N_FACTOR_IN_REGENCY_OF_KAMPAR_RIAU_PROVINCE_COSEET_Heriyanto.pdf

by

PROCEEDNG
ICoSET
2017

International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH)
08 - 10 November 2017
Pekanbaru, Indonesia

ICoSET 2017 Partner and Support

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ISBN: 978-979-3793-73-3

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FOREWORD FROM CHAIR OF ICOSET & ICOSEEH UNIVERSITAS ISLAM RIAU

In the name of Allah, Most Gracious, Most Merciful

Assalamualaikum Wr. Wb,

Welcome to the International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH).

ICoSET & ICoSEEH 2017 has a theme "Sustainability Development in Developing Country". This forum provides researchers, academicians, professionals, and disciplinary working or interested in the field of Science Electrical Technology and Social Education Economy and Humaniora to show their works and findings to the world.

I would like to express my hearty gratitude to all participants for coming, sharing and presenting your experiences in this vast conference. There are more than 150 papers submitted to ICoSET & ICoSEEH UIR 2017. However only high quality selected papers are accepted to be presented in this event, so we are also thankful to all the international reviewers and steering committee for their valuable work. I would like to give a compliment to all partners in publications and sponsor ships for their valuable supports.

Organizing such a prestigious conference was incredibly challenge and would have been impossible without our outstanding committee, So, I would like to extend my sincere appreciation to all committees and volunteers from Chiba University, Saga University, Universiti Teknologi Mara, Universiti Utara Malaysia, Dayen University, Kyungdong University for providing me with much needed support, advice, and assistance on all aspects of the conference. We do hope that this event will encourage the collaboration among us now and in the future.

We wish you all find opportunity to get rewarding technical programs, intellectual inspiration, renew friendships and forge innovation and that everyone enjoys some of what in Pekanbaru-Riau special.

Pekanbaru, 8th November 2017

Dr. Evizal Abdul Kadir, M.Eng

Chair of ICoSET & ICoSEEH 2017

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FOREWORD FROM RECTOR UNIVERSITAS ISLAM RIAU

It is our great pleasure to join and to welcome all participants of the International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH) 2017 in Pekanbaru. I am happy to see this great work as part of collaborations among Chiba University, Saga University, Universiti Teknologi Mara, Universiti Utara Malaysia, Dayen University, Kyungdong University. In this occasion, I would like to congratulate all participants for their scientific involvement and willingness to share their findings and experiences in this conference.

I believe that this conference can play an important role to encourage and embrace cooperative, collaborative, and interdisciplinary research among the engineers and scientists. I do expect that this kind of similar event will be held in the future as part of activities in education research and social responsibilities of universities, research institutions and industries internationally.

My heart full gratitude is dedicated to organizing committee members and the staff of Islamic University of Riau for their generous effort and contribution toward the success of the ICoSET & ICoSEEH 2017.

Pekanbaru, 8th November 2017

Prof. Dr. H. Syafrinaldi, SH., MCL

Rector of Islamic University of Riau

Pekanbaru, Indonesia

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TIME SCHEDULE

International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH)
Pekanbaru, Indonesia, 08-10 November 2017

TIME	ACTIVITIES	PERSON IN CHARGE	VENUE
November 08, 2017			
08.00-08.30	Registration	Committee	Auditorium Rectorat 4th Floor
08.30-09.15	Opening Ceremony:	Committee	
	Quran Recitition	Committee	
	Indonesia Raya National Anthem	Committee	
	Speech of the Committee	Chairman of the committee **Dr. Evizal Abdul Kadir, ST, M.Eng**	
	Opening speech	Rector of Islamic University of Riau **Prof. Dr. H. Syafrinaldi, SH., MCL**	
	Performing Arts (Traditional Dance)	Committee	
09.15-09.30	Photo Session and Coffee Break	Committee	
09.30-12.00	Keynote speakers: 1. Prof. Dr. Shigeki Inaba: Professor of Agronomy. Agricatural Plant Science & Agricultural Economics. Saga University, Japan. 2. Prof. John Lee PhD, ME, MSc, BSc: President Kyungdong Global Campus Research, Kyoto University, Japan 3. Yohei Murakami, Ph.D: Center for the Promotion of Interdisciplinary Education	Moderator 1. Dr. Ujang Paman Ismail, M.Agr 2. Dr. Evizal Abdul Kadir., M.Eng 3. Arbi Haza Nst, B.IT, M.IT	
12.00-13.00	Lunch Break	Committee	3rd Floor
13.00-15.00	Parallel Session 1 Participants	Moderator	4rd Floor
15.00-15.30	Coffee Break	Committee	
15.30-17.30	Parallel Session 2 Participants	Moderator	
17.30-17.45	Closing Ceremony	Committee	

