The analysis of labor force participation in rubber smallholding sector in Banyuasin Regency, South Sumatera, Indonesia

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A R T I C L E   I N F O

A B S T R A C T

The fact is that natural rubber has a strategic role as it is one of the commodities industry tropical crops. In addition, it also has important and strategic role in supporting the national economy, primarily as a source of livelihood of millions of rubber farmers in rural areas. This study analyzed the potential of using family labor in rubber smallholding sector in Banyuasin Regency, South Sumatra Province, Indonesia. The total sample used for the study was 280 respondents of households. Data was analyzed using multiple regression analyses. The multiple regression analysis used to identify the determinants of labor force participation decision regarding work in the rubber smallholding in the study area such as rubber production (kg per year per hectare), number of family workers, age of family head, location of dwelling, education of family head, and average years of schooling of family workers. Based on the analysis, only two factors affected significantly family labor force participation outside their smallholdings, namely number of family labor and education of family head.

A B S T R A K

Sudah menjadi kenyataan bahwa karet alam memiliki peran strategis karena merupakan salah satu tanaman tropis industri komoditas. Selain itu, produk ini juga memiliki peran penting dan strategis dalam mendukung perekonomian nasional, terutama sebagai sumber mata pencaharian jutaan petani karet di daerah pedesaan. Penelitian ini menganalisis potensi penggunaan tenaga kerja keluarga di sektor kebun karet plasma di Kabupaten Banyuasin, Provinsi Sumatera Selatan, Indonesia. Total sampel yang digunakan untuk penelitian ini adalah 280 responden rumah tangga. Data dianalisis menggunakan analisis regresi berganda. Analisis regresi berganda digunakan untuk mengidentifikasi faktor-faktor penentu keputusan partisipasi angkatan kerja mengenai pekerjaan di kebun karet plasma di daerah penelitian seperti produksi karet (kg per tahun per hektar), jumlah pekerja keluarga, umur kepala keluarga, lokasi tempat tinggal, pendidikan kepala keluarga, dan rata-rata masa pendidikan pekerja keluarga. Berdasarkan hasil analisis, hanya dua faktor yang mempengaruhi partisipasi angkatan kerja secara signifikan terhadap keluarga di luar kebun karet plasma mereka, yaitu jumlah tenaga kerja keluarga dan pendidikan kepala keluarga.

1. INTRODUCTION

It can be said that Indonesia's natural rubber has a strategic role because it is one of the commodities for industry tropical crops in which these crops also have important and strategic role in supporting the national economy. Besides that, it is also considered a primary source of livelihood of millions of rubber farmers in rural areas so as to stem the tide of urbanization, as well as an employer for rubber factory workers. One of these is as superior as the mainstay and export of natural rubber that is able to contribute in the efforts to increase Indonesia's foreign source. For example, Indonesia's export earnings from rubber in 2010 were about US$ 9.373 billion or it has a contribution 5.94 percent of national total export (BPS 2011).

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Eighty five percent of the land in Indonesia is used for the cultivation of rubber consisting of smallholding and the remaining 15 percent is of the large plantations (GAPKINDO 2009). In an effort to achieve Indonesia's position as the world's biggest rubber producer and to increase the role of plantation sub-sector in contributing to the foreign exchange, it is necessary to develop rubber smallholdings. Thus, the development of the smallholdings can increase their productivity and improve farmers' income, thus eradicating the poverty of smallholders.

In fact, the low production of rubber smallholders in Banyuasin Regency tends to decrease. As the main livelihood of rubber smallholder in Banyuasin Regency, of course latex decline in production has an impact on income. The average latex production of this region is 1,200 kg per hectar annually. It is lower than the national average of 2,500 kg per hectare per year (Plantation Department/*Dinas Perkebunan* 2007). In an effort to increase rubber smallholders' farmers' income and make this sector still exist, it is necessary to develop rubber smallholdings, including labor family participation.

There are some key issues such as productivity, efficiency, and income stabilization. These factors can induce the sustainability of smallholder producers. In this case, farm structure is the most simply characterized by the size of farms and their farm and household characteristics (O`Sullivan 2000). A dilemma where the income received from the rubber plantations should be allocated to increase the production of latex and subsistence. Based on Central Bureau of Statistic or BPS (2012), in Banyuasin Regency, the average rubber smallholders' households have four and five dependents. They are classified in the labor force and not labor force. This means that they have family labor can be allocated to work in their own rubber plantation or outside their own rubber plantation to extra income for household.

