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## RESEARCH ARTICLE

## Simultaneous Equation Model for Economic Calculation of Households of Independent Rubber Farmers in Mineral Land in Kampar Regency, Riau Province

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### Abstract

Rubber is a plantation crop which is mostly a source of community income in Kampar District. As a source of household income, rubber farming is managed by households independently. This study generally aims to design models and government policy strategies in the development of smallholder rubber plantations on land typology mineral land conditions on the economic decision making of rubber farmer households. Specifically, this study was conducted with the aim of analyzing the characteristics of independent smallholders and internal and external dominant factors that influence the allocation of working time, income and household expenses of rubber farmers. This research was conducted using a survey method located in Kampar District. The data used in this study consisted of primary data obtained using the interview method. Samples were taken by simple random sampling method with 60 rubber farmers. Descriptive analysis and Economic Decision Model of Rubber Farmer Households using the simultaneous equation model approach with the Two Stages Least Square (2SLS) analysis method were performed to answer the research objectives. The results showed that only internal factors of farm households are responsive to household economic decisions. There are no external factors included in the model that are responsive to the economic decisions of rubber farming households in Kuantan Singingi Regency regarding the aspects of production, working time allocation, income and expenditure of rubber farming households. From the aspect of production, no responsive internal or external factors were found, but the biggest effect was the number of productive rubber stems. From the aspect of work time allocation, internal factors that are responsive to influence are the total outpouring of farmer work, outpouring of farm family work in businesses and the workforce of farmer households. Furthermore, from the aspect of farmer's household income the responsive internal factors that influence it are the farmer's household income in the business, then what influences household expenditure is outflow of work in business, farmer education, wife education and total rubber farmer income. The policy implications of increasing rubber prices and outpouring of family work in the business have the most positive impact. While the increase in wages for workers outside the family has a negative impact on the household economy.

**Keywords:** Household Economy, Dominant Factors, Rubber.

### 1. Introduction

The agricultural sector in Indonesia continues to be demanded to play a role in the national economy through the formation of Gross Domestic Product (GDP), foreign exchange earnings, supply of food and industrial raw materials, poverty alleviation, employment provision and increasing community income.

At the provincial level, Riau does not differ greatly from the national level. In 2016, the area of rubber was ranked second after oil palm with an area of 504,553 ha. In the last five years (2012-2016), the total area, production and number of farmers cultivating rubber plants in Riau Province tended to decrease. In 2012, the area of rubber plantations was 128,520 ha with a production of 392,781 tons, decreasing to 90,877 ha with a production of 333,155 tons. The number of farmers cultivating rubber plants also

declined from 276,210 households to 244,560 households (Badan Pusat Statistik, 2017b). At the level of Kampar Regency, it is not much different from the provincial level. In 2012 the largest plantation area was occupied by oil palm plants with an area of 190,486 Ha. While the rubber plant is in second place with an area of 92,509 Ha. In the period 2012-2016 the area of rubber plantations decreased. In 2012 the area of rubber plantations was 91,328 hectares and in 2016 the area of rubber plants was 91,143 hectares (Badan Pusat Statistik, 2017a). The decreasing area and production of rubber plants, as well as farmers who are working on rubber plants are thought to be due to the conversion of rubber land to oil palm.

Development in the plantation sector is directed to further accelerate the rate of production growth both from large plantations, private and state plantations and community nucleus estates as well as self-managed plantations to support industrial

4 development, as well as increase the utilization and preservation of natural resources (SDA) in the form of land and water. The role of the plantation sector is so great for increasing the use of farmers and supplying raw materials for the domestic industry and as a source of foreign exchange (Heriyanto, 2017).

Various problems that occur will affect production acquisition, allocation of work time, income, and the level of welfare of farmers. The level of welfare of farmers can be seen from the expenditure of household consumption. In other words, households are faced with the problem of allocating work time, income and expenses. The economic decisions of rubber farming households in relation to the allocation of work time, household income and expenditure, are theoretically influenced by internal and external factors. A rubber farming household that uses labor from outside the household expects workers with high productivity, but with low wages. Instead a worker tends to expect a job with a high level of wages.

