PENGARUH LAHAN, SUMBER DAYA MANUSIA DAN TEKNIK BUDIDAYA TERHADAP PENINGKATAN PRODUKSI KOPI RAKYAT DI KABUPATEN JEMBER

(The Effect of Field, Human Resources and Cultivation Technique on The Enhancement of Coffee Production in Jember)

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ABSTRACT

The potential for the cultivation of coffee plant in Eastern Javasupported agood geographical, but productivity is still low. Opportunities need to be harnessed by improving farming techniques until handling both production and quality to get the competitive advantage to the national market and international especially Robusta coffee. The purposes of this study were to (1) analyze the effect of field on the enhancement of coffee production in Jember. (2) analyze the effect of human resource on the enhancement of coffee production in Jember. (3) analyze the effect of cultivation technique on the enhancement of coffee production in Jember. The populations of this study were coffee farmers in Jember. The numbers of the population were 3.280 of farmers. This study used samples from 160 people. Used data analysis in this study was called by SEM (Structural Equation Modelling). Based on the result of the analysis, it could be concluded that field and human resources was not significantly influencing the enhancement of coffee production. The positive significant enhancement on coffee production was caused by cultivation technique. Evarage productivity about 750-1300 kg green coffee/ha/year. This research had the managerial implications for policymakers through three approaches: Prioritizing cultivation technique especially on shade management dominant indicator because the people cultivated the field owned by Indonesia Forest Company. Improving human resources through training and suprvising on coffee cultivation technique. Ruling out the use of filed that is physically less in accordance with the terms grew of coffee.

Keywords: filed, production, cultivation technique, human resources, green coffee, SEM

ABSTRAK

Potensi budidaya tanaman kopi di Jawa timur didukung kondisi geografis yang baik, tetapi produktivitas masih rendah. Peluang yang ada perlu untuk dimanfaatkan dengan melakukan perbaikan teknik budidaya sampai penanganan pascapanen secara baik untuk mendapatkan produksi dan mutu yang mempunyai daya saing terhadap pasar nasional maupun internasional khususnya kopi Robusta. Penelitian ini bertujuan (1) menganalisis pengaruh lahan terhadap peningkatan produksi kopi rakyat di Kabupaten Jember; (2) menganalisis pengaruh sumberdaya manusia terhadap peningkatan kopi rakyat di Kabupaten Jember; dan (3) menganalisis pengaruh Teknis budidaya terhadap peningkatan produksi kopi rakyat di Kabupaten Jember. Populasi dalam penelitian ini adalah petani kopi rakyat di Kabupaten Jember. Jumlah populasi

sebanyak 3.280 Petani kopi rakyat. Penelitian ini menggunakan ukuran sampel dari 160 orang. Metode analisis data yang digunakan SEM *(Structural Equation Modelling).* Berdasarkan hasil analisis data maka dapat disimpulkan bahwa lahan dan sumber daya manusia tidak berpengaruh signifikan, sedangkan teknis budidaya berpengaruh positif signifikan terhadap peningkatan produksi kopi rakyat di Kabupaten Jember. Produktivitas rata-rata sekitar 750-1300 kg/ha/thn. Penelitian memiliki implikasi manajerial bagi pengambil kebijakan melalui pendekatan: Memprioritaskan teknis budidaya terutama pada indikator dominan pengaturan naungan karena masyarakat petani kopi rakyat mengelola lahan hutan lindung milik Perhutani; Peningkatan sumber daya manusia melalui pelatihan dan bimbingan teknis budidaya terutama pada teknik pengolahan kopi; Mengesampingkan penggunaan lahan yang secara fisik kurang sesuai dengan syarat tumbuh kopi.

Kata kunci : lahan, produksi, teknis budidaya, sumber daya manusia, biji kopi, SEM

INTRODUCTION

The development of Indonesian coffee exports in the form of green beans during the last 5 years has fluctuated, the volume in 2009 was 510,187 tons, in 2010 amounted to 423,780 tons, in 2011 amounted to 346,091 tons, in 2012 amounted to 447,064 tons, in 2013 amounted to 532,157 tons. While the area of 2009 amounted to 1,266,237 ha, in 2010 amounted to 1,210,364 ha, in 2011 amounted to 1,292,965 ha, in 2012 amounted to 1,305,895 ha, in 2013 amounted to 1,331,000 ha, and in 2014 amounted to 1,354,000 ha (AEKI, 2015).