This is a study of rubber smallholders in Banyuasin Regency, a prime rubber smallholding area in South Sumatra, Indonesia. This study analyzes the factors determining family labor supply. The question in this research is what factors affect the decision to work or not to work outside the rubber smallholding?

2. THEORETICAL FRAMEWORK

The decline in the unemployment rate is one of the indicators of the economic success of a region (Todaro 2006). Yet, the increase of unemployment in rural areas usually occurs because of the small family farm land area and the low level of education of the labor force. The basic theory of the use of labor in the agricultural sector is Chayanov's theory. Chayanov`s introduce an economic model to make a household decision and describe the behavior of farming household by identifying determinants of household are allocated the family labor. In Chayanov theory`s, household is a unit of economic activity which serves as a consumer and also a producer.

As a producer, a household will produce goods for their own needs and for trading while as a consumer, a household will try to maximize the utility rate through the optimization of utility. A constraint faced in the optimally of utility is the income rate. The decision of consumption activity is related to the decision in undertaking production activity. A household which serves as a producer will produce goods which will be used for consumption needs and for trading. In this case, a household will maximize benefits or income which can be done by increasing productivity or by reducing production costs. It is said that farmers emphasize more on securing family needs rather than on getting profits (Thorner, Kerblay & Smith 1996).

The determinants of labor supply are other wage rates, non-wage income, preferences to work versus leisure, non-wage aspects of the job and number of qualified suppliers. Labor allocation depends on the time to relax and wage labor market will be accepted. Besides that, the allocation of the use of family labor in the agricultural sector is influenced by agricultural production, household characteristics, assets owned and internal factors and external factors households (McConnel, Camphell & David 1999).

The allocation of family labor is an effort of rubber smallholders to increase household income. They family labor can be allocated to the agricultural or non-agricultural sector. Besides the utilization of vacant land is also one attempt to allocation family labor outside the main job as a rubber farmer. Based on Team of Swadaya Publisher or *Penulis Penebar Swadaya* (2009), rubber plantation can be interspersed with other crops that can be used by farmers to be sold or consumed. It`s means that there is needs more labor to do a side job. The research conduct by Kindangen (2000) on the coconut farmers at Sulawesi for one year spent about 80 hours. This indicates that the available time of about 35 hours per month or 420 hours per year are not allocated. The uses of family labor of course

have an impact on the work ethic that is not easy to be changed. The possibility of farmers had enough with what they have gained over the years. Kindangen`s study suggest that to give understanding the importance of the use of the spare time to by farmers to get an extra income and increase farmers' household.

As Adriani (2000) found, majority of rural farming tend to work less than 35 hours per week. Labor in the agricultural sector is also lower than the non-agricultural sector. This research supported by Kasryno (2000) which states that the agricultural sector is still prevalent phenomenon of underemployment. Average hours of the agricultural sector are 26 hours per week while in the manufacturing sector 44 hours. The level of labor wages in the agricultural sector a half of non-agricultural sector. To increase income of farmer`s household, according to Pranadji (1999) need to stimulate the enthusiasm of farmers, including increased output and output marketing.

Another proponent is Renkow (2003) who estimated labor market model at the county level for North Carolina. He used the county level data considering the years 1980 and 1990. Three stage-least-square (3SLS) methods were employed for empirical analysis. The findings showed that changes in real wages and housing prices seemed to be more vital factors of adjustment in labor market in metro counties than in rural counties. In addition, labor force growth was significantly influenced by the changes in employment in nearly counties.

Besides the above evidence, Wang & Glauben (2007) also showed that there existed non-divisibility between labor demand and supply decisions of farm workers and thus imperfections in the labor markets. Li Q et al.(2005) reported that the off farm labor markets would be functioning well because the returns of off farm labor were almost equal over many alternative employment opportunities and off farm incomes were significantly determined by education. Also, Kimhi (2004) discussed the role and importance of agriculture sector in the development of rural areas. The study used data on rural semi-cooperative villages. The data collected from four sources. Census of Population in Israel was the main source of data for the study. OLS technique was used for estimation analysis. The study concluded that the impact of importance of agriculture or rural development was mixed.

