The Relationships between the Socioeconomic Profile of Farmers and Paddy Productivity in North-West Selangor, Malaysia

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Citation Reference:

Alam, M.M., Siwar, C., Talib, B., and Mohd Ekhwan, T. 2011. The Relationships between the Socioeconomic Profile of Farmers and Paddy Productivity in North-West Selangor, Malaysia, *Asia-Pacific Development Journal*, Vol. 18(1), pp. 161-173, Available at < <http://www.unescap.org/pdd/publications/apdj-18-1/5-Alam-and-others.pdf>>. (ISSN 1020-1246; Publisher- United Nations (UN ESCAPE) Publication)

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Abstract

Paddy is the main food crop in Malaysia, but due to a low rate of productivity, the land area for paddy production is gradually decreasing. As a consequence, it is critically important to know the socio-economic characteristics of the paddy farmers and their linkage with agricultural productivity to ensure the sustainability of paddy farms as well as farmers' livelihood. This study analyses the relationships between the paddy yields and the socio-economic characteristics of the farmers in the Integrated Agricultural Development Area (IADA), North-West Selangor, Malaysia. The data was collected through a survey. To analyse the data, this study conducted cross-sectional multiple OLS regressions. The findings of the study revealed that several socio-economic and physical characteristics had significant effects on paddy productivity in Malaysia. Based on the findings, some policy recommendations and action plans have been proposed focusing on paddy productivity and socio-economic sustainability of the livelihood. The findings of the study are important for the policymakers and relevant agencies.

JEL Classification: C21, Q12, Q15, Q18.

Key words: Paddy productivity; Socioeconomic characteristics; Physical characteristics; Agricultural Policy; Malaysia

I. INTRODUCTION

Malaysia is one of the fast growing industrializing countries. In the path to industrialization, the agricultural sector's share of the country's gross domestic product (GDP) has been declining since 1975. In 1970, the contribution of agriculture to GDP was 30.8 per cent, which was the highest among all sectors. It fell to 22.7 per cent in 1975 and stood at 22.9 per cent and 20.8 per cent in 1980 and 1985, respectively, but still remained the top sector contributing to GDP. In 1990, agriculture became the second largest sector, contributing 18.7 per cent to the national GDP. In 1995, the contribution of agriculture to the national GDP further declined to 13.6 per cent, but it remained as the second largest sector in the economy. The contribution of the sector continued to decline to 8.9 per cent and 8.2 per cent in 2000 and 2005, respectively. As the agriculture sector lost its importance to the national economy, services and manufacturing sectors became the first and second highest contributing sectors, respectively, placing the agriculture as the third engine of economic growth in the country

Land use for the agricultural activities in Malaysia is declining due to the country's rapid economic development. In line with the changing economy, many land areas once used to grow crops are now be used for housing, business, and industrial purposes. From 1960

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until 2005, the land use for industrial crops increased while land use for food crops decreased. This implies that more and more agricultural land is being used for growing industrial crops and that the importance of growing food crops is on the decline. In terms of numbers, land use for food crops accounted for 31.5 per cent of the total agricultural land in Malaysia, compared to 16.3 per cent in 2005. Among the industrial crops, palm oil accounted for the largest share of the total land utilization in the country. Agricultural land used by the palm oil sector has significantly increased over the last five decades from only 2.1 per cent of the total amount in 1960 to 63.4 per cent in 2005. This is an indication that palm oil production has been gaining in importance and contributing significantly to the national economy. Yamada (2003: 171) mentioned that the agriculture sector in Malaysia is characterized by a dualistic structure, consisting of large plantation companies, which are professionally managed and focus on perennial crops, such as oil palm, rubber and cocoa, and small farmers, which are generally not well managed and concentrate their activities on cultivating food crops.

Rice is the main staple food in Malaysia. There are 300,000 paddy farmers in the country, of which only 40 per cent of them are full-time farmers (Man and Sadiya, 2009). Pio Lopez (2007) mentioned that A World Bank study noted - 65 per cent of farms are less than one hectare, and Malaysia is an inefficient producer of rice. The study also noted that the price of locally produced rice was double that of imported rice. It was estimated that 74 per cent of paddy producers' monthly income came from income support measures, suggesting that the Malaysian paddy subsector is non-viable and non-sustainable. Government support for research and development, production and marketing in this subsector have taken many forms. Credit facilities, fertilizer subsidies, irrigation investment, guaranteed minimum price, income support programmes, subsidized retail price as well as research and extension support (training and advisory services), to the tune of billions of dollars for the past 50 years, have been a fiscal drain on the nation. Despite the massive fiscal outlays, rice production remains chronically inefficient with regards to meeting market demand. Given the continued decline in cultivated area, negligible gains in productivity, continued increases in the cost of production and decreasing profitability, rice production in Malaysia can be considered a sunset industry (Pio Lopez, 2007).