Comparison between the price level of rubber also determines the decision of rubber farmers to keep doing rubber plantation business or not. If the price of rubber products produced is quite high while the price of inputs is relatively cheap, so that production costs are less than the gross income obtained, then the business is profitable. The higher the level of profits obtained, the rubber plantation business will increasingly develop. Various external shocks that affect the production process will affect the allocation of work time, will further affect the acquisition of income and ultimately will affect the amount and pattern of household expenditure.

Based on the background description and problems above, in general this research objective is 1) analyze the household economy which includes the allocation of working time, income and expenditure of rubber 2) farmer households on mineral land. Specifically the purpose of this study 7) to Analyze the characteristics of rubber farmers and internal and external dominant factors that affect the allocation of work time, income and household expenditure.

## 2. Literature Review

### 2.1. Agricultural Development Concepts

Some economists claim that agricultural development is believed to be able to drive economic growth while at the same time helping to reduce income inequality, poverty and unemployment (Poonyth, D, R. Hassan & Calcaterra, 2001; Romeo, M, 2000, 2001; Warr, 2006). Some agricultural development strategies that are expected to achieve this are Agricultural-Led Growth strategies (Poonyth, D, R. Hassan & Calcaterra, 2001), strategi Agriculture-Based Development by (Poonyth, D, R. Hassan & Calcaterra, 2001; Romeo, M, 2000, 2001), and strategi Agricultural Demand Led Industrialization (ADLI) by (Adelman, 1984; Julia, 2016).

The concept of agricultural development includes land resources, nftah plasma, water, 5)chnology, financing and human resources (HR). Agricultural development aims to increase farmers' income and welfare through increasing agricultural production.

This increase in agricultural production in addition to meeting domestic 5)ndustrial raw materials that continue to grow also aims to increase foreign exchange from exports of agricultural products. One of the steps that can be taken to increase the contribution of the agricultural subsector is the production of plantation crops (Soekanda, 2001).

Strategi Agricultural-Led Growth (Poonyth, D, R. Hassan & Calcaterra, 2001) emphasized that the agricultural sector as a leading sector in economic development because the agricultural sector is a driver for economic growth. Therefore the agricultural sector needs to get the main attention compared to other sectors because of its potential in driving economic growth and job creation. Development of a productive agricultural sector and better rural areas is the key to the growth of the agricultural sector and is a precondition for successful economic development.

Strategi Agriculture-Based Development (Romeo, M, 2000, 2001), based on the consideration that in many low-income countries the majority of the population is in rural areas, where the agricultural sector is the main source of life. This strategy is more effective than the import substitution strategy or the export-led industrialization strategy, based on the consideration that it provides opportunities for income generation, directly or indirectly, for rural populations. Through this strategy public resources are increased to be allocated to the agricultural and rural sectors and is expected to increase agricultural productivity and income of rural populations.

The role of the agricultural sector in economic development includes: (1) increasing the availability of food or food surplus for domestic consumption, (2) releasing excess labor to the industrial sector, (3) being a market for industrial products, (4) increasing domestic savings, ( 5) increasing trade (sources of foreign exchange), and (6) improving the welfare of rural people (Jighan, 1994).

Research on the household economy of farmers has been done by researchers, such as the household economy of rice farmers. Households in paddy farming in production are determined by labor in the family, the amount of seeds, fertilizers and pesticides. The difference between households is that households of paddy rice farmers use more labor in the family (Elinur, Asrol, & Heriyanto, 2017; Heriyanto, 2018).

Next Heriyanto (Heriyanto, 2017), has conducted research on the analysis of the efficiency of rubber production factors in Kampar Regency, Riau Province. The results of his study showed that the dominant factors affecting rubber production in Kampar District were the number of plants, age of plants, number of workers and investment. The production factor is the number of plants, and the number of workers is technically inefficient, allocative, and economically. The use of fertilizers tends to be technically and economically efficient, but allocatively inefficient.

Rubber farm house hold economic research analyzes from the aspects of production, farm household work time allocation, the use of non-family labor, non-farm income, and household expenditure that includes food and non-food expenditure. This research will produce a comprehensive economic

model of smallholder farmers' households that have not been studied by researchers before. This study also recommends policies relating to the development of smallholder rubber in the context of increasing the household income of rubber farmers.