The potential of coffee cultivation in East Java is supported by good geographical conditions, but productivity is still low. Coffee producing areas in East Java are divided into six regions, namely Ijen-Raung-Argopuro (Jember Regency, Bondowoso, Situbondo, Banyuwangi), Bromo-Tengger-Semeru (Lumajang Regency, Malang, Probolinggo), Wilis (Madiun Regency, Kediri, Trenggalek) , Lawu (Magetan Regency, Ngawi), Pantura Region (Situbondo and Probolinggo Districts) Wibowo in Tempo (2012).

The community coffee plantations in Jember district are spread in several sub-districts with a total area of 5,596.24 hectares. Subdistricts in Jember whose coffee area is above hundreds of hectares include: Silo Subdistrict covering 2,291.70 hectares, Sumber Baru Sub-District covering 293.00 hectares, Panti District covering 389, 09 hectares, Sukorambi District 107.82 hectares, Ledokombo District covering 5336.19 hectare, Sumberjambe Subdistrict covering 586.02 hectares, and Jelbuk District 616.14 hectares (Dishutbun Jember Regency 2015). The results of the Herminingsih (2012) study state that in the case study in Sidomulyo Village, Silo District, Jember Regency, it was concluded that the production unit, namely coffee cultivation techniques, had a significant influence on increasing community coffee. Kuswarsidi's (2010) research, entitled Analysis of People's Coffee Production and Development in Jember Regency, concluded that: (1) the techniques of community coffee farming in Jember district based on farmers' responses to Jember Forestry and Plantation Service's recommendations tended to be lacking in implementing recommendations. (2) Variable number of plants, number of labor, inorganic fertilizers, and age of plants affect the production of community coffee in Jember Regency, while land area and organic fertilizer have no significant effect on coffee production in Jember Regency. (3) The prospect of the development and coffee market of community coffee plantations in Jember is still quite large along with the increase in demand for coffee products.

Riswandi (2013) states that in a study entitled Robusta Coffee Production Efficiency Analysis in Temanggung Regency it can be concluded that the factors that influence coffee production include land area, number of plants, appropriate use of fertilizers, age of plants

where the older the plant decreases. Quality human resources also influence the increase in production and application of agricultural intensification in cultivation techniques.

Based on the potential coffee development area in Jember Regency, and in line with the development in the Argopuro mountain range area which is focused on developing Robusta coffee, the area needs to be prepared for the development of community coffee. Production developments need to be supported by improvements in cultivation techniques and quality. Argopuro mountainous communities have cultivated coffee plants for a long time and are hereditary, but not accompanied by improvements in technology from land preparation, cultivation techniques and good processing to produce good quality products.

Increasing production and quality will have an impact on increasing the competitiveness of Robusta coffee as a superior commodity, so it is deemed necessary to develop the potential of existing resources by synchronizing existing local requirements. This study reveals the resource potential and characteristics of farmers on the slopes of Argopuro so that it is necessary to know the influence of land, human resources and cultivation techniques on increasing Robusta coffee production, as well as problems that arise.

METHOD

This study uses survey methods The method used in the study is descriptive, analytical, and comparative methods. Discretionary method is a method that gives a description of phenomena systematically, factually and actually regarding facts, traits and phenomena that are to be observed. Analytical methods are analytical methods aimed at testing hypotheses and making deeper interpretations of the relationships to be solved (Elida et al 2012). The emphasized aspect is to know the condition of the land, human resources, and cultivation techniques in people's coffee agribusiness, the development of the analysis carried out is in-depth analysis, which is explained descriptively about the factors of production and the problem.

The method of data analysis using Structural Equation Modeling (SEM) allows to test the validity and reliability of research instruments, confirming the accuracy of the model while testing the effect of a variable on other variables. SEM can test together (Haryono and Wardoyo, 2013). Research includes quantitatively explaining the influence between variables through testing hypotheses and at the same time making explanations of several variables, including explanatory research (Explanatory Research) and confirmatory research (Confirmatory Research).

Data will be processed and presented based on the principles of descriptive statistics, while for the sake of analysis and testing hypotheses used the inferential statistical approach. The analysis used to test the hypothesis in this study is the Structural Equation Modeling or (SEM) equation model using the version 18 AMOS (Analysis of Moment Structure) package. Structural equation models (SEM) are the analytical methods used in this study.

The method of data collection conducted in the study was a survey method with a questionnaire. Questionnaire is a technique of data collection conducted by giving a set of questions or written statements to the respondent to answer. Questionnaires were given directly to respondents. Data collection was carried out using a closed questionnaire to obtain data on indicators of variables developed in the study (Sucipto 2015).

