

The Role of Arabica Coffee in Local Economic Development in Highland of Simalungun District, North Sumatera, Indonesia

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Abstract—Coffee is very important commodity in the global trade. Arabica coffee is superior commodity for farmers in Simalungun highland, North Sumatera, Indonesia. Productivity of arabica coffee in the region is only 50%-65% of the expected productivity. Therefore, there is a 35% to 50% productivity difference between actual and expected productivity. As a superior commodity, arabica coffee development requires adequate policy and program. This research analyzed the role of arabica coffee farm in local economic development. The role is measured with three indicators, that is farmers income, employment, and increased local economic activities. These indicators are analyzed with Share Analysis and Scenario Analysis. Arabica coffee farming has a 1.70% contribution to regional income, 3.34% to agricultural sector income, and 5.61% to income of smallholder plantation. In employment aspect, arabica coffee farming roles about 8.26%, 13.32%, and 25.84%, to district, agricultural sector, and smallholder plantation employment, consecutively. Economic activity as a result of backward linkages of arabica coffee farming will increase by 30% in 2020 and 85% in 2025, such as productive area and input factors. Local government policy is good enough to develop arabica coffee commodity, but relevant technical office program is not optimum even it is less focused. This research recommend local programs to support better arabica coffee development.

Keywords—*arabica coffee; local economy development; local policy; Simalungun-Sumatera*

I. INTRODUCTION

Coffee commodity is the world most widely traded agricultural commodity, produced and exported by sixty developing countries and grown by smallholder farmers [1]. The commodity is the second most important export commodity in the global trade [1] [2] [3] [4]. After Brasil and Vietnam, Indonesia is the third largest coffee producer [5]. As a main estate crop, coffee has contributed to Indonesian economy as foreign exchange, source of farmers income, producer of raw material, job creation and regional development driven [6]. North Sumatera Province (NSP) is the largest producer of arabica coffee. Production in 2015 has reached 49,565 ton or 31% of national production. Highland of Simalungun District is an important area of arabica coffee

producer in NSP with production about 8,500 ton in 2015 or 17% of NSP production [7].

Agricultural commodity production is an important source of farmers income and employment in many developing countries [8]. Agricultural productivity has significant effects on poverty reduction [9], through an increase in household real income and labor absorption in on-farm and off-farm [10]. Indonesia is one of big agricultural producer in the world and have big consequence to global food economic. Unfortunately, to reach sustainable productivity growth has not yet support existing policy and institution [11].

Local economic development (LED) is a process to actuate and maintain business activity and/or job opportunity by local government and community based-organization. Main objective of the LED is stimulating local job in the certain sector to increase people welfare, through human and natural resources allocation [12]. The LED principles are common interest, integrated approach, priority to unmet need, social capital, and community centered development [13]. As in [14], there are many components of LED: mobilization and participation of local actors, proactive attitude of local government, existing of local leadership, public-private partnership, initiating in LED strategy, promotion of micro-small-medium enterprises and human resource training, coordinating of program and instrument, and LED institution.

LED is focused on local potency to create job opportunity and increasing local income [12] [15] [16] [17] [18] [19], increasing local economic capacity [20], sustainable economic growth [21] [22] and creating competitive ability and equity [22]. LED is aimed to use local resources (labor, capital, land, and other resource) effectively [23], sustainable rural development and providing in benefit for poor and marginal people [17], and reducing poverty and unemployment [16]. Based on the above various empirical studies, this research used three indicators to measure the role of arabica coffee in local economic development: income, employment, and increased economic activity. Arabica coffee is a superior commodity in Simalungun highland, but actual productivity is very low, that is 50% to 65% of the expected productivity. There is a 35% to 50%

productivity difference between actual and expected productivity. As in [24], this research uses difference between actual and expected production as one of the performance indicators of agricultural productivity.

Arabica coffee is a prospective commodity in LED strategy. LED strategy implementation in this commodity will be able to enhance local economy indicators, such as farmers income, local job, and rising local economic activity. As a superior commodity, arabica coffee development requires adequate policy and technical program. This research analyzes coffee development policy and technical program in Simalungun District. Local policy are analyzed from Regional Middle-term Development Planning (RMDP) document; meanwhile technical program aspect are analyzed from the program implementation by several technical local offices, mainly Dinas Perkebunan. Based on the above description, this study is aimed to analyze the role of arabica coffee in LED and to review RMDP and technical program to support arabica coffee development in Simalungun highland.

II. METHODOLOGY

This research was carried out at Simalungun highland, North Sumatera, Indonesia. Secondary data is obtained from several local government office publication (Simalungun in Figures, Gross Regional Domestic Product), Directorate General of Estate Crop) and previous relevant research result.