The current record also shows a negative trend of land usage for paddy production. There are total 426,260 ha paddy planted area, and average yield is 3.5 tons per hectare (Malaysia, 2008). Singh and others (1996) pointed out that the actual farm yields of rice in Malaysia varied from 3 to 5 tons per hectare, where potential yield is 7.2 tons. Pio Lopez (2007) noted that rice production in Malaysia was going to end due to the continued decline in the cultivated area, negligible gains in productivity, continued increases in the cost of production and decreasing profitability. Jayawardane (1996) indicated that 90 per cent of the total paddy productivity is contributed by labour, farm power, fertilizer and agro-chemicals. Out of which, 45 per cent is contributed by labour.

The Third Malaysia Plan (Malaysia, 1976) reported that the incidence of poverty was 88 per cent among the rice farmers. The National Response Strategies (Malaysia, 2001) also reported that the poor are the most vulnerable population group to climate change and that the hardcore poor tended to have a relatively large number of household members and be involved in agricultural activities. While working in the Muda Agricultural Development Authority (MADA) area, Corner (1981) observed that off-farm employment should be expanded as part of an anti-poverty strategy. Shand and Chew (1983) conducted research in Kelantan, Malaysia and found that a large majority of farmers had relied heavily on off-farm

employment in order to attain a modest standard of living. An assessment of the socio-economic profile of farmers in Selangor, Malaysia, indicated that 81 per cent of the farmers were between 20 and 60 years old, and that 84 per cent of them had at a least primary education (TaniNet 2nd Report, 2000).

To remedy the above, the Second National Agricultural Policy 1992-1997 (Malaysia, 1992) has been revised and Third National Agricultural Policy 1998-2010 (Malaysia, 1998) has been introduced based on a vision of sustainable development of a dynamic agricultural sector focusing on the market-led, commercialized, efficient and competitive growth of agriculture. The principal aim of Third National Agricultural Policy was to maximize income of the stakeholders through optimal utilization of resources.

In addition to actual production, several socio-economic characteristics as well as the physical assets must be accounted for when measuring productivity pertaining to agricultural activities. Moreover, variables that may affect productivity, such as climate change, must also be considered by officials when setting agricultural policies. This paper attempts to analyse the effects of the socio-economic characteristics of farmers on the productivity of paddy as well as discussing the policy implications for the relevant factors.

II. BACKGROUND OF THE STUDY AREA

The agricultural history of the study area started before 1930. An irrigation controlled area was built at Pancang Bedena in 1932 and 15,000 acres of land was converted to a rice field, with planting starting in this area in 1936. The yield was very low at that time due to a water shortage. To solve the water shortage, a barrage at Tengi river was built in the same year of 1936. Since 1948, a number of concrete waterways have been built in the area. In 1962, double planting of paddy per year was introduced in the area and a pump house was built in Began Terap to provide sufficient water in remote land areas in the south. By 1966, all of the paddy areas in the study area were being planted twice yearly. In 1978, Projek Barat Laut Selangor (PBLS) was established to help boost productivity, upgrade and improve the infrastructure of the agricultural plots, and look after the welfare of the farmers. In 1982, planting by direct seeding was introduced in this area. Before it was changed to North West Selangor Integrated Agricultural Development Project (IADP), it was called Tanjung Karang Drainage Scheme. In 1985 North-West Selangor Integrated Agricultural Development Project (IADP) was completed, costing USD\$87 million, financed by World Bank loan. This project focused on improving irrigation infrastructure for rice intensification. Recently the name of IADP has been changed as Integrated Agricultural Development Area (IADA) that focuses on the area development in the North-West Selangor.