## 2.2. Household Economy

Understanding farm households is very important because the characteristics are very unique and complex. In this case the household has resources that can provide satisfaction and can be shared among household members. In addition, households in increasing their satisfaction must have alternatives so that households have many choices. Household economic activities such as production activities as a farming company, consumption activities as consumers and as labor providers. In carrying out these activities the household carries out the principle of utility maximization with budgetary or resource constraints (Nakajima, 1989).

Farmer household as an economic unit that acts as a producer and consumer. Households as producers carry out production activities and as consumers carry out consumption activities simultaneously. This will be different from the company's activities. Companies as economic units only carry out the activities of producing goods and services to achieve maximum profits.

(Becker, 1965) formulating an agricultural household model (economic model of agricultural households) that integrates production and consumption activities as a whole and the use of labor in the family is preferred. This household economic model uses a number of assumptions, namely: First, household satisfaction in consuming is not only determined by the goods and services obtained in the market, but also is determined by various commodities produced in the household. Second, the element of satisfaction is not only goods and services, but includes time. Third, time and goods or services can be used as factors of production in household production activities. And fourth, households act as producers as well as consumers.

Meanwhile, (Barnum & Squire, 1978) revealed that the household economic model can be used to analyze the economic behavior of agricultural companies which all use paid labor and sell all products produced to the market. Unlike subsistence agriculture which relies on family labor, so there is no market surplus.

(Singh, I. & Strauss, 1986) arrange the agricultural household economic model as a basic model of the household economy. In the model stated that household utilities are determined by consumption of goods and services produced by households, consumption of goods and services purchased in the market, and consumption of leisure (leisure time).

households include activities of production, consumption and allocation of labor in the family carried out simultaneously with more complex estimation techniques. Estimation of the model uses two stage least squares (2SLS) or three stage least squares (3SLS) estimation techniques. Rice farm household economics studies using 2 SLS estimation

techniques were carried out by (Faradesi, 2004; Rochaeni & Erna M, 2005) in Cianjur Regency and Bogor City. Economic research on farm households is also applied to farm households in plantation crops, such as rubber and oil palm farm households, research conducted by (Elinur & Asrol, 2015a; Husin & Dwi Wulan, 2011; Khaswarina, 2017).

The farm household economics research analyzes the allocation of work time in farming, production and household expenditure. The allocation of work time consists of the equations of outpouring of family labor in lowland rice farming, outpouring of non-farm family labor. The production equation is influenced by the use of rice production factors. Equation of rice farmers household expenditure consists of food and non-food expenditure. However, this research has not accommodated household expenditure in terms of health, education and leisure time (leisure) (Faradesi, 2004; Rochaeni & Erna M, 2005)

The economic research of rubber farmer households consists of a flow of farmer's household working time on rubber farming and non-farming. Household income consists of income from rubber, non-rubber and non-farming farming. Rubber farmer household expenses consist of food, non-food expenditure, education expenditure, farm investment and farmer household savings. The model does not yet accommodate the demand for workers outside the family and clothing, housing and health and leisure expenses. This research is still in the village scope (Husin & Dwi Wulan, 2011; Khaswarina, 2017; Heriyanto et al., 2019; Ningsih et al., 2020).

The economic research of the oil palm farmer household builds a model consisting of the equal allocation of farm household work time, oil palm production, labor demand outside the farmer's family, farmer's household income and farmer household expenditure. The study of the household economics of oil palm farmers includes four aspects: First, the demand for labor is distinguished from labor within the family and outside the family. Second, include outflow of family work outside the business and income from outside the oil palm farm. Third, include business investment, education investment and household savings, i.e. saving money in financial institutions on the household expenditure side. And fourth, household consumption consists of food, non-food consumption and recreation (Elinur & Asrol, 2015a; Heriyanto & Asrol, 2019; Karya, Heriyanto, & Asrol, 2019).