The role of arabica coffee in regional income and local job opportunity is examined descriptively with *Share*

Analysis. The increased local economic activity is analyzed with *Scenario Analysis* [25] [26] [27] [28]. This research offer scenario which uses existing growth rate to determine condition to be achieved in 2020 and 2025. The research also reviewed existing local policy and technical program to obtained and propose better arabica coffee program. The RMDP and the technical program relates to arabica coffee development was reviewed from relevant technical local offices.

III. RESULTS AND DISCUSSION

A. Farmers Income and Employment

Arabica coffee contributes 1.70% to regional income. The role of this commodity in Agricultural Sector is reaching about 3.34% and 5.61% in smallholder plantation. Based on the indicator of labor absorption, arabica coffee farming contributes about 8.26% to total employment of Simalungun District, 13.32% to total employment of Agricultural Sector, and 25.84% to employment of the smallholder plantation (Table 1). In addition, by using World Bank poverty level (US\$1.25 per capita per day), arabica coffee farm in Simalungun highland enable to give income as US\$1.59/day per capita (17,005 farmer households or 68,020 capita). So that coffee enable to reduce poverty level in rural area in Simalungun highland. As a comparison, as in [29], average net coffee sales contributes about US\$0.38/day per capita in northern Nicaragua.

TABLE 1. THE ROLE OF ARABICA COFFEE IN LED OF SIMALUNGUN HIGHLAND

Regional Income and Share (2016)	Unit	Quantity
1. Regional income	(IDR billion)	30,191,078
2. Agriculture Sector income	(IDR billion)	15,393,444
3. Estate Crop income	(IDR billion)	9,170,000
4. The role of arabica coffee:		
a. Average income	(IDR billion/ha/yr)	57
b. Productive acreage	(ha)	6,747
c. Total farming revenue ($a \times b$)	(IDR billion/yr)	382,687
d. Total labor	(mandays/ha/yr)	279
e. Total labor's wage	(IDR billion/yr)	131,769
f. Total revenue ($c + d$)	(IDR billion/yr)	514,456
5. Share in Simalungun GDRP ($e : 1$)	%	1.70
6. Share in GDRP of Agriculture Sector ($e : 2$)	%	3.34
7. Share in GDRP of Estate Crop ($e : 3$)	%	5.61
Employment and Share (2016):		
8. Total labor of District	(mandays)	413,154
9. Total labor of Agriculture Sector	(mandays)	256,155
10. Total labor of Estate Crop	(mandays)	132,000
11. Total labor of coffee farming	(mandays)	34,110
The role of arabica coffee farming:		
12. Share in District labor (11 : 8)	(%)	8.26
13. Share in Agriculture labor (11 : 9)	(%)	13.32
14. Share in Estate Crop labor (11 : 10)	(%)	25.84

Arabica coffee farming has been giving a positive role to solve seasonal and disguised unemployment problem in rural region. These unemployment often occurs in horticulture and food crop farming in Simalungun highland. As in [30], labor need in agricultural sector is very fluctuating (Fig. 1, top). The phase $0-t_1$ and t_2-t_3 is condition of excessive labor supply (S_L) while phase t_1-t_2 is labor demand (D_L) greater than labor supply. The most possible strategy to solve the problem is farming diversification so that labor demand will be relative constant.

The pattern of monthly labor absorption on arabica coffee farming is relative constant compared with labor absorption in the annual crops. This is mainly due to the frequency of arabica coffee harvest is two times a month; there are even farmers who harvest every week. The pattern of labor absorption in arabica coffee farming (D_{LC}) in Simalungun highland is relative constant throughout the year (Fig.1, bottom).

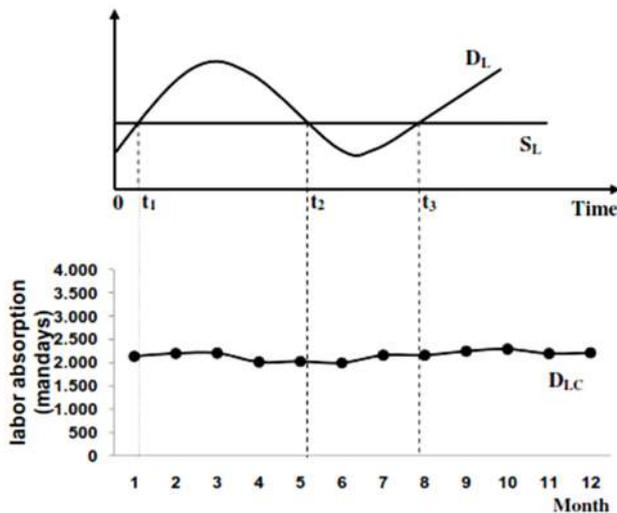


Fig. 1. Comparison of seasonal unemployment curve in annual crops (top) and labor absorption in arabica coffee farming in 2016 (bottom)

B. Increased Economic Activity

Increased economic activity is analyzed from aspect of backward linkages of the arabica coffee agribusiness development. The increased economic activity is measured from input requirement in 2020 and 2025. The input requirement is calculated by using two criteria, i.e. the area of arabica coffee farming in 2016, and input recommendation based on Table 2.