Sampling technique is the process of selecting portions of the population to represent the population. The study used Random Sampling, which is a homogeneous sampling technique (Kuncoro 2004). The method of data collection by random sampling is a sampling method that is done intentionally which the researcher feels is known, has extensive information related to research and other information that can enrich the information obtained so that more information can be used to draw conclusions. (Sugiyono, 2004). Furthermore, the determination

of target respondents was based on initial information from key informants, namely Chief of Lembaga Masyarakat Desa Hutan (LMDH) and field conditions. The primary data was obtained from interviews with 160 farmers representing 4 LMDH which were then validated by the LMDH chairman. While secondary data was obtained from relevant agencies related to coffee agribusiness such as the Plantation and Forestry Service, Jember Regency Central Bureau of Statistics, tracking books, journals, articles, and internet studies.

The sampling location was done by random sampling, the basis for consideration of location was that coffee plants became the main commodity cultivated by farmers. Furthermore, the samples were determined in Kemiri Village, Panti District and Karangpring Village, Sukorambi District, each represented by 2 LMDH. The location is in the mountains of Argopuro which is included in the Jember Regency. The study was conducted in 2018.

RESULTS AND DISCUSSION

Results of SEM (Structural Equation Modeling)

The model is said to be good when the development of a hypothetical model is theoretically supported by empirical data. The complete SEM (Structural Equation Modeling) analysis results can be shown in figure 1.

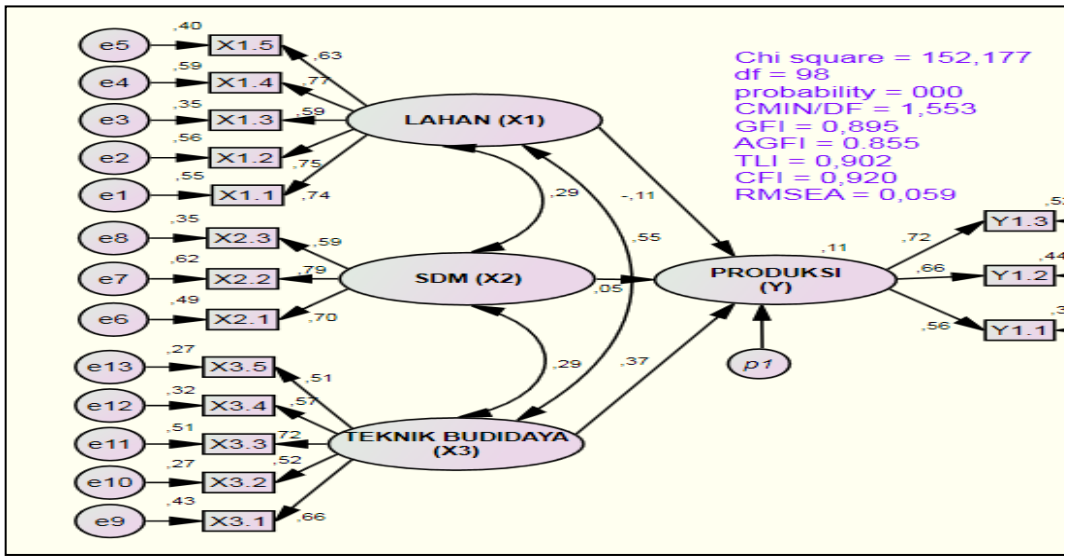

Figure 1. Result of the SEM *(Structural Equation Modeling)*

Production of Coffee

The average productivity of coffee production cultivated by farmers on the slopes of Argopuro Mountain is 750-1300 kg / ha / year. According to the 2017 Central Bureau of Statistics data, the productivity of Robusta coffee according to the subdistrict for Sukorambi District was 8.96 kg / ha / year, while for the Panti Subdistrict it was 5.77 kg / ha / year. While coffee productivity in Jember Regency averages 7.61 kg / ha / year.

Coffee processing carried out by smallholders in Jember has 2 systems, namely dry systems and wet systems. Soejono (2012) that the processing system benefits farmers. The application of the community coffee farmer processing system consists of 2 systems, namely dry processing and semi-wet (semi wet). Rahayu and Sulistyaningsih (2012) that the post-harvest processing system in Jember Regency has 2 systems, namely dry processing and wet processing.

