namely (1) Increasing regional income, (2) Increasing community empowerment, (3) Management and utilization of abundant natural resources (coffee), (4) Increasing market area, (5) Development edutourism area, and (6) Increasing business income. The classification and structure of the objective elements of the Java Ijen-Raung coffee agroindustry development can be seen in Figure 1.

Figure 1 (a) shows that sub-element (4) is in sector IV (Independent), which means that sub-element is a key sub-element that has a strong driving force and has a very low dependence on

Table 7. Arabica coffee business income per year

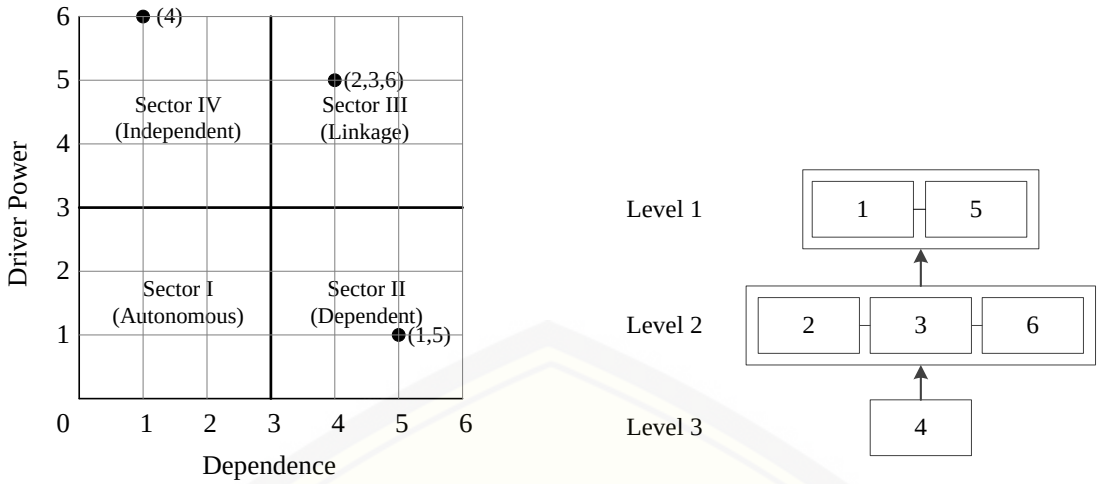
No.	Products Types	Production (kg/year)	Selling Price (IDR/kg)	Income (IDR)
1.	Green bean	4,500	90,000	405,000,000
2.	Roasted coffee	4,305	125,000	538,125,000
3.	Ground coffe	3,990	170,000	678,300,000
		Total Income		1,621,425,000

Table 8. Financial feasibility analysis results

No.	Parameter	Unit	Value	Decision
1.	BEP green bean	kg	1,213	
	BEP roasted coffee	kg	795	
	BEP ground coffee	kg	472	
2.	NPV	IDR	2,545,769,373	feasible
3.	IRR	%	86.37	feasible
4.	Net B/C	-	1.38	feasible
5.	PP	year	1.16	feasible

Table 9. Financial feasibility analysis results of superior products

No.	Parameter	Unit	Value	Decision
1.	BEP ground coffee	kg	1,295.50	
2.	NPV	IDR	4,573,184,901.92	feasible
3.	IRR	%	141.34	feasible
4.	Net B/C	-	1.72	feasible
5.	PP	year	0.71	feasible



(a) Classification of objective elements (b) Objective element structure

Figure 1. Classification and Hierarchical Structure of Objective Elements

other objective elements. This result shows that sub-element (4) can be the goal that determines success in developing the Java Ijen Raung Arabica Coffee agroindustry at Bondowoso Regency.

ISM analysis produces a hierarchical structure of the sub-element of the program objectives, which consists of 3 levels. The hierarchical structure of the program objective elements (Figure 1 (b)) shows that sub-element (4) is a sub-element at the lowest level, which is the most basic or primary sub-element of the development goal of the Arabica coffee agroindustry. This result follows the road map set by the Bondowoso Regency government, which states that the focus of coffee development in 2020-2025 is the expansion of downstream product marketing (Suradi et al., 2017).