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TIME	ACTIVITIES	PERSON IN CHARGE	VENUE
November 09, 2017			
07.30-08.00	Re-registration	Committee	1st Floor
08.00-17.00	Siak Tour: 1. Istana Siak 2. Klenteng Hock Siu Kiong (Bangunan Merah) 3. Masjid Syahabuddin 4. Balai Kerapatan Adat		

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	2	1002	Arbi Haza Nasution, Yohei Murakami, Toru Ishida	Similarity Cluster of Indonesian Ethnic Languages
	3	1007	Jaroji, Agustiawan, Rezki Kurniati	Design Self Service Software Prototype For Village Office Using Unified Modeling Language
	4	1009	Yoanda Alim Syahbana, Memen Akbar	Analysis Of Frame Loss Position Influence And Type Of Video Content To Perceived Video Quality
	5	1010	Apri Siswanto, Norliza Katuk, Ku Ruhana Ku-Mahamud, Evizal Abdul Kadir	An Overview of Fingerprint Template Protection Approaches
	6	1013	Yuniarti Yuskar, Dewandra Bagus Eka Putra, Tiggi Choanji, Ziadul Faiez, Muhammad Habibi	Sandstone Reservoir Characteristic Based on Surficial Geological Data of Sihapas Formation in Bukit Suligi Area, Southwest Central Sumatra Basin
Parallel Presentation 2 (15.30-17.30)	7	1015	Raisa Baharuddin, Selvia Sutriana	Effect of Maturity Level of Compost And Shallot Varieties to Growth and Yield in Peat Soil
	9	1019	Ida Syamsu Roidah, Dona Wahyuning Laily	Improving Family Revenues Through Role of Household Mother In Rejotangan District
	10	1026	Fathra Annis Nauli1, Jumaini, Diva de Laura	Relationship Between Adolescent Characteristic and Bullying Incidents At Private Junior High School In Pekanbaru
	11	1025	Husnul Kausarian, Batara, Dewandra Bagus Eka Putra, Adi Suryadi Evizal Abdul Kadir	Measurement of Electric Grid Transmission Lines as the Supporting of National Energy Program in West Sumatera Area, Indonesia through Geological Mapping and Assessment

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	2	1016	Sisca Vaulina, Khairizal, Hajry Arief Wahyudy	Factors Affecting Production of Coconut (*Cocos Nucifera* Linn) In Gaung Anak Serka District Indragiri Hilir Regency, Riau Province
	3	1004	Nur Khamdi, Muhammad Imam Muthahhar	Determining Sliders Position by Using Pythagoras Principle of 3-DOF Linear Delta Robot
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	6	1008	Idham Nugraha, Febby Asteriani, Puji Astuti, Retno Sawitri, Firdaus Agus	The Effects of Tengku Agung Sultanah Latifah Bridge Toward Physical Development in Siak Sub Districts
	7	1003	Heriyanto	Efficiency Of Rubber People Production In Kampar Regency Of Riau Province
	8	1011	Ariyon, M, Nugroho, R. S.	Production Optimization Esp-To-Gas Lift In High Gor Case Using Well Simulator
	9	1014	Anas Puri	Effect of Safety Factors on The Calculated Deflection of 1-Pile Row Full Scale Nailed-Slab Pavement System Resting on Soft Clay Due to Concentric Loadings
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	16	1027	Ernita, M. Noer, Sidik Arif Irawan	Green Beans Plant Response (Vigna Radiata L) On Liquid Organic Fertilizer (Lof) Nasa and NPK Compound Fertilizer
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EFFICIENCY ANALYSIS OF RUBBER PRODUCTION FACTOR IN REGENCY OF KAMPARRIAU PROVINCE