This economic study of rubber farming households combines the economic models of rice farming households and rubber and oil palm farming households. The economic model of rubber farming households consists of complex equations that accommodate household expenditure that are in accordance with household economic phenomena, among others: first, the rubber production equation is influenced by production factors consisting of the amount of crops, fertilizers, pesticides and internal labor. Second, the equality of household time allocation for rubber farmers from the allocation of working time for households in farming and outside farming. Third, household income from rubber

farmers consists of rubber farming income, non-rubber farming income and non-farming income. Fourthly, the household expenditure of paddy farmers consists of food expenditure, clothing expenditure, education expenditure, health and recreation expenses. Fifth, the rubber farming household economic model also includes expenditures for farming investment, because in general rubber farmers in the study area set aside their income for the farming. From several farmer household economic studies, this study has similarities and differences with previous farmer household economic research. The similarity is that this research has accommodated all farm household economic activities which include production, consumption and work time allocation aspects. The advantage of this research is that it includes clothing and health and recreation expenses, which have not been accommodated by previous studies.

### 2.3. Review of Previous Studies on Home Economics

Studies of the household economy have been carried out both partially and simultaneously such as, (Chuzaimah, 2006; Elinur, 2004; Heriyanto, 2017; Husin & Sari, D, 2011; Koestiono, 2004; Siti & Erna, 2005) analyzing policy simulations of the household economy of agriculture. The results of the policy simulation imply that the policy of increasing output prices is not effective in increasing the amount of production that can be sold to the market. This is due to additional benefits due to rising prices of agricultural output and technological improvements are more allocated as labor costs.

(Priyanti, B.M, Y.Syaukat, & S.U, 2007) conducting a Farmer Household Economy Model Study on Crop-Livestock Integration Systems. the results of the study that the farm household economic model is able to explain reciprocal farm household income obtained from maximizing satisfaction with production constraints, time allocation and income distribution. This includes aspects of production, allocation of use of family labor, use of inputs and production costs, income and income as well as farm household expenses. This model is very useful to identify the factors that influence the decisions of farm households, especially in increasing income simultaneously and integrated between crop and livestock businesses.

(Husin & Sari, D, 2011), conducted a study on the Economic Behavior of Rubber Farmer Households in Prabumulih in Workforce Allocation, Production and Consumption with the result that the behavior of farm household household time allocation behavior was influenced by total household expenditure, rubber land area, non-rubber farm land area, rubber farming income and number of children under five. Farmer household production behavior is influenced by the area of rubber land, non-rubber farming land area, outpouring of family labor on rubber farming, the use of fertilizers and pesticides. Farmer household consumption behavior is influenced by total household income, time spent working by household members on rubber farming and number of household members. Several variables that were responded to

elastically by the variable of work time spent were rubber farming income, total household expenditure and non-rubber farming land area. Whereas the variable which is responded elastically by household expenditure is total household income and expenditure for food consumption.

Research conducted by (Elinur & Asrol, 2015b) about the economic decisions of oil palm farmer households in the village of Indra Sakti Kecamatan Tapung, Kampar Regency The economic model of the household that he built includes aspects of production, location of work time, use of labor within and outside the family, household expenses consisting of food and non-food expenditure. The research has not included expenditure on clothing, housing, education, health, and recreation. Overall expenditure is aggregated in food expenditure. This research is still in the scope of the village.

(Khaswarina, 2017; Wahyudy, 2019), conducting research on the household economics of ex-UPP TCSDP rubber farmers in Koto Damai Village, Kampar District. The economic model of the constructed household has included the production equation, allocation of work time, income in and out of farming, and food expenditure, education expenditure, non-food and household savings. The model does not yet accommodate the demand for workers outside the family and clothing, housing and health and leisure expenses. This research is still in the village scope.

### 3. Research methods

The location of the study was determined proportionally, namely in the Kampar District the Kampar District was chosen with consideration that the Kampar Regency was the second largest rubber plantation area after Kuantan Singingi Regency in Riau Province. To achieve optimal results, this research is expected to be funded within one year.