Again, Mduma & Wobest (2005) analyzed the factors that affect the rural labor force participa-

tion. The study used the data from Household Budget Survey (HBS) in Tanzania in the year 2000-2001. Truncated regression and negative binomial regression techniques were employed for estimation. The findings of the study indicated that level of education, land availability, access to economic centers and credit turned out to be the most crucial factors in determining the rural labor force participation and the share of the labor income in total cash income. Glauben, Herzfeld & Wang (2008) contributed to the continued discussion over Chinese labor force participation in rural labor market during the last twenty years. They used the household data from the Zhejiang province during the period 1986-2002 analyze empirically household, farm and regional characteristics influencing the probability of the farmers' participation in any one labor market regimes. The results of the study indicated that rural employment was significantly affected. The findings showed that the education turned out to be the crucial factor for labor market participation.

Still another researchers, Faridi & AB Basit (2011) studied show that the rural labor force participation both on farm and off farm activities is regarded very important for rural development. The present research has explored various human and non-human factors for determining the rural labor supply. We have observed from the present analysis that Education turns out to be very significant factor in determining rural labor supply. The completed years of education and various educational levels have positive and significant impact on rural supply of labor. The study concludes that marital status; number of dependents and social overhead capital positively affect the supply of labor in rural areas.

Further, we have found that number of livestock, size of land holdings and spouse's participation in economic activities significantly reduce the off farm labor force participation. Based on the study's findings, the following suggestions are recommended:

1. Basic and higher education institutions should be established in rural areas especially agricultural education.
2. Government should improve the rural infrastructure by providing electricity, health facilities and also road infrastructure.
3. Security facilities should be provided through establishing police stations in rural areas.
4. To expand the rural business activities, markets and business centers might be developed in rural areas

3. RESEARCH METHOD

Concepts and Operational Variables

A variable is a concept that has a variety of values. The concept can be determined from one or more variables which can be a research element. In this study, the concept of determined variables is described as follows:

a. **A rubber smallholding** is owned by individuals or households. Their own capital is relatively low as well as their bargaining level. Their sources of livelihood are their small holdings, which were inherited over several generations.

b. **Household** is a group of people who live in a house and combine their income/earnings to consume from the same kitchen. Household (in terms of the concept) is more interpretive economic significance from the family unit, such as how to manage the family economy, the division of labor and function, earnings, consumption, type of production and services produced.

c. **The utilization of family labors** (Y1) is a decision of utilizing family labors for having rubber plantation activities or not. The decision to utilize family labor is 1 and the decision not to utilize family labor is 0. The measurement of family labors activity is hours per day. Based on BPS, the standard of working hours in Indonesia is ranged from 35 to 42 hours per week with effective working time of 5 days a week. The variables of utilization of family labor are as follows:

1. **Latex production (X1)** is the number of rubber production harvest. The rubber product is latex. The measurement of latex product uses kilogram per tree per year per hectare.

2. **Number of family workers (X2)** is number of family of labor force in household. Based on BPS, the labor force category in Indonesia starts from 15 to 64 years. This category is used in this research.

3. **Age of family head (X3)** is the age of family head which the measurement of age of family head is in years.

4. **Location of dwelling (X4)** is the distance between a living place and a centre of city. The measurement of dwelling location is in kilometers.

5. **Education of family head (X5)** is the level of formal education of family head. The variables are as follows:
   - Primary school

- Junior high school
- Senior high school
- Above senior high school

6. **Average years of schooling of family workers (X6)** is the level of formal education of family members who are in the labor market outside the rubber smallholding. Given the variation in the educational attainment of family members who are working outside rubber smallholding, the average of the level of education (in years) is used in this study. The categorization of education level of family members in the labor market is as follows (based on Regulation No. 20 Year 2003 in the Indonesian National Education System):
   - Low education (1 to 9 years)
   - Medium level education (more than 9 to 12 years)
   - High education level (more than 12 years).