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Abstract

Kampar regency is one of the districts in Riau province which contributes significantly to the economy in Riau Province, especially in the agricultural sector in the plantation sector. Rubber plantations are a source of prosperity, progress, independence, and pride of Kampar district government. Plantation management at present still relies on and relies on the abundance of human resources are relatively cheap. Efficiency, productivity, quality, sustainability are still low. This study aims to analyze the efficiency of rubber production in Kampar regency by building multiple linear regression model and production efficiency analysis. The results showed that the dominant factors affecting rubber production in Kampar Regency were number of plants, plant age, number of labor and investment. The factors of production are the number of plants, and the amount of labor is not technically efficient, allocative, and economical. The use of fertilizers tends to be technically and economically efficient, but alocatively inefficient. In order to obtain optimal production, this study recommends the need for rejuvenation of old or damaged rubber plants using superior seeds and maintained in accordance with the standards of rubber cultivation techniques. The efficient use of labor can be achieved by applying a rubber tapping system appropriately tailored to the conditions of the plant and the price of rubber. In addition, the use of balanced fertilizers in accordance with the recommended should be applied.

Keywords: *Dominant Factors, Technical Efficiency, Allocative Efficiency, Economic Efficiency*

INTRODUCTION

The agricultural sector in Indonesia is divided into five subsectors, namely food agriculture sub-sector, estate sub-sector, forestry sub-sector, livestock sub-sector and fishery sub-sector. The agricultural sector is continually required to play a role in the national economy through the formation of Gross Domestic Product (GDP), foreign exchange gain, food supply and industrial raw materials, poverty alleviation, employment and income generation.

The value of Gross Domestic Product (GDP) of agricultural, livestock, forestry and fishery products at 2000 constant prices amounted to 304,777.1 billion rupiahs in 2010 and 339,890.2 billion rupiahs in 2013 or an increase of 10.33 percent. While the role of agriculture sector to Indonesia's GDP in 2013 fell from 13.17 percent to 12.89 percent. The role of agriculture sector to GDP is ranked second after the management industry sector is

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26.83 percent. (Badan Pusat Statistik Indonesia, 2014).

The contribution of the agricultural sector to the total value of GDP of Riau Province ADHK-DM in 2010 has an increasingly fluctuating trend. In 2010, the contribution of the agricultural sector to the total value of GRDP of ADHK-DM Province was 17.08%, increasing to 17.73% in 2014. During the period 2010 - 2014, the average growth of agricultural sector contribution increased by 0.75% per year. Where the agricultural sector ranked second only to the mining sector. GRDP for Kampar District from agriculture was 29.95 percent in 2009 and 28.91 percent in 2013 or decreased by 0.70 percent. Where the agricultural sector in kampar district ranks second after the mining sector. Thus seen that the agricultural sector is able to contribute significantly to PDRB Kampar regency.

At the Kampar regency level is not much different from the provincial level. In 2013 the largest area of plantation crops is occupied by oil palm plantation with an area of 190,486 Ha. While the rubber plant is in second with 92.509 Ha and Gambir plant is in third with 4,817 Ha. In the period of 2009-2012 the area of rubber plantation decreased. In 2009 the total area of rubber plant is 91,328 Ha and in 2012 the total area of rubber plant becomes 91,143 Ha. But not so with the production of rubber plants, where in the year 2009 to 2012 rubber production has increased from 46,656 tons to 61,040 tons. Whereas in 2012 until 2013 there was a tendency of increasing rubber plantation area to 92,609 ha and a decrease of rubber production to 60,714 tons (BPS Kabupaten Kampar, 2014). The decline in the area of rubber plantation is suspected due to the conversion of rubber land to palm oil which is considered easier in the company and has a higher economy.