The drying process carried out by farmers by drying the coffee fruit is heated directly in the sun. Sometimes the sun does not appear or shine for a moment so that the impact on drying time is longer, it will also result in a decrease in the quality of coffee. This drying is done until the water content is approximately 13%. Widyotomo and Sri Mulato (2000) argue that drying is one of the stages in processing which is a contributing factor in the decline in the quality of coffee beans. After that the skin is peeled with a huller until polishing is done to make the coffee color brighter to increase the selling price / price of coffee. Soetriono (2015) states that coffee beans are sorted to meet the specified quality standards, sorting should be started from farmers. The consequences of traders / exporters resorting to (re-sorting) the original coffee.

While processing with wet systems is mostly done by farmers who deposit / sell coffee yields to groups. Yields of coffee beans sold to groups must meet a minimum standard of 75% must be red. Glondong harvested in red and red yellow will be processed with a wet system and the remaining green will be processed with a dry system. Processing of wet systems requires more procedures and costs so that it is difficult to be carried out by individual farmers, so many LMDH farmers sell to groups to produce good quality. The results of the processing with a wet system are directly accommodated by the company / coffee exporter so that it must meet the standards set. The income received by farmers is higher than the processing of dry systems. This is in the opinion of Soejono (2012) stating that wet-based systems provide relatively higher benefits than dry processing. Rahardjo (2013) stated that wet coffee processing on average produces better coffee quality than dry coffee processing. Whereas Widyotomo (2014) states that wet processing is carried out with the aim of accelerating the processing of coffee.

Based on the analysis of the physical quality of robusta coffee, coffee produced by farmers is based on analysis in accordance with the provisions of the Indonesian National Standard (SNI 01-2907-2008) where there are maximum limits on the value of the defect in each class. Based on the results of analysis of coffee defect systems produced by smallholders including quality class 3 with a maximum defect value between 26-44. The postharvest process is very influential on the quality produced by one of them is a processing system where the wet processing system contributes greatly to the quality / quality of the coffee produced. In general, the physical quality / quality of coffee produced by community coffee farmers in Jember Regency is better than the physical quality of Robusta coffee produced by farmers on the slopes of Mount Tambora which is classified as quality class 4 - 6 (Aklimawati et al 2014).

Land Influence Against Increased Production of Coffee

Based on the results of testing the model analyzed in the study using Structural Equation Modeling (SEM), it shows that the land has no direct effect (Directs Effects) on people's coffee production. It is evident from a number of respondents stating that of the five land indicators that get the highest scores are the physical properties of the land.

The test results show that the path coefficient between the land and coffee production is -0.112, the probability value is 0.407 and the CR value is -0.829. Whereas that can be accepted at a significant level of 0.05 is the Probability value ($P < 0.05$) with the value of Critical Ratio ($CR > 2.00$).

This is because the condition of the land in the farmer's land area is a mountainous area that has land height, soil physical characteristics / soil texture and the same length of dry month. When viewed from the results of the technical suitability class of robusta coffee land, the average entry in the S2 class is that the land that is rather suitable has optimal carrying capacity with several limiting factors (Table 2). These limiting factors will hinder the implementation of crop cultivation, lower productivity and require higher input.

Table 2. Technical Criteria for Robusta Coffee Land Suitability

No	Characteristics Quality of Land	Sustainable of Land Class			
		S1	**S2**	**S3**	**N**
1.	Iklim -Lama bulan kering (<60 mm/bln)	2-3	3-4 1-2	4-5 0-1	>6
2.	Elevansi (m dpl)	300-500	500-600 Atau 100-300	600-700 Atau 0-100	>700
3.	Lereng (%)	0-25	25-40	-	>40
4.	Sifat fisik: -Tekstur tanah	Geluh pasiran,geluh lempung pasiran, geluh debuan,geluh lempung debuan	Pasir geluh lempung, pasiran, lempung debuan	Lempung	Pasir lempung masif (lempung berat).
5.	Sifat kimia tanah (0-30 cm) -pH	5,5-6,0	6,1-7,0 5,0-5,4	7,1-8,0 4,0-4,9	>8 <4
	-C organik (%)	2-5 Sedang	1-2;5-10	0,5-1;10-15	<0,5;>15
	-N	Sangat tinggi Sedang	Rendah	Sangat rendah	-
	-P	Sangat tinggi Sedang	Rendah	Sangat rendah	-
	-K	Sangat tinggi	Rendah	Sangat rendah	-

Source : PTP XII, 2018

Factors that cause land do not affect production include: Improper production processes in accordance with the recommendations include the provision of excessive fertilizer which results in the physical properties / testur of the soil becomes harder, not prepared a good terrace siring so that nutrients in the soil become eroded carried by water / erosion, the nutrient content in the land managed by the average farmer is low.