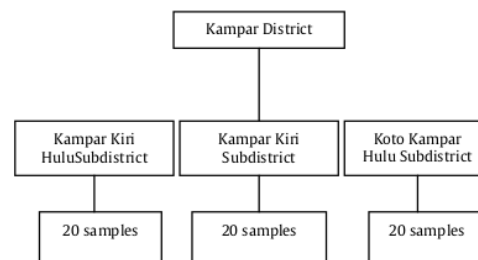


Fig 1. Number of Rubber Farmers Samples in Kampar District

Sampling in this study was conducted using a multi-stage purposive sampling method with criteria having an area of 1-3 Ha with a rubber plant age of 13-25 years. Samples were taken in 3 districts, namely Kampar Kiri Hulu Subdistrict, Kampar Kiri Hilir Subdistrict and XIII Koto Kampar Subdistrict, because the three districts are rubber production centers in Kampar Regency. Each sub-district took 20 rubber farmers and a total sample of 60 rubberfarmers. A clearer scheme for rubber farming household sampling is presented in the figure above.

The type of data collected is cross section data. Primary data were obtained from direct interviews

with respondents, namely rubber farming households using a prepared questionnaire. Besides that, secondary data from a number of related institutions were also collected, such as: the Plantation Agency, the Central Statistics Agency and other sources. Secondary data are used to sharpen and support the analysis in this study.

#### 4. Data analysis

To answer the objectives of the characteristics of independent rubber farmers the study was analyzed using descriptive analysis. with the tabulation method focused on explaining the pattern of work time allocation, income contribution and household expenditure patterns. The description of the pattern of rubber farm household household work time allocation includes the length (percentage) of work time allocated to businesses within and outside the rubber plantation business. Furthermore, the

allocation of working time can be disaggregated according to household members (husband, wife and children).

Meanwhile, the descriptive analysis of income contribution is intended to get a picture of the amount of income contribution in the business and outside the rubber plantation business to the total income of rubber farmer households. Next the descriptive analysis of household expenditure patterns is focused on looking at the amount of income allocation that is reinvested in the rubber plantation business, consumption expenditure, savings, investment and leisure. The pattern of household consumption expenditure is further broken down according to commodity groups, namely food and non-food consumption. In addition, a descriptive analysis was also carried out relating to the general description of sample identity (age, education, number of family members and work experience).

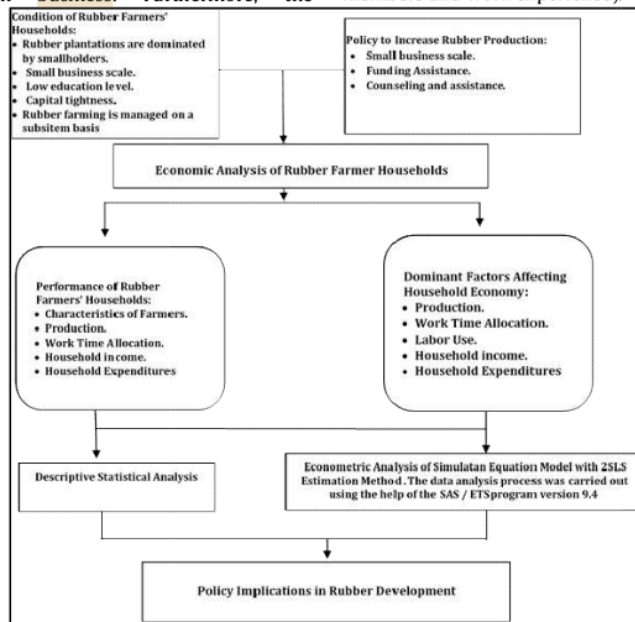


Fig 2. Frame work for Economic Analysis of Rubber Farmer House holds in Kampar District analyzed with the Simultan Equation Model Econometry with 2SLS Estimation Method.

Furthermore, the household economic model that analyzes internal and external dominant factors that affect the allocation of work time, household income and expenditure and the impact of changes in government policy on household economic decision making are analyzed using the simultaneous equation approach with the Two Stages Least Square (2SLS) analysis method. The data analysis process was carried out using the help of the Statistical Analysis System Econometric Time Series (SAS / ETS) program version 9.4. Frame work for Economic Analysis of Rubber Farmer House holds in Kampar District analyzed with the Simultan Equation Model Econometry with 2 SLS Estimation Method can be seen in the figure below.