Rubber plantations in Kampar regency are dominated by smallholder rubber plantations. Observing the results of smallholder productivity with low productivity of smallholder rubber based on data from Kampar District Plantation Office is only 0.78 tons / ha / year, caused by factors such as: (1) the majority of farmers have not used rubber planting material of superior clones grafting) and has not yet applied the standard of cultivation and maintenance of rubber plantation as well as recommended post-harvest technology, (2) there is a large old rubber garden area that needs to be rejuvenated soon. These factors affect each other. This factor becomes a determinant as well as a barrier to production, especially in rural areas so that rural communities, especially rubber farmers who have problems in their efforts to boost production.

Based on the above study in general this study was conducted with the aim to analyze the efficiency of rubber production in Kampar regency. Specifically aimed at analyzing the dominant factors affecting rubber production, analyzing technical efficiency, allocative efficiency and economic efficiency of rubber

METHODOLOGY

This research was conducted in Kampar Regency, using multy stage purposive sampling method with the criteria of 1-3 ha with the age of 13-25 years old. Samples were taken in 3 sub-districts, namely Kampar Kiri Hulu, Kampar Kiri Hilir and XIII Koto Kampar sub-districts, because the three districts are rubber production centers in Kampar regency. Each sub-district took as many as 20 rubber farmers and a total sample of 60 rubber farmers.

Methods of data analysis in this study using Cobb-Douglas production function. The Cobb-Douglas function is a function or equation involving two or more variables. Mathematically, the Cobb-

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Douglas function can be written as follows (Koutsoyiannis, 1997; Soekartawi, 2003):

$Y = b_0 X_1^{b1} X_2^{b2} X_3^{b3} \quad X_4^{b4} \quad X_5^{b5} e^u$

Where:

Y = Number of rubber production (Kg / hectare / year)
X1 = Number of Plants (Tree / hectare / year)
X2 = Age of plant (hectare / year)
X3 = The amount of fertilizer (Kg / hectare / year)
X4 = Amount of labor (HKP / Hectare / year)
X5 = Investment (Rp / hectare / year)
b0 = Intercept
b1 ... b5 = Farameter of factors of production to be expected
e = Natural logarithm, e = 2,718
u = Pitfalls

The equation will be converted into multiple linear form to facilitate the calculation by using natural logarithmic transformation, the parameter is determined by using the *Ordinary Least Square (OLS)* method so that the equation becomes as follows:

$\text{Ln } Y = \text{Ln } b_0 + b_1 \text{ Ln } X_1 + b_2 \text{ Ln } X_2 + b_3 \text{ Ln } X_3 + b_4 \text{ Ln } X_4 + b_5 \text{ Ln } X_5 + u$

Expected alpha parameters (Hypothesis) b1, b2, b3, b5> 0 and b4 < 0.

In order to provide econometrically valid results it is necessary to test some econometric assumptions which include the detection of normality, multicollinearity, heteroscedasticity and autocorrelation of the equations in the regression model (Gujarati, 2003, Thomas, 1997; Verbeek et all., 2000).

Furthermore, after testing the econometric assumptions, production efficiency analysis is performed. in the terminology of economics suggests that efficiency can be classified into 3 (three) kinds, namely allocative efficiency, technical efficiency, and economic efficiency. A production is said to achieve an allocative efficiency when the Marginal Product Value (MPV) equals the price of the factor of production. The Value of Marginal Product (MPV) is the addition of revenue received due to the additional use of the input unit. Mathematically can be written as follows (Soekartawi, 2003):

$$MPV_x = P_x \text{ atau } \frac{NPM_x}{P_x} = 1$$

Technical efficiency is the amount that shows the ratio between actual production and maximum production. Calculation of technical efficiency is done by calculating Marginal Physical Product (MPP) from each production factor. MPP is derived from the first derivative of the production function :

$Y = b_0 . X_1^{b1} . X_2^{b2} . \quad X_3^{b3}. \quad X_4^{b4}. \quad X_5^{b5}$

$MPP = \frac{dY}{dX} = b_0 . b_1 . X_1^{b1} . X_2^{b2} . X_3^{b3} . X_4^{b4} . X_5^{b5}$

Technical efficiency is achieved when MPP = 0. If MPP> 0, then the use of production input is not technically efficient, and if MPP <0, it means the use of input is technically inefficient. The Economic efficiency is a quantity that shows the comparison between actual profit and maximum profit. Mathematically, the relationship between technical efficiency, allocative efficiency and economic efficiency are as follows (Soekartawi, 2003):

EE = TE x AE

Where: EE = Economic Efficiency
TE = Technical Efficiency
AE = Allocative Efficiency

Thus, if TE and EA are known, then EE can also be calculated. The quantities of TE ≤ 1, AE ≤ 1, and EE do not always have to be less or equal to one..