This is supported by the results of laboratory soil testing where the average nutrient content in the soil is low (see table 3). Criteria for the robusta coffee plantations of the people included in the S2 class can be used for Robusta coffee cultivation with certain additions and treatments. Murad, 2014 stated that land suitability for coffee plants with S2 classes is feasible to develop coffee cultivation to prevent land degradation and improve land.

Ways that can be done to improve the physical properties of the soil include adding nutrients by adding organic matter. Organic fertilizers can be made by making compost from leaf litter or twigs from pruning products, or by using waste products from coffee processing, both dry

processing systems and wet processing systems that have been processed / fermented into compost. Provision of fertilizer in a balanced manner is the provision of fertilizers tailored to the needs of plants. As well as planned land clearing with good preparation of siring terraces, shelter preparation and spacing arrangements, and making rorak.

Table 3: Results of 2015 Land Analysis

No	Parameter	Unit	Analysis Result	
			Sampel 1	Sampel 2
1	N-total	%	0,21	0,24
2	P - tersedia	Ppm	10,2	11,27
3	K - tersedia	Ppm	60,89	65,71
4	C - Organik	%	1,82	1,87
5	Tekstur	-	Geluh Lempung Pasiran	Geluh pasiran

Source : *Soil Laboratorium Polije (2018)*
Information : Sampel 1 = Sukorambi
Sampel 2 = Panti

Effect of Human Resources on Increasing Production of Coffee

Based on the results of testing the models analyzed in the study using Structural Equation Modeling (SEM), it shows that human resources have no direct effect (Directs Effects) on people's coffee production. It is evident from a number of respondents stating that of the three indicators of human resources that get the highest score is the experience of farmers.

The test results show that the path coefficient between human resources to production is 0.050, the probability value is 0.669 and the CR value is 0.427. Whereas that can be accepted at the 0.05 significance level is the Probability value (P <0.05) and the Critical Ratio value (CR> 2.00).

Factors that cause human resources do not affect the increase in people's coffee production, among others: the experience of farmers in coffee cultivation has not provided a good contribution to the increase in people's coffee production because farmers' experience is not supported by knowledge for improvement or technological innovation due to the level of education low. The experience of plant cultivation carried out is still hereditary and based on the knowledge gained from being a plantation worker so that the application of innovative cultivation techniques as recommended is still low. This is in accordance with Hartadi's opinion. et al, 2012 which stated that the weakness factor of farmers was that the level of education and knowledge of farmers was mostly relatively low. Lonni (2012) states that training education is one of the factors that determine the quality of human resources, the more highly educated workforce, the better the quality of human resources.

The average coffee farmer has a relatively low education level of around 60% not graduating or only graduating from elementary school (table 3), this causes the absorption of technological innovations or recommendations for cultivation techniques that are difficult to accept or apply. Training education is provided by related institutions such as the Forestry and

Plantation Service (districts and provinces) as well as from other related institutions. The training education that was obtained was not fully accepted by the community coffee farmers because the training education provided was not in accordance with the needs or desires of the farmers so farmers could not directly implement the results of the training in increasing people's coffee production. As an example of the explanation respondents received training for making ground coffee with the aim of increasing / increasing farmers' income. But what is needed by farmers is how to increase coffee production by improving cultivation according to recommendations in the field and correct post-harvest handling from harvesting the results to a good processing system so that good quality coffee quality will be produced. Indra (2011) who stated that the factor of production of human labor in coffee plants in the Level II District of Central Aceh was not efficient.

Table 3 Respondents Based on Education Levels of Farmers

Level of Education	**Amount**	
	Frekuensi	**Persentage**
<SD	64	40,00
SD	42	26,25
SMP	27	16,87
SMA	23	14,38
Diploma	4	2,50
Total	160	100,00

Suardiman (2001) in Tobing (2009) states that education will provide a person's ability to think rationally and objectively in facing problems. Education is also an element of modernization that leads to the creation of a rational way of thinking and lifestyle that encourages the application of modern technology. The results of the Sondang study (2009) state that farming experience occurs because of the influence of time experienced by farmers. Farmers who are experienced in dealing with agricultural barriers will know how to overcome them, farmers who are not yet experienced or have difficulty in solving obstacles. The more experience gained by farmers, the higher farmer productivity, so that farming will be better and vice versa if the farmer is less experienced will get unsatisfactory results. The farming experience is inseparable from the experiences he has experienced. If farmers have a relatively successful experience in trying their farms, they usually have better knowledge, attitudes and skills than those who are less experienced. However, if the farmer always experiences failure in trying certain farms, it can cause a reluctant race to cultivate the farm.