Now the IADA in North West Selangor consists of eight areas - Sawah Sempadan, Sg. Burong, Sekinchan, Sg. Leman, Pasir Panjang, Sg. Nipah, Panchang Bedena, and Bagan Terap. The total agricultural land area of the IADA is 100,000 hectare (ha), with 55,000 ha used for palm oil, 20,000 ha for coconut, 5,000 ha for fruits and vegetables and 20,000 ha for paddy. This 20,000 ha for the paddy area contains a river, a drainage system, and rural roads. The total paddy producible area is 18,638 ha, and currently paddy is planted on 18,355 ha. Total paddy irrigated area is 18,980 ha, with the additional 625 ha being used for drainage. There are total of 10,300 paddy farmers and 30,000 other crops producers. The total size of the agricultural community is 50,000.

III. DATA AND METHODOLOGY

As mentioned earlier, the productivity of crops is determined by many socio-economic and physical factors. To ascertain the effects of these factors, this study mostly relied on primary data from a research project entitled “The economics of climate change: Economic dimensions of climate change, impacts and adaptation practices in agriculture sector: Case of paddy sector in Malaysia”, conducted by the Institute for Environment and Development (LESTARI) of the National University of Malaysia (UKM) (Alam and others, 2010a). Data for this project were collected through a sample survey of paddy producing farmers in the eight sections of the Integrated Agricultural Development Area (IADA) of North West Selangor, Malaysia. The target group of the survey was paddy producing farmers. The survey was a structured questionnaire taken by regular enumerators of the IADA authority under the direct supervision of IADA officials. The population size of the area was 10,300 while the sample for the study consisted of 198 respondents proportionately distributed among the eight areas based on the size of the irrigated land area. The 198 households covered 577.53 ha of paddy areas. The sample within the area is selected randomly. Details socioeconomic profiles of the respondents are available at Alam and others (2010a, 2010b).

While analysing the relationship between socio-economic characteristics of farmers and agricultural yield, this study conducted cross sectional-multiple OLS regressions based on the survey data. To avoid the problem of heteroskedasticity, further regression was conducted by the “White Heteroskedasticity – Consistent Standard Errors and Covariance” method by using EViews econometric software.

The econometric model used in this study avoided the direct inputs variables that determine the crop yield, such as labour hours, use of pesticides, use of fertilizers and use of irrigation. Instead, it assumes that all of the direct input factors are exogenous and constant based on the view that the government provides these facilities in fixed quantities, which very few farmers exceed. In this model, factors relevant to socioeconomic characteristics of farmers (W_1 - W_{11}), physical characteristics of the farm (W_{12} - W_{22}), and farmers’ knowledge about relevant current issues, such as climate change (W_{23}), are considered to determine its relationship with the yield of paddy production.

$$P_i = \alpha + \beta_1 W_{1i} + \beta_2 W_{2i} + \beta_3 W_{3i} + \beta_4 W_{4i} + \beta_5 W_{5i} + \beta_6 W_{6i} + \beta_7 W_{7i} + \beta_8 W_{8i} + \beta_9 W_{9i} + \beta_{10} W_{10i} + \beta_{11} W_{11i} + \beta_{12} W_{12i} + \beta_{13} W_{13i} + \beta_{14} W_{14i} + \beta_{15} W_{15i} + \beta_{16} W_{16i} + \beta_{17} W_{17i} + \beta_{18} W_{18i} + \beta_{19} W_{19i} + \beta_{20} W_{20i} + \beta_{21} W_{21i} + \beta_{22} W_{22i} + \beta_{23} W_{23i} + \epsilon$$

Here, P_i = Yield of Paddy Production

W_{1i} = Race of the Farmer (Dummy Variable where Malay = 1, Other = 0)

W_{2i} = Gender of Farmer (Dummy Variable where Male = 1, Other = 0)

W_{3i} = Age of the Farmer

W_{4i} = Secondary Occupation (Dummy Variable where Having Secondary Occupation = 1, No Secondary Occupation = 0)

W_{5i} = Tertiary Education (Dummy Variable where Having Tertiary Education = 1, Other = 0)

W_{6i} = Primary Education (Dummy Variable where Having Primary Education = 1, Other = 0)