Sampling and Data Collection

The total sample size is 280 rubber smallholding households. Because the sample is homogenous, i.e. rubber smallholder household, the sample was taken using random sampling. The data collection consists of primary and secondary data. Collecting primary data is done through direct observation and questionnaires. Observation is a technique used to collect data by conducting systematic observation and recording of the phenomena in accordance with the purposes of this research. Direct observations are observations made on objects being studied in place. Another data collection technique is by distributing questionnaire. Questionnaire is an attempt to gather information by submitting a number of written questions to be answered in writing by respondents. The data analyzed using multiple regression analyses.

The model for decision to use labor family on own rubber smallholding and non rubber smallholding activity (Y) analysis is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon \tag{1}$$

The Model equation 1 was used to identify the influence of explanatory variables X1, X2, X3, X4, X5 and X6 was done by simultaneous and partial analysis to the dependent variable (Y). Y is nominal scale.

Y = Decision use to labor family
$X1$ = Latex production (kg per year per hectare)
$X2$ = Number of family workers

Table 1
Backward Stepwise Regression

	Variables	B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	X3	.012	.013	.770	1	.380	1.012
	X5			11.115	3	.011	
	X5(1)	.745	.591	1.590	1	.207	2.106
	X5(2)	1.329	.545	5.938	1	.015	3.777
	X5(3)	1.085	.371	8.562	1	.003	2.961
	X2	1.083	.151	51.637	1	.000	2.954
	X6			1.198	2	.549	
	X6(1)	-.023	.441	.003	1	.958	.977
	X6(2)	-.289	.342	.713	1	.398	.749
	X4	.004	.004	.893	1	.345	1.004
	X1	.000	.000	.034	1	.855	1.000
	Constant	-3.095	.985	9.871	1	.002	.045
Step 2a	X3	.012	.013	.785	1	.376	1.012
	X5			15.487	3	.001	
	X5(1)	.809	.474	2.911	1	.088	2.246
	X5(2)	1.392	.424	10.768	1	.001	4.022
	X5(3)	1.119	.321	12.142	1	.000	3.063
	X2	1.084	.151	51.616	1	.000	2.955
	X6			1.221	2	.543	
	X6(1)	.001	.421	.000	1	.999	1.001
	X6(2)	-.279	.338	.683	1	.409	.757
	X4	.004	.004	.944	1	.331	1.004
	Constant	-3.221	.706	20.841	1	.000	.040
Step 3a	X3	.012	.013	.771	1	.380	1.012
	X5			19.315	3	.000	
	X5(1)	.921	.378	5.939	1	.015	2.511
	X5(2)	1.458	.352	17.156	1	.000	4.297
	X5(3)	1.093	.305	12.802	1	.000	2.983
	X2	1.068	.143	56.029	1	.000	2.910
	X4	.004	.004	1.047	1	.306	1.004
	Constant	-3.321	.648	26.292	1	.000	.036
Step 4a	X5			20.171	3	.000	
	X5(1)	.938	.376	6.210	1	.013	2.555
	X5(2)	1.467	.351	17.428	1	.000	4.337
	X5(3)	1.137	.302	14.195	1	.000	3.118
	X2	1.102	.138	63.540	1	.000	3.011
	X4	.005	.004	1.193	1	.275	1.005
	Constant	-2.903	.433	44.997	1	.000	.055
Step 5a	X5			20.061	3	.000	
	X5(1)	.911	.375	5.913	1	.015	2.488
	X5(2)	1.448	.350	17.118	1	.000	4.254
	X5(3)	1.146	.302	14.450	1	.000	3.146
	X2	1.100	.138	63.713	1	.000	3.004
	Constant	-2.650	.361	53.914	1	.000	.071
	Constant	-2.650	.361	53.914	1	.000	.071

X3 = Age of family head
X4 = Location of dwelling
X5 = Education of family head
X6 = Average years of schooling of family workers

4. DATA ANALYSIS AND DISCUSSION

In this research, the regression equation for the labor force participation of family labor outside the own family plantation farm:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$
(2)

In the regression model, we define the education categories of X_5 using the following dummy variables:

X5A = 1 primary education, 0 others
X5B = 1 junior high school, 0 others
X5C = 1 senior high school, 0 others.