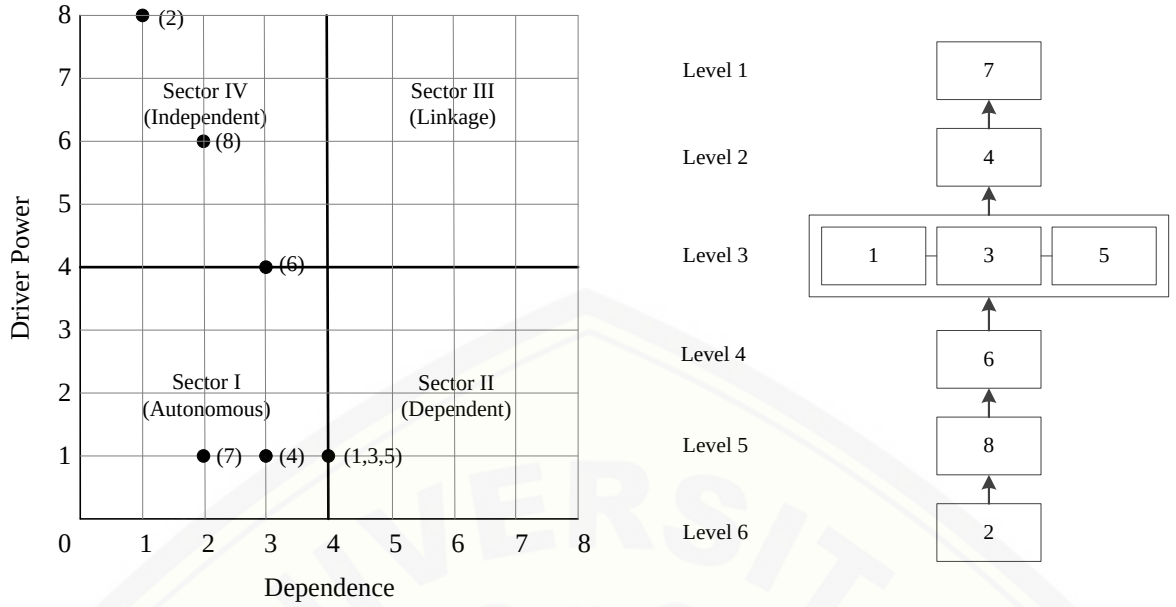
Most of the downstream Arabica coffee products are currently sold to the local market in Bondowoso Regency. Downstream coffee products are conventionally sold to stalls, shops, or cafes through partnerships. Some business actors have started selling their products online through websites or using simple applications, such as marketplaces on Facebook, Whatsapp, and Instagram. Some coffee business actors have also begun marketing their products outside Bondowoso Regency. Some roasted and ground coffee products have been sold to Jakarta, Yogyakarta, Semarang, Jember, Malang, Solo, and Bali. High-quality specialty dry beans have been exported to Germany, Russia, and Australia. Business actors also carry out promotions to encourage increased sales by participating in various exhibition events and competitions. The broad market area is expected to be a factor that drives the development of the existing agroindustry.

Development Constraints

The constraint elements of the downstream agroindustry development of Java Ijen-Raung Arabica Coffee consist of eight sub-elements: (1) Limitations of promotion and marketing expansion, (2) Limitations of quality control of products produced from each agroindustry, (3) Products produced by each industry are the same types (4) Limited amount of capital used for business expansion, (5) Insufficient information and understanding of product certification, (6) Insufficient human resources insight in developing their products or business, (7) Limited business partners as a supporter of sustainability the business is run, and (8) lack of skills in coffee management. The classification and structure of the constraints on the development of the Java Ijen-Raung coffee agroindustry can be seen in Figure 2.

Figure 2 (a) shows that sub-elements (2) and (8) are in sector IV (Independent), which means that both sub-elements are driving sub-elements that affect other elements but are not dependent or easily influenced by other elements. Sub element (2) is at a higher point, so it has a more significant influence. This result means that sub-element (2) is the most critical constraint to be resolved first.