W_{7i} = Secondary Education (Dummy Variable where Having Secondary Education = 1, Other = 0)
 W_{8i} = Family Size (number of family members)
 W_{9i} = Non-Agriculture to Agricultural Income Ratio
 W_{10i} = Number of Available Vehicle
 W_{11i} = Distance between Home and Field
 W_{12i} = Farm Size (Size of Paddy Cultivated area)
 W_{13i} = Mixed Ownership of Land (Dummy Variable where Both Own and Rent Land Use = 1, Other = 0)
 W_{14i} = Own Land (Dummy Variable where Own Land Use = 1, Other = 0)
 W_{15i} = Number of Available Machineries
 W_{16i} = Locality Sawah Simpadan (Dummy Variable where Sawah Simpadan = 1, Other = 0)
 W_{17i} = Locality Sekinchan (Dummy Variable where Sekinchan = 1, Other = 0)
 W_{18i} = Locality Sg. Nipah (Dummy Variable where Sg. Nipah = 1, Other = 0)
 W_{19i} = Locality Bagan Terap (Dummy Variable where Bagan Terap = 1, Other = 0)
 W_{20i} = Locality Sg. Burong (Dummy Variable where Sg. Burong = 1, Other = 0)
 W_{21i} = Locality Pasir Panjang (Dummy Variable where Pasir Panjang = 1, Other = 0)
 W_{22i} = Locality Sg. Leman (Dummy Variable where Sg. Leman = 1, Other = 0)
 W_{23i} = Know about current issues (such as Climate Change)
 α = Constant
 β = Coefficient of Respective Explanatory Variable
 ε = Residual

IV. RESULTS AND DISCUSSIONS

The multiple regression based on the social characteristics of farmers on yield of paddy shows mixed results. The results differ based on normal output and heteroskedasticity consistent standard errors and covariance (the White Test for heteroskedasticity) output. For reporting purposes both data are reported, but for analysis and drawing inferences only the heteroskedasticity adjusted results are considered here. In both cases, the R^2 is 0.44, which means that the independent variables explain 44 per cent of the dependent variable. As explained earlier, this model assumes the main input variables that determine yields of paddy are exogenous due to an almost fixed value for all observations. As these exogenous variables highly determine the dependent variable, excluding them in the model would result in a moderate value of R^2 .

Table 1. Descriptive statistics

Variable	Mean	Std. Deviation	N
Pi	6.95	2.169	198
W_{1i}	.90	.302	198
W_{2i}	.90	.295	198
W_{3i}	52.93	11.629	198
W_{4i}	.16	.364	198
W_{5i}	.04	.197	198
W_{6i}	.47	.501	198

W _{7i}	.43	.496	198
W _{8i}	4.74	1.972	198
W _{9i}	2.92	2.681	198
W _{10i}	.30	.459	198
W _{11i}	.53	.500	198
W _{12i}	2.97	2.071	198
W _{13i}	.13	.333	198
W _{14i}	.10	.295	198
W _{15i}	.10	.302	198
W _{16i}	.13	.333	198
W _{17i}	.16	.369	198
W _{18i}	.18	.382	198
W _{19i}	.12	.327	198
W _{20i}	.56	3.082	198
W _{21i}	.59	.493	198
W _{22i}	1.42	4.232	198
W _{23i}	3.62	1.921	198

Table 2. Regression output for paddy yield on farmers' socio-economic characteristics

Variable	Normal Value				Heteroskedasticity Consistent Value			
	Coefficient	t-stat	P-value	Elasticity	Coefficient	t-stat	P-value	Elasticity
α	8.93*	6.12	0.00		8.93*	6.12	0.00	
W _{1i}	-3.12*	-5.00	0.00	-0.40	-3.12*	-5.00	0.00	-0.40
W _{2i}	-0.36	-0.69	0.49	-0.05	-0.36	-0.69	0.49	-0.05
W _{3i}	-0.01	-0.59	0.56	-0.06	-0.01	-0.59	0.56	-0.06
W _{4i}	-0.68***	-1.84	0.07	-0.02	-0.68***	-1.84	0.07	-0.02
W _{5i}	1.38	1.56	0.12	0.01	1.38	1.56	0.12	0.01
W _{6i}	1.08***	1.75	0.08	0.07	1.08***	1.75	0.08	0.07
W _{7i}	1.29**	2.11	0.04	0.08	1.29**	2.11	0.04	0.08
W _{8i}	0.04	0.54	0.59	0.03	0.04	0.54	0.59	0.03
W _{9i}	0.06	1.09	0.28	0.00	-0.09**	-2.16	0.03	-0.01
W _{10i}	0.42	1.15	0.25	0.22	-0.11	-1.25	0.21	-0.06
W _{11i}	-0.20	-0.54	0.59	-0.04	-0.03	-1.48	0.14	-0.01
W _{12i}	0.14**	2.07	0.04	0.06	0.06	1.09	0.28	0.02
W _{13i}	-0.20	-0.40	0.69	-0.01	0.42	1.15	0.25	0.02
W _{14i}	0.44	0.53	0.59	0.03	-0.20	-0.54	0.59	-0.02
W _{15i}	0.63	1.60	0.11	0.27	0.14**	2.07	0.04	0.06
W _{16i}	-0.21	-0.34	0.73	0.00	-0.20	-0.40	0.69	0.00
W _{17i}	0.88***	1.82	0.07	0.01	0.44	0.53	0.59	0.01
W _{18i}	0.58	0.96	0.34	0.01	0.63	1.60	0.11	0.01
W _{19i}	0.01	0.01	0.99	0.00	-0.21	-0.34	0.73	0.00
W _{20i}	-0.09**	-2.16	0.03	0.00	0.88***	1.82	0.07	0.02
W _{21i}	0.04	0.13	0.90	0.00	0.58	0.96	0.34	0.01
W _{22i}	-0.03	-1.48	0.14	0.00	0.01	0.01	0.99	0.00
W _{23i}	-0.11	-1.25	0.21	-0.01	0.04	0.13	0.90	0.00