The education above senior high school is the base group for comparison purposes. The variable of education of family labor is a categorical variable having 3 categories i.e. low, medium and high levels. In the regression model, X6 is expressed as a set of dummy variables as follows:

X6A = 1 low education, 0 others
X6B = 1 medium education, 0 others

Higher education is the base group for comparison purposes. The regression model for the decision of using or not using the family labor outside the family rubber farm is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_{5A} + \beta_6 X_{5B} + \beta_7 X_{5C} + \beta_8 X_{6A} + \beta_9 X_{6B}$$
(3)

In this case, the variable Y1 is a dependent categorical variable with 2 categories, i.e. 1 if family labor is used outside the rubber farm and 0 otherwise. Based on the analysis, some independent variables were found to be insignificant in the equation (Table 1). Statistically, those variables can be eliminated gradually from the regression model using backward stepwise method (Table 1).

The results show that the insignificant independent variables taken out gradually from the model are the variables X1, X3, X4 and X6, but have a positive sign, thus leaving only the variables X2, X5A, X5B and X5C in the model. It means that of all the identified variables, there are only two variables influencing significantly the decision of using or not using the labor of family members, i.e. the variables of the number of the family member labor (X2) and education of family head (X5). This research uses *Backward Stepwise Regression.* The advantage of backward elimination is that it allows the researchers to look at all independent variables in the model before removing the variables that are not significant. The result is presented in Table 1.

Step 1, all independent variables are included in the model, as in Table 1. Step 2, variable X1 is excluded from the model because it does not affect Y significantly. Step 3, variable X6 is excluded from the model because it is not significantly influential. Step 4, variable X3 is excluded from the model due to the same reason. Step 5, no more variables are excluded from the model because these remaining variables are statistically significant at α= 5%.

Based on the results in Step 5 of the table, the regression model is:

$$Y = \beta_0 + \beta_1 X_2 + \beta_2 X_{5A} + \beta_3 X_{5B} + \beta_4 X_{5C}.$$
(4)

The equation is:

$$Y = -2.650 + 1.100 X_2 + 0.911 X_{5A} + 1.448 X_{5B} + 1.146 X_{5C}.$$
(5)

Based on equation 2, the numbers of family members in working age group and education of the family heads have a positive, significant effect on Y. It means that the more the number of family members in the working age group, the more likely it is that the family utilizes their labor power outside the farm. The coefficients of the education dummy variables indicate that the probability of family members' labor force participation outside the farms is higher in households where the family head has either primary, junior high school or senior high school education as compared to the case where the family head has above senior high school education (i.e. the base group).

Based on research finding, most of the rubber farmers in Banyuasin Regency have relatively bigger families; i.e. 6 to 7 number of family members. Bigger family means more household expenses for consumption. This was quite a problem for families, who have insufficient income to meet their family needs. However, having a big family also means family members can help their families earn extra income by working in or outside their rubber farm. However, this study showed that farmers in Banyuasin regency prefer to postpone their labor force participation of the school going children; i.e. they rather have their children complete senior high school education before allowing them to enter the labor force. This is one way farmers can enhance their children's earning power in the future.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATION

In general, it can be concluded as the following: First of all, there are two variables that have significant effect on the decision to use family labor, namely the number of the family member labor and education of family head. As based on equation 5, the number of family members in working age group and education of the family heads has a positive, significant effect on decision use to labor family. It indicates that the more the number of family members in the working age group, the more likely it is that the family utilizes their labor power outside the farm. The coefficients of the

education dummy variables indicate that the probability of family members' labor force participation outside the farms is higher in households where the family head has either primary, junior high school or senior high school education as compared to the case where the family head has above senior high school education (i.e. the base group).

The implication of this research is the farmers should give priority to children's schooling as they have viewed that human capital investment is important to improve earnings. The government could help children of the poor farmers to get the higher levels (medium/high) of education. One of the ways is to give education loans or scholarship to the poor children and to provide adequate educational facilities and schools in Banyuasin regency.

REFERENCES

Adriani, Dessy, 2000, 'Dampak Kebijaksanaan Pemerintah Terhadap Keragaan Pasar Kerja dan Migrasi pada Periode Krisis Ekonomi Di Indonesia', *Post Graduate Thesis*, Program Pascasarjana IPB, Bogor.

Badan Pusat Statistik, 2009, *Banyuasin dalam angka,* Kabupaten Banyuasin, Sumatera Selatan, Indonesia, BPS Kabupaten Banyuasin.