Effect of Cultivation Technique on Increasing the Production of Farmers Coffee

Based on the results of testing the models analyzed in the study using Structural Equation Modeling (SEM), it shows that cultivation techniques directly influence (Directs Effects) on people's coffee production. It is evident from a number of respondents stating that of the five cultivation techniques indicators that get the highest score are shade settings.

The test results show that the path coefficient between cultivation techniques and production is 0.371, the probability value is 0.021 and the CR value is 2.304. Whereas that can be accepted at a significant level of 0.05 Probability (P <0.05) and the value of Critical Ratio (CR> 2.00).

The factors that cause cultivation techniques to influence coffee production are influenced by coffee cultivation activities carried out by farmers, some of which have met the rules of good coffee cultivation or Good Agriculture Practice (GAP). Herminingsih (2012) which states that

production namely coffee cultivation techniques have a significant influence on increasing people's coffee production.

The cultivation activities carried out include trimming coffee plants which are carried out at least 3 times which include off-harvest pruning (PLP), mild pruning / wwilan. Pruning off the harvest is done after the harvesting activity is completed, namely by cutting the branches / branches that are dry, the branches affected by pests & diseases and branches that are no longer productive. Whereas the next pruning is a mild pruning, which is to remove the water buds and unwanted branches, for example, reverse branches. Cutting water shoots is intended to maximize the use of nutrients for the growth of branches which will produce flowers and fruit so that production can be maximized.

Fertilization carried out by farmers at least once in one season, fertilizer that is often used is phonska fertilizer which is considered by farmers to have fulfilled the three elements needed by plants. But there are farmers who only provide one or two elements that are also adapted to the needs / phases of plant growth. The understanding of farmers that fertilization is one of the important parameters to obtain optimal results in coffee production. Rahayu and Sulistyaningsih (2012) state that increasing the competitiveness of people's coffee in Jember district can be done by applying balanced fertilization.

Trimming the shade is mostly done by farmers once in a season, or more than that by looking at the shade canopy conditions. A good shade arrangement will provide sufficient incoming light for photosynthesis and maintain plant moisture so as to reduce the incidence of plant pests and diseases. Pest and disease control is usually carried out in the event of a large attack. Pests that attack a lot are fruit powder and the disease is leaf rust. The type of pesticide given is adjusted to the level of attack, but usually farmers control attacks by doing crop canopy trimming and shade management appropriately and regularly. Abdoellah (2014: 45) states that coffee cultivation systems using shade trees greatly help stabilize the soil and reduce erosion due to the role of the tree root system, and leaf avalanches that cover the soil surface, and increase water stable aggregates, namely soil structures that suppress erosion.

Weed control carried out by farmers is usually 3 times in one season, namely 2 times done mechanically by cutting / brushing and once done by chemical means. But if there is less / no labor, then weed control is chemically the last alternative. Weed control is intended to improve garden sanitation, reduce the incidence of hosts of pests and diseases and to reduce competition for nutrient absorption by coffee plants. Abdoellah (2014: 48) states that coffee agroecosystem without weed litter is the main contributor to P, which is 89%, while weed-based agroecosystems contribute P to 46-60%, the difference from returns from litter is positive, even though weeds are strong competitors wise control is needed.

CONCLUSIONS AND RECOMMENDATIONS

Conclusins

1. The land does not affect the increase in coffee production due to the decrease in physical / soil texture, the absence of terrace siring, the low average nutrient content. The land suitability criteria for Robusta coffee cultivation is in the S2 class.
2. Human resources have no effect on increasing coffee production due to the low level of farmer education, training education that does not support the experience of farmers in

aquaculture, so input of technological innovation and renewal is difficult for farmers to accept and implement.

3. Cultivation techniques have an effect on increasing coffee production, this needs to be maintained and made it possible to develop it better so that good cultivation practices (GAP) will be realized.
4. The physical quality of the original robusta coffee beans produced by community coffee farmers is classified as a quality class 3. The number of physical defects is between 26-44.

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