RESULT AND DISCUSSION

Result of estimation model of rubber production factor in this research is very good as where seen from coefficient of determination (R^2) that is 0,9470. This shows that 94.70 percent of the number of production variables can be explained by the number of plants, the number of labor, the use of fertilizer, the age of plants, and working capital. While 5.30 percent is influenced by other variables that are not included in the model. This variation is significant at a real 1 percent level seen

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from F arithmetic of 312.69 and probability <0.0001.

The result of normality test using Shapiro-Wilk statistic shows that the result of Shapiro-Wilk statistic calculation for rubber production is 0.88. The value is significant at a real 1 percent level. The multicollinearity test of VIF values for all independent variables (number of plants, plant age, amount of labor, use of fertilizers, and investment) has a value less than 10. The result of heteroscedasticity test shows a Breusch-pagan statistic of 7.77, the value is different with zero at 5 percent real level. The value of Durbin-Watson (DW) in the built model is 2.064, at n = 60 and k = 6 from the DW distribution table with 1 percent real level obtained dL value of 1,808 and du 2,192. This indicates that the data is normalized, does not occur multicollinearear, does not occur heterokedasitas and there is no autocorrelation.

The dominant factor affecting rubber production can be seen from the estimation of the model of the use of rubber production factors in Table 1 below

Table 1. Results of model estimation of the use of production factors of smallholder rubber farming in Kampar regency

Variabel	Parameter Estimate	Standard Error	t Value	Pr > |t|	Variance Inflation
Intercept	-0.88355	1.13016	-0.78	0.4378	0
Number of plants	0.88329	0.06079	14.53	<.0001	3.17175
Age of the plant	-0.11708	0.06370	-1.84	0.0716	1.39693
Amount of labor	0.14117	0.06030	2.34	0.0229	1.11531
The amount of fertilizer	0.00221	0.00508	0.43	0.6659	1.11590
Investment	0.23692	0.08901	2.66	0.0102	2.85166

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Based on the estimation result of model in Table 1 it is known that there are four variables that have real effect on the production of smallholder rubber, that is the number of plants, plant age, labor, and investment. While the amount of fertilizer has no significant effect on the production of smallholder rubber in Kabupten kampar.

The coefficient of the number of plants has a positive sign that is 0.88329 which means that every 1 percent increase in the number of plants will increase the amount of production by 0.88329 percent, vice versa, any 1 percent reduction in the number of plants, will decrease the amount of production by 0.88329 percent with the assumption that other factors of production remain. This indicates that the number of plants responsive to rubber production, so it can give an idea that the number of plants is the factor of production of the greatest influence in determining the amount of rubber production. Based on this the farmers can still increase the number of cultivated rubber plants because each additional input will increase output. This is similar to the study Agustina at all (2016).

The result of the estimation can show that the data of plant age negatively affect the amount of rubber production and significantly different with zero at the real level of 10 percent so that hypothesis H0 accepted and hopotesis Haditolak. This means that if the age of the plant increases then the amount of production will be reduced. The coefficient of plant age has a negative sign that is -0.11708 which means that every 1 percent increase in plant life will decrease the amount of production by 0.11708 percent. Thus it can be concluded that if there is a decline in rubber production due to old age the rubber plant is time to be rejuvenated.

The coefficient of labor has a positive sign that is 0.14117 which means that every 1% increase in labor will increase the production amount of 0.14117%, and vice versa, 1% reduction of labor will decrease the production amount by 0, 14117 percent assuming other production factors remain. The effect of the use of labor on production is positive so that it can increase rubber production by increasing the use of labor without reducing the use of other production factors. The largest allocation of working time of farmers in farming is harvest labor. The greater the allocation of harvest work, the production (yield) tends to increase. This is similar to the study Rizal (2014), Ronal. S at all (2014), Yarna Hasian (2015), Gede at all (2015), Reni at all (2014), Silvira at all (2013), Felicia at all (2014), Lidya at all (2015), Shelvi at all (2014), Susilawati at all (2015), Stulov (2016), Reny at all (2014) dan Ongki at all (2015).