Badan Pusat Statistik, 2011, *Statistik Perkebunan Karet Indonesia*, Sumatera Selatan, Indonesia, BPS Pusat Palembang.

Badan Pusat Statistik, 2012, *Sumatera Selatan dalam angka*, Sumatera Selatan, Indonesia, BPS Pusat Palembang.

Barnum, NH & Squire, L 1979, 'An econometric application of the theory of the farm household', *Journal of Development Economics*, 6 (102), pp. 46-51.

D Thorner, B Kerblay & REF Smith (ed.), 1996, *The Theory of Peasant Economy*, The American Economic Association, Home Wood, Illinois.

Damsar 2002, *Sosiologi ekonomi*, PT RajaGrafindo Persada, Jakarta.

Dinas Perkebunan Propinsi Sumatera Selatan, 2007, *Profil perkebunan di Sumatera Selatan*, Palembang, Indonesia.

Faridi, Muhammad Zahir and AB Basit, 2011, 'Factors Determining Rural Labor Supply: A Micro Analysis', *Pakistan Economic and Social Review*, Volume 49, No. 1 (Summer 2011), pp. 91-108.

GAPKINDO, 2009, *Prospek Perkebunan Karet Indonesia*, <http://karetalam.com/index.htm>

Glauben, T, T Herzfeld and X Wang, 2008, 'Labor market participation of Chinese agricultural household: Empirical evidence from Zhejiang province', *Food Policy, Science Direct*, Volume 33, pp. 329-340.

Hardi, Usman, 1990, 'Perilaku ekonomi rumah-tangga usahatani sebagai unit produksi dan konsumsi terpadu dengan aplikasi pada petani padi semi komersial di kawasan Tarum Timur Propinsi Jawa Bara', *PhD Dissertation*, Universitas Padjadjaran, Bandung.

Kasryno, Faisal, 2000, 'Sumberdaya Manusia dan Pengelolaan Lahan Pertanian Di Pedesaan Indonesia', *Forum penelitian Agro Ekonomi*, Pusat Penelitian Sosial Ekonomi Pertanian, Badan Litbang Pertanian, Departemen Pertanian, Bogor.

Kimhi, A 2004, 'The role of agriculture in rural well-being in Israel', The Center for Agricultural Economic Research, *Paper,* No. 3.04.

Kindangen, JG 2000, 'Pemberdayaan Petani Dalam Pengembangan Sistem Usaha Pertanian Berbasis Kelapa di Sulawesi Tengah', *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*, 3 (1), pp. 25-29, Bogor.

Li, Q, A de Brauw, S Rozelle and L Zhang, 2005, 'Labor market emergence and returns to education in rural china', *Review of Agricultural Economics*, Volume 27 (3), pp. 418-424.

McConnel, Camphell R, Stanley L Brue & David A Macpherson, 1999, *Contemporary Labor Economic*, Fifth edition, Irwin/McGraw-Hill, Singapore.

Mduma, JK and P Wobest, 2005, 'Determinants of rural labor market participation in Tanzania', *African Studies Quarterly*, Volume 8 (2), pp. 32-47.

O`Sullivan, Arthur, 2000, *Urban Economic,* International Edition, The McGraw-Hill Companies, Inc., United State of America.

Pranadji, T 1999, W*irausaha, kemitraan dan pengembangan agribisnis secara berkelanjutan dalam dinamika inovasi social ekonomi dan kelembagaan pertanian*, Bogor: Pusat Penelitian Social Pertanian, Balitbang Pertanian.

Renkow, M 2003, 'Employment, growth, worker mobility and rural economic development', *American journal of Agricultural Economics*, Volume 85 (2), pp. 503-513.

Simanjuntak, P 1997, 'Penawaran tenaga kerja wanita: Beberapa faktor penting yang mempengaruhinya dan rekomendasi kebijakan pada wanita yang telah kawin di Sumatera Utara', *Paper*, Fakultas Ekonomi Universitas HKBP Nommensen, Medan, Indonesia.

Tim Penulis Penebar Swadaya, 2009, *Panduan Lengkap Karet*, Penerbit Penebar Swadaya, Jakarta.

Wang, X, T Herzfeld and T Glauben, 2007, 'Labor allocation in transition: Evidence from Chinese rural households', *China Economic Review*, Volume 18, pp. 287-308.