The new arabica coffee farm area needs shade trees. The recommendation of the shade tree is 70 trees/ha for non-pruning shade tree (such as *Erythrina lithosfera*, *Tona sinensis*, *Parkia spiciosa*, *Pithecollobium jiringa*, *Paraserianthes falcataria*, *Durio zibethinus*, *Parsea gratissima*, *Maesopsis eminii*, or others multi-purpose tree species) or 400 trees/ha [32] for pruning shade tree (*Leucaena glauca* or *Glirisdia sepium*). Coffee berry borer (CBB) is controlled by combination of fungi *Beauveria bassiana* (Bb) and trap. Bb and trap

requirement is based on Bb application for 5% and trap application for 2.5% of total arabica coffee farming area.

TABLE 2. RECOMMENDATION OF INPUT REQUIREMENT AND OTHER ARABICA COFFEE FARMING SUPPORTS

Input and Support Requirement	Recommendation
Organic fertilizer ^a	1 x 5 kg/tr/yr
Single fertilizer: ^a	
Urea	2 x 100 g/tr/yr
Phonska	2 x 100 g/tr/yr
KCl	2 x 100 g/tr/yr
Compound fertilizer ^a	2 x 200 g/tr/yr
Dolomite ^a	1 x 0,5 kg/tr/3 yrs
Certified coffee seedlings ^b	2.000 tr/ha
Shade tree (not pruning) ^c	>70 tr/ha
Shade tree (pruning) ^c	400 tr/ha
<i>Beauveria bassiana</i> ^c	3 x 2,5 kg/ha
CBB trap ^b	24 unit/ha

^a [31], ^b [32], ^c [33]

Based on 2016 condition and input recommendation in Table 2, we calculate input requirement for arabica coffee farming as approach to show potential economic activity in Simalungun highland as backward linkages (Table 3). For instance, the region will need about 70,752 ton organic fertilizer in 2020 and 99,233 ton in 2025. Meanwhile, for 5% application to control CBB will need about 5,306 unit and 7,442 unit CBB trap in the same year. Economic activity as a result backward linkages of arabica coffee commodity will be increase in 2020 and 2025, such as productive coffee area and input factors. On average, these activities will increase by 30% in 2020 and 85% in 2025.

TABLE 3. THE INCREASED OF ECONOMIC ACTIVITY IN 2020 AND 2025

Input Requirement	2016	2020	2025
Coffee land cultivation (ha)	6,747	8,844	12,404
Organic fertilizer (ton) ^a	53,976	70,752	99,233
Single fertilizer (ton): ^a			
Urea	2,159	2,830	3,969
Phonska	2,159	2,830	3,969
KCl	2,159	2,830	3,969
Compound fertilizer (ton) ^a	4,318	5,660	7,939
Dolomite (ton) ^a	5,398	7,075	9,923
<i>Beauveria bassiana</i> (kg) ^b	2,530	3,316	4,652
CBB trap (unit) ^c	4,048	5,306	7,442
Seedling of shade tree, not pruning (000) ^a	472	619	868
Seedling of shade tree, pruning (000) ^a	2,699	3,538	4,962
Seedling of certified coffee (000) ^a	10,795	14,150	19,847

IV. CONCLUSION

Arabica coffee farming has a high prospect to achieve LED goals, i.e. increased regional income, employment, and local economic activities. It contributes about 1.70% in regional income and 8.26% in regional employment. The labor absorption in arabica coffee farming is more stable throughout the year and then arabica coffee farming becomes a solution to solve seasonal unemployment problem in horticulture and food crops farming in the coffee producer area. The arabica coffee farming has increased economic activity, mainly related to backward linkages aspect in arabica coffee agribusiness. Economic activity as a result of backward linkages of arabica coffee commodity will be increase by 30% in 2020 and 85% in 2025, such as productive coffee area and input factors requirement.

Local government policy in Regional Middle-term Development Policy of Simalungun District within Year 2011-2015 relating to arabica coffee development, is good enough. However, relevant technical office program is not enough even less focused. Therefore, this research recommend many technical programs to support LED strategy based on agribusiness of arabica coffee. The programs are: model farm, integrated training on good agricultural practices, training on farm business and management, training on coffee certification, input factors access, seed and seedling quality, farm credit access, coffee intensification and extensification, pulper standardization, local processing and market center, local R&D, market partnership, and improving regional infrastrucur.

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