#### 4. Results and Discussions

#### 4.1. Characteristics of Independent Rubber Farmers

The profile of rubber sample households (hereinafter referred to as rubber farm households) can be seen in Table 1. Based on Table 1, it can be seen that the average age of heads of rubber farmer families is 48 years, thus it can be said that the average rubber farmers are at productive age. The average rubber farmer starts a rubber gardening business at the age of 32 years. Thus the average rubber farmer has been in business for 16 years, so it can be said that these rubber farmers have enough experience in running a rubber farming business.

Table 1. Characteristics of Rubber Farmer Households

No.	Description	Unit	amount
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1.	Number of household respondents from rubber farmers Gender:	Person	60
a.	Men	Person	58
b.	Women	Person	2
2.	The average age of rubber farmers	Year	48
3.	The average length of education of rubber farmers	Year	9
4.	The average length of education of a rubber farmer's wife	Year	9
5.	Average rubber farmer work experience	Year	16
6.	Average household member is a rubber farmer	Person	6
7.	Average household workforce of rubber farmers	Person	4
8.	average household student is a rubber farmer household	Person	2
9.	Average area of rubber farmers	Hectare	2
10.	Origin:		
a.	Respondents were from Kampar Regency	Person	57
b.	Respondents came from outside Kampar District	Person	3

Table 2 shows that the formal education of rubber farmers and wives of rubber farmers, respectively 10 years and 9 years. Thus it can be said that the education of rubber farmers and their wives is still low, ie only graduated from junior high school.

The average rubber farm household member is 6 people, including 4 people belonging to the labor force and 2 school children. In general, the household workforce of rubber farmers works both inside and outside the rubber farming business. The majority of rubber farming households are from Kampung Kabuapten, as many as 57 households. Only 3 rubber farmer households come from outside Kampar District. This indicates that the rubber farming business is dominated by people from within Kampar District.

Farmers who are working on this rubber have an average of 2 hectares of garden area. Rubber plantation land is own property with an average pattern of rubber plantation exploitation by rubber farmers and their families

#### 4.2. Internal and External Dominant Factors That Affect Working Time Allocation, Income and Expenditures of Rubber Farmer Households

Table 2 shows the results of the estimation of the rubber production equation that rubber production is not responsive to the outflow of household work in the business (positive) and the number of productive rubber rods (positive). Although the elasticity values are not responsive, rubber production is more sensitive to changes in the number of productive rubber stems than changes in the flow of rubber farm family work in the business.

Variations in the work flow of rubber farming families in the rubber farming business, labor outside the family and the number of productive rubber stems have a positive effect on production. This illustrates that if the outflow of rubber farming family work in the rubber farming business, labor outside the family and the number of productive rubber stems increases, then rubber production will tend to increase.

Table 2. Internal and external dominant factors that affect the allocation of working time, income and expenditure of rubber farmer households