The coefficient of investment has a positive sign to production of 0.23692 which means that every 1 percent increase in working capital will increase the amount of production by 0.23692 percent, and vice versa, any 1 percent reduction in investment will decrease the production amount of 0, 23692 percent assuming other factors of production remain. This indicates that the effect of investment on rubber production is responsive to this matter with the study Desi (2015).

Production Efficiency

Soekartawi (2003) in the terminology of economics argues that efficiency can be classified into 3 (three) kinds, namely allocative efficiency, technical efficiency, and economic efficiency. Analysis results Technical efficiency, allocative efficiency or price and economic efficiency can be seen in table 2.

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Table 2. Results of Technical Efficiency Analysis, Allocative Efficiency and Economic Efficiency

Variabel	Technical Efficiency	Allocative Efficiency	Economic Efficiency
Number of plants	-21.92*	-3.06*	66.98*
Amount of labor	-8.03*	-3.15*	25.27*
The amount of fertilizer	-0.13***	-0.31*	0.04***

Description: * Inefficient; ** not yet efficient; *** already efficient

The result of technical efficiency calculation shows that the value of technical efficiency of the number of plants, and labor of respectively -21.92, and -8.03. These values are <0 (small from zero), meaning that the use of plant quantity factors, labor and fertilizers is not technically efficient. Therefore it is necessary to add the use of factor of plant number, labor and fertilizer. While the value of technical efficiency for plant age factor is 150.78, the value is>0 (large from zero), meaning the plant's age factor is not technically efficient. It is therefore necessary to rejuvenate the old / damaged plants. Meanwhile, the value of technical efficiency of fertilizer use and investment = 0 (equal to zero), meaning that the use of fertilizer and investment is technically efficient.

The value of the allocative efficiency for the factor of the number of plants, labor, and the use of fertilizer, respectively is -3.06, -3.15, -0.31, the values are <1 (small of one), meaning that the amount factor plants, the amount of labor and the use of inc6ally inefficient fertilizers, thus reducing the use of production factors.

The result of the economic efficiency calculation shows that the number of plant and labor is 66,98 and 25,27, the value is> 0 (big from zero), meaning the use of plant quantity factor a11 the amount of labor is not economically efficient. Therefore, it is necessary to increase the use of the number of plants and the number of workers. While the result of economic efficiency for fertilizer use factor is 0,04, the value is = 0 (equal to zero), meaning that fertilizer is economically efficient.

5. CONCLUSION

The dominant factors affecting rubber production in Kampar regency are number of plants, plant age, number of labor and investment. All the statistically significant different factors had a positive effect except the age of the plant. Furthermore, the use of factors of production, in particular the number of plants and the number of labor, is not technically efficient, allocative, and economical. The use of fertilizers (dominated by urea fertilizers) uses tend to be technically and economically efficient, but alocatively inefficient.

The policy implications for optimizing rubber production in Kampar District are: First The use of the number of crops in smallholder rubber farming in Kampar Regency is known to be responsive to production and has not yet reached technically and economically efficient condition, therefore to optimize rubber production the farmers can still increase the use the number of plants. The average use of the number of smallholder rubber plantations in Kampar Regency is 431 stems / hectare, while to obtain optimal results, the recommended rubber planting distance from the Kampar Regency plantation is 6 x 3 meters or the total population of about 550 trees / hectare. Both the ages of the rubber plant have many old and damaged, therefore need to be rejuvenated rubber plant. Rejuvenation of rubber using superior seeds and maintained in accordance with the

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standards of cultivation techniques is believed to be able to increase the productivity of rubber produced. Thirdly, to obtain a more optimal production and efficient use of labor, it is necessary to apply the appropriate rubber tapping system adapted to the condition of the plant and the price of rubber.

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