Bondowoso Regent Regulation No. 25 of 2016 concerning Governance and Trading System for Java Arabica Coffee Products, Ijen-Raung (2016) states that quality control is carried out periodically in each Poktan and product processing unit which is called Unit Pengolahan Hasil (UPH)



(a) Classification of constraint elements (b) Constraint element structure

Figure 2. Classification and Hierarchical Structure of Constraint Elements

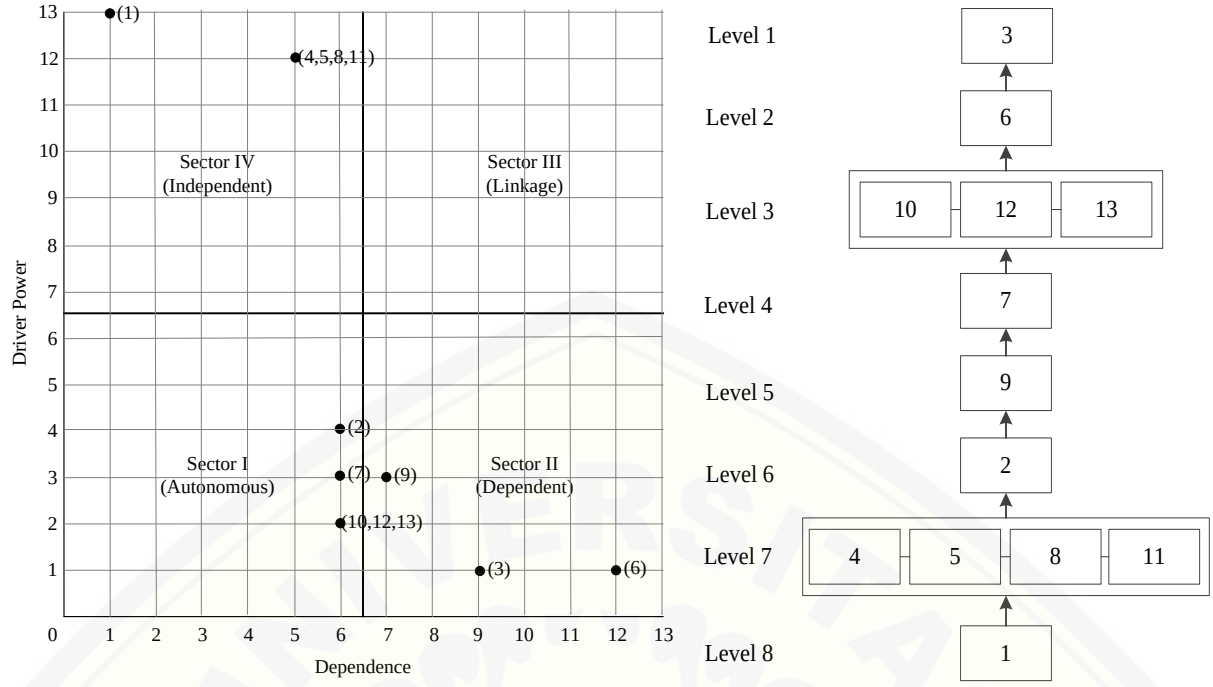
to maintain and improve coffee quality. Quality control is performed by the association of Indonesian coffee farmers which is called Asosiasi Petani Kopi Indonesia (APEKI), the society for the protection of geographical indications which is called Perhimpunan Masyarakat Perlindungan Indikasi Geografis (PMPIG), and the Indonesian coffee and cocoa research center which is called Pusat Penelitian Kopi dan Kakao Indonesia (Puslitkoka). Most of the quality control and testing processes in the field are based on the UPH request or the roasting and powdering unit. This condition causes business actors who have not received quality control to carry out downstream coffee production activities that do not meet the specified standards. Weak product quality control can cause the produced product not up to the standard, which implies that the product may not include a geographic indication (GI) label in the form of the word "Java Ijen-Raung Arabica Coffee" along with its logo.