Variabel	Parameter Estimate	t Value	Pr >  t	Elasticity
<b>1. Production</b>				
Intercept	-3481.0400	-2.6600	0.0100	
Workflow in business	1.8465	3.9400	<0.0002	0.4018
External family labor	1.4665	0.9600	0.3404	
Number of productive rubber stems	10.9694	21.5900	<0.0001	0.9356
R2 = 0.91199, Fvalue = 193.44, Pr > F < 0.0001, Dw = 1.929889				
<b>2. Workflow in business</b>				
Intercept	1917.9570	6.6000	<0.0001	
Rubber farm household income in the business	0.0000	3.4500	0.0011	0.2279
Outflow of work outside the business	-0.6661	-5.4400	<0.0001	-0.2162
Rubber farm household workforce	118.2826	1.3100	0.1956	
R2 = 0.47965, Fvalue = 17.21, Pr > F < 0.0001, Dw = 1.923857				
<b>3. External family labor</b>				
Intercept	313.7619	3.5700	0.0008	
Rubber farmers household income outside the bus	0.0000	11.7200	<0.0001	0.6274
The total outpouring of farmers' work	-0.0617	-1.8900	0.0634	-1.4268
Rubber farm household workforce	-13.6572	-0.8400	0.4023	
Rubber farmer work experience	-1.2138	-0.4600	0.6476	
R2 = 0.47965, Fvalue = 17.21, Pr > F < 0.0001, Dw = 1.923857				
<b>4. Outflow of work outside the business</b>				
Intercept	14.863900	1.7500	0.0852	
Workflow in business	-0.8648	-3.5500	0.0008	-2.6644
Rubber farm household workforce	3.69.6034	3.2000	0.0023	1.7351
R2 = 0.4022, Fvalue = 19.18, Pr > F < 0.0001, Dw = 1.659385				
<b>5. Rubber farmers household income outside the business</b>				
Intercept	62.29224.0000	3.5500	0.0008	
Rubber farm household income in the business	-0.0520	-4.0200	0.0002	-2.0196
Outflow of work outside the business	4300.1760	5.0000	<0.0001	1.0484
R2 = 0.38478, Fvalue = 17.82, Pr > F < 0.0001, Dw = 1.568858				
<b>6. Rubber farm household food consumption</b>				
Intercept	9.100771	10.58	<0.0001	
Total income of rubber farmer household	0.0009	0.2600	0.7947	
Number of family members	11.59123.0000	7.3000	<0.0001	0.3642
Recreational expenditure of rubber farmers' household	4.8413	5.9000	<0.0001	0.0979
Wife's education	-2.04663.0000	-2.0800	0.0426	-85.103.4607
R2 = 0.68107, Fvalue = 29.36, Pr > F < 0.0001, Dw = 1.342588				
<b>7. Non-food consumption of rubber farming households</b>				
Intercept	-2.19881.0000	-0.3000	0.7622	
Total income of rubber farmer households	0.0030	1.3900	0.1714	
Number of family members	841287.8000	5.2900	<0.0001	0.9657
Farmer Education	38506.8700	0.7800	0.4366	
Wife's education	707.62.1500	1.4600	0.1504	
R2 = 0.41041, Fvalue = 7.52, Pr > F < 0.0001, Dw = 1.554068				
<b>8. Educational investment</b>				
Intercept	274738.0000	0.2600	0.7948	
Total income of rubber farmer households	0.0024	0.4900	0.6256	
Number of school children	27.49502.0000	10.9600	<0.0001	0.8670
Wife's education	17597.3800	0.1900	0.8495	
R2 = 0.76172, Fvalue = 59.67, Pr > F < 0.0001, Dw = 1.522326				
<b>9. Business investment</b>				
Intercept	4.80003.14.0000	1.8000	0.0768	
Total income of rubber farmer households	0.3015	2.4000	0.0197	0.2623
Workflow in business	93.96.2280	0.9100	0.3684	
Number of school children	-34.79493.0000	-0.6400	0.5249	
Business scale	5.68472.37.0000	4.4900	<0.0001	0.2945
R2 = 0.47231, Fvalue = 12.31, Pr > F < 0.0001, Dw = 1.426965				
<b>10. Recreational expenditure of rubber farmers' households</b>				
Intercept	5.78960.6000	1.5000	0.1399	
Total income of rubber farmer households	0.0009	0.8300	0.4079	
Workflow in business	-5.41.0220	-3.4300	0.0012	-4.7125
Outflow of work outside the business	-3.10.4.160	-3.1100	0.0030	-0.8776
Farmer Education	503.76.3100	2.5500	0.1135	1.8117
Wife's education	638.28.4900	3.4500	0.0011	1312.289.7143
R2 = 0.55386, Fvalue = 13.41, Pr > F < 0.0001, Dw = 1.605136				
<b>11. Savings</b>				
Intercept	-63.764.91.0000	-1.8600	0.0688	
Total income of rubber farmer households	0.0754	19.4900	<0.0001	1.5748
Total consumption of rubber farmers	-0.1290	-0.5800	0.5643	
Interest rate	26.578.19.0000	5.2700	<0.0001	0.8489
R2 = 0.7685, Fvalue = 61.28, Pr > F < 0.0001, Dw = 1.300045				

Note: Significant at 10 percent level

From the aspect of work time allocation shows that the outflow of family work in the business is not responsive to household income in the business (positive) and outflow of family work outside the business (negative). Furthermore outflow of family work outside of business is responsive to outflow of household work outside the business (negative) and the number of household workforce (positive) (Table 2).