*, **, and *** are significant at the 1%, 5% and 10% significance level, respectively.

Note: Elasticity = $\beta_j * (\bar{W}_{ji} / \bar{P}_{ji})$; $\bar{W}_{ji}$ = Mean of Respective W_i ; $\bar{P}_{ji}$ = Mean of Dependent Variable P_i ; j = Respective Independent Variable.

The demographic data, including, among other factors, ethnicity, gender and age, are considered in terms of labour quality for the yield of production. The result shows that that race has significant impacts on productivity. In the dummy variable, Malay farmers are classified as 1 and Chinese farmers are classified as 0. The coefficient of the regression result shows a significant negative relationship, a 1 per cent significance level, between the race of the farmers and productivity, which means that the productivity of Malay farmers is lower than that of Chinese farmers. The elasticity shows -0.4 for Malay farmers with regard to paddy yield. In terms of age and gender, the quality of labour does not have a significant impact on paddy yield.

The availability of secondary occupations for the farmers has a significant negative impact, a 7 per cent significance level, on paddy yield. For a 1 per cent increase in secondary occupations among farmers, the yield of paddy production decreases by 0.02 per cent. This variable indicates that the quality of labour input, in terms of concentration or effort and managing enough time for the agricultural purposes, is required for increasing the yield.

The education level of the farmer plays a major role in the yield of agricultural output. If a farmer has a tertiary education, there is no significant impact on the paddy yield, but for those with primary and secondary educations, the impacts on paddy yield are significant, with significance levels of 8 per cent and 4 per cent, respectively. Farmers need a basic level of education to understand and read relevant news, rules and notices, which can affect productivity significantly. The elasticity of primary and secondary educated farmers on paddy yield is 0.07 and 0.08, respectively. This means that a 1 per cent increase in primary level-educated farmers leads to a .07 per cent increase in paddy yield, and a 1 per cent increase in secondary level-educated farmers leads to .08 per cent increase in paddy yield.

The size of a family or number of family members in terms of quantity of labour has no significant impacts on paddy yields. This finding is consistent with the initial assumption that labour is an exogenous factor in the model, means same amount of labour hour is provided by all farmers.. Consequently, increased labour inputs provided by a large family have no significant effects on yield. Moreover, a small family tends to cover required labour needs by hiring workers and thus the impact of labour is on profitability rather than on productivity.

The ratio of non-agriculture to agricultural income has significant negative impacts, at 3 per cent significance level, on paddy yields. If farmers have more non-agricultural income compared to agricultural income, the productivity of paddy declines due to the less attention farmers provide to agricultural work. If the ratio increases by 1 per cent, the yield of paddy productivity declines by 0.01 per cent.

The distance between the paddy field and home and the number of available vehicles has no significant impact on paddy yield. Farmers usually live very close to their fields, and have enough vehicles on hand to reach the fields when necessary. As a consequence, these factors have no significant impacts on paddy yield.

The farm level production or individual farmer level production has no significant impacts on productivity. Due to the use of almost constant rates of inputs by farmers, provided by government which is considered as exogenous variables in the model, the yields of farms or individual farmers have no significant difference. The ownership of the land also has no significant impacts on yield of paddy production. However, both the farm size and ownership criteria have impacts on the profitability rate as opposed to the productivity rate.