Institutions Playing a Role in Downstream Agroindustry Development

Institutions (actors) that have an essential role in the development of downstream agroindustry for Java Ijen-Raung Arabica Coffee are (1) BAPPEDA, (2) Community empowerment agency which is called Badan Pemberdayaan Masyarakat (BAPEMAS), (3) Regional owned enterprises which is called Badan Usaha Milik Daerah (BUMD), (4) Dinas Koperasi, Perindustrian dan Perdagangan, (5) Dinas Pertanian (6) PT Perkebunan Nusantara, (7) Banking, (8) Poktan, (9) BUMDes, (10) Research institutes (research centers and universities), (11) Indonesian state-owned enterprises in the forestry sector which is called Perhutani, (12) Cooperatives, and (13) Association of national coffee which is called Sustainable Coffee Platform of Indonesia (SCOPI).

The classification and structure of institutional elements that play a role in the development of downstream coffee agroindustry can be seen in Figure 3. Figure 3 (a) shows that sub-elements (1), (4), (5), (8), and (11) are in sector IV (Independence) are the institutions that have a critical role in the success of agroindustry development. These institutions are local government institutions, namely the BAPPEDA, Dinas Koperasi, Perindustrian dan Perdagangan, Perhutani, and Poktan.

ISM analysis resulted in the structure of institutional elements that play a role in developing downstream coffee agroindustry consisting of 8 (eight) levels. The elements structure of the agroindustry development institution (Figure 3 (b)) shows that sub-element (1) is at the lowest or basic level so



(a) Classification of Institution elements

(b) Hierarchical structure of institutional elements

Figure 3. Classification and Hierarchical Structure of Institutional Elements

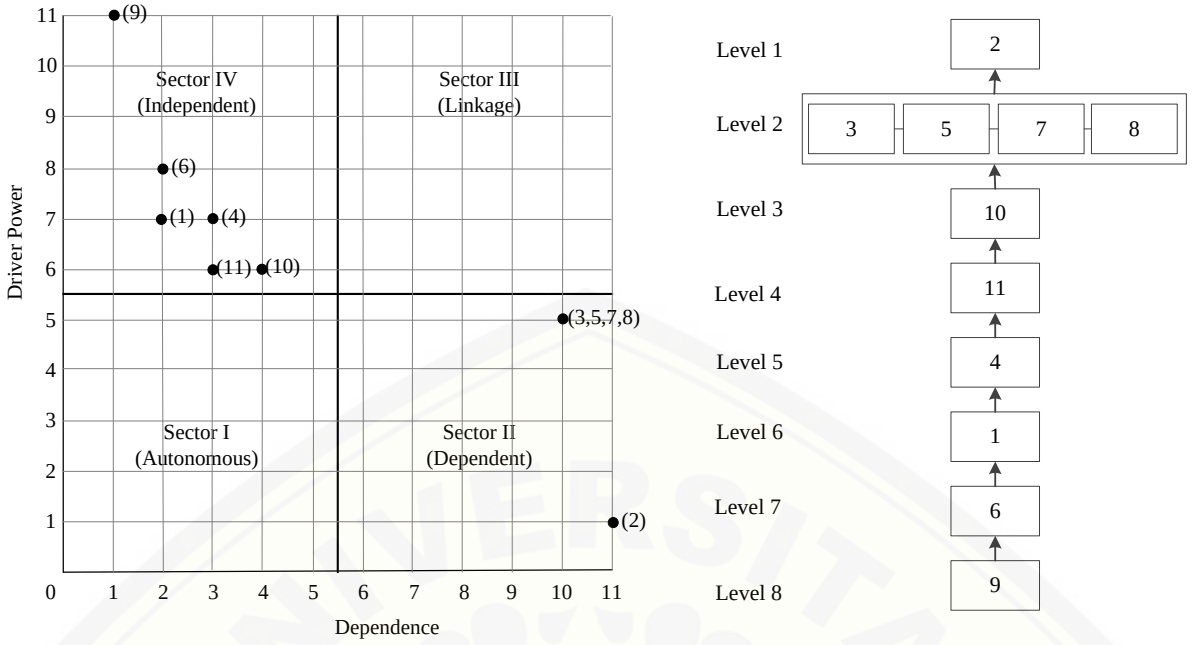
that the institution is the regional government institution that has the most role in the development of downstream Arabica coffee agroindustry. BAPPEDA acts as a development planner in the region, including planning for developing the Ijen-Raung area as a center for downstream coffee agroindustry for Java Ijen-Raung Arabica Coffee. The agency also coordinates the implementation of activities involving stakeholders in developing Java Ijen-Raung Arabica Coffee: Dinas Koperasi, Perindustrian dan Perdagangan, Dinas Pertanian, Perhutani, and Poktan.