The results of the estimation of the equation of the use of workers outside the family show that the use of workers outside the family is not responsive to changes in household income of rubber farmers outside the business (positive). However, the use of labor outside the family of rubber farmers in an effort is responsive to changes in the total outpouring of farmer work (negative).

Furthermore, the estimation results of the household income equation can be stated that the household income of rubber farmers outside the business is responsive to changes in household income of rubber farmers in the business (negative). However, the household income of rubber farmers outside the business is not responsive to changes in the outflow of rubber farming families outside the business (positive) (Table 2).

Furthermore, the results of estimating the expenditure of rubber farmer households shows that the food consumption of rubber farmer households is not responsive to changes in the number of rubber farmer family members (positive), rubber farmer household recreation expenses (positive) and the education of rubber farmer wives (negative). In the equation of non-food consumption of rubber farmer households shows that non-food consumption of rubber farmer households is not responsive to changes in the total income of rubber farmer households (positive), the number of rubber farmer family members (positive), education of rubber farmer wives (positive) and investment of farmer household education rubber (negative).

Table 2 shows the investment in education shows that the education investment of rubber farmer households is not responsive to changes in the number of school children of rubber farmer households (positive). Several studies on farm household economics show that household education expenditure is significantly influenced by the number of school children and total household income of farmers. Both variables are positively related to education expenditure (Adevia, Bakce, & Hadi, 2017; Asrol & Heriyanto, 2019; Husin & Dwi Wulan, 2011; Khairina, 2017; Putra, Bakce, & Rifai, 2012). Thus the results of this study are in accordance with the results of previous studies.

The equation of rubber farm household business investment it can be stated that the rubber farm household business investment is not responsive to changes in the total income of rubber farm households (positive) and the outflow of rubber farm family work in businesses (positive). Research result (Putra et al., 2012) shows the rubber farming investment variable is influenced by the total income of rubber farm households and the number of school children and is positively related. Both variables are not responsive to investment in rubber farming. Thus this research is similar (Adevia et al., 2017; Putra et al., 2012), where the income variable in farming is part of the total income of farm households.

Meanwhile, from the estimation results in the equation of rubber farmer household recreation expenditure it can be stated that the rubber farmer household recreation expenditure is responsive to

changes in the outflow of rubber farm family work in businesses (negative), rubber farmer education (positive) and the education of rubber farmer wives (positive), but not responsive to changes in the outflow of rubber rubber family work outside the business (negative). Whereas based on the estimation results on the rubber farmer household saving equation it can be stated that the amount of rubber farmer household savings is responsive to changes in the total income of rubber farmer households (positive) but not responsive to changes in the total consumption of rubber farmer households (negative) and changes in interest rates (positive)

## 5. Conclusion

Based on the results of the previous analysis and discussion, conclusions can be drawn. The conclusions of this research are:

- 1) Characteristics of Rubber Farmers, the average age of rubber farmers at productive age (48 years), the length of education of rubber farmers 9 years, the education of the wife of rubber farmers 9 years, 16 years of farmer work experience, 6 household members, 4 farmers' labor force, number 2 school children, 2 hectares land.
- 2) Internal factors of farm households are responsive to household economic decisions. There are no external factors included in the model that are responsive to the economic decisions of rubber farming households in Kuantan Singingi Regency regarding the aspects of production, working time allocation, income and expenditure of rubber farming households. From the aspect of production, no responsive internal or external factors were found, but the biggest effect was the number of productive rubber stems. From the aspect of work time allocation, internal factors that are responsive to influence are the total outpouring of farmer work, outpouring of farm family work in businesses and the workforce of farmer households. Furthermore, from the aspect of farmer's household income the responsive internal factors that influence it are the farmer's household income in the business. then what influences household expenditure is outflow of work in business, farmer education, wife education and total rubber farmer income.

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