Activity Element

The activity element is an element of effort that can be made to develop downstream agroindustry for Java Ijen-Raung Arabica Coffee. Sub-elements of important activities in the development of downstream coffee agroindustry include (1) Development of Arabica coffee-based agropolitan areas, (2) Development of coffee-based tourism village facilities, (3) Development of coffee agroindustry centers, (4) Fulfillment of product certification, (5) Procurement activities every year, such as coffee festivals, coffee picking, and exhibitions, (6) Improving innovation and product quality, (7) Partnerships with third parties, (8) Product introductions with parties outside the region, (9) Improving the quality of human resources humans, (10) Improved product branding, and (11) Coffee regulation.

The sub-elements classification of the downstream coffee agroindustry development activities (Figure 4 (a)) shows that the sub-elements (1), (4), (6), (9), (10), and (11) are in sector IV (Independent), which means that the sub-element is included in the element that functions as a driving force. These sub-elements are essential activities that can be carried out to develop the Java Ijen-Raung Arabica Coffee agroindustry in Bondowoso Regency.

ISM analysis resulted in the structure of activity elements that can be carried out to develop downstream agroindustry for Java-Ijen Raung Arabica Coffee, consisting of eight levels, as shown in Figure 4 (b). The sub-element (9) is at the lowest level or the basic level, so that the sub-element is the main sub-element that must be done. If the activities in sub-element (9) can be carried out, then activities in other sub-elements can also be carried out.



(a) Classification of activity elements

(b) Hierarchical structure of activity elements

Figure 4. Classification and Hierarchical Structure of Activity Elements

The ISM analysis results show the interrelationships between the key elements of objectives, constraints, institutions, and activities. Human resources quality improvement activities can overcome constraints of limited quality control due to lack of quality control. Improving the quality of human resources will impact increasing insight to produce high-quality coffee products. Efforts to increase human resources indirectly require support from local governments, especially BAPPEDA as a local government agency tasked with planning, regulating, and making policies from various development sectors in the region. Local government support in improving the quality of human resources will produce quality, innovative, and creative human resources to produce high-quality products. High-quality products will compete and attract consumer interest, achieving the development goal of increasing broader market area.

CONCLUSIONS

The downstream agroindustry of Java Ijen-Raung Arabica Coffee in Bondowoso Regency has the potential to further be developed. The location that is considered appropriate as the center of the downstream agroindustry development for Java Ijen-Raung Arabica Coffee is Sumberwringin District with the priority for downstream coffee products is ground coffee. The ground coffee has an added value of IDR 19,380/kg. The feasibility analysis results show that the downstream agroindustry of Java Ijen-Raung Arabica Coffee is feasible to be developed with an NPV value of IDR 2,545,769,373. The downstream agroindustry development strategy for Java Ijen-Raung Arabica Coffee is based on structuring key elements results are increasing market area, monitoring product quality, developing human resources for agroindustry players, and continuous coordination with supporting and related institutions, especially from the BAPPEDA Bondowoso. The downstream agroindustry development for Java Ijen-Raung Arabica Coffee can be performed by growing a sustainable coffee-based agroindustry cluster. The agroindustry cluster integrates the concept of sustainable development, which aims to increase the cluster's competitiveness. The development of this cluster is expected to strengthen the Java Ijen-Raung Arabica Coffee brand as a superior product of the Bondowoso Regency, East Java.

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