The available number of machines for carrying out agricultural activities has significant impacts on yield productivity of paddy. This is an indicator of using technology and timing of technology usage. At a 4 per cent significant level, it shows that the total number of available machines to the farmer or farm has significant impacts on paddy yield. A 1 per cent increase in the number of machines leads to a 0.06 per cent increase in the productivity of the paddy.

The productivity of paddy among the eight areas of IADA varies. Some areas of the IADA have statistically significant impacts on the yield. One of them is Sg. Burong which is significant at 7 per cent significance level. The area of Sekinchan is not statistically significant, but the productivity of this area is very high. The variation in crops from area to area results from the variation in land fertility and climate-related factors such as the land moisture level, the rate of rainfall and temperature rates, etc.

The knowledge of farmers about recent issues, such as awareness about climate change, has no significant impacts on yield of paddy, because this information is readily available to everybody. Moreover, the IADA authority provides the information, controls and monitors all relevant issues of paddy production in this locality.

Several socio-economic variables of the farming community, that have statistically significant relationships with paddy yield, changes due to declining paddy productivity. When Chinese farmers find their productivity is higher than that of Malay farmers, rationally Chinese farmers will gradually occupy the agricultural sector. Government allotted a fixed amount of land for Malay farmers, but the possibility is there that Malay farmers lease the land to the Chinese farmers, which will give a win-win situation for both group. Though government restricted a fixed amount of land for non-Malay farmers, still the ratio of Malays to other races farmers is declining. Farmers with secondary occupations have negative relationships with yield. When yields decline, the secondary occupations of farmers increase further. Moreover, education has a positive relationship with yield, as yield decrease, the number of educated farmers also decline. In addition, the ratio of non-agricultural income to agricultural income will increase more in the future as yields decline due to climate change. The socio-economic characteristics of the farming community are changing and will change even more depending on the intensity of the adverse effects stemming from climate change.

The physical characteristics of the farm that have significant impacts on paddy yield has important implications, such as commercial farms will likely benefit more from the positive relationship between machinery and productivity than individual farmers as they are in a better position to purchase new machines. Furthermore, few localities have positive relationships with yields that leads to increase in the demand of land in these areas. Due to the differentiations of paddy productivity among geographical areas, income inequality among the farmers in different areas are increasing.

V. CONCLUSIONS AND RECOMMENDATIONS

As shown in the study, several socio-economic and physical characteristics of farmers have significant impacts on paddy productivity. One characteristic in particular is race. The productivity of Malay farmers compared with Chinese farmers is significantly low, with the elasticity at -0.4 for in terms of paddy yield between the two groups. The option of pursuing a secondary occupation for farmers has significant negative impacts on paddy yield. If the number of farmers pursuing secondary occupations increases 1 per cent, the yield of paddy production decreases by 0.02 per cent. The level of education also has significant impacts on paddy yield. A 1 per cent increase in farmers having a primary level education results in a 0.07 per cent increase in paddy yield, and 1 per cent increase in farmers having a secondary level education of farmers raises paddy yield 0.08 per. The ratio of non-agriculture to agricultural income has significant negative impacts on paddy yield. If the ratio increases by 1 per cent, the yield of paddy productivity declines by 0.01 per cent. Moreover, examples of physical farm characteristics that have significant impacts on paddy yield are technology and geographical position. A 1 per cent increase in the number of farm machines leads to a 0.06 per cent increase in the productivity of the paddy. Among the areas, Sg. Burong shows positive impacts on yield where the elasticity value is 0.02.

Based on the findings, there are several policy implications. Currently, government allocated a certain amount of land only for Malay farmers even though their productivity is lower than other ethnic groups. It is also a threat for achieving self-sufficiency level of paddy production at national level. At the same time, due to having high productivity of Chinese farmers, if government allots more land to Chinese farmers it will create a social imbalance. Therefore, the government should initiate policies that aim to help Malay farmers boost their productivity through specific training or education programmes, awareness creation programmes or extra incentive programmes.

Production practices are an important element in government policy. Currently, the government specifies certain areas for paddy production. This approach inhibits farmers who tend to select the crops they produce of their own choosing and results in higher land degradation due to mono crop production. In this area, based on soil suitability, crop rotation and crop variety are needed to maintain land fertility and reduce the risk of climate change. The government should also pay more attention on other relevant factors, such as agricultural wages, land leasing systems and rates and maximum farm size. These factors are very important for the sustainability of small farmers, poverty reduction and reducing income inequality and positive effort directed at them would increase overall productivity to gain self-sufficiency or close to self-sufficiency level in rice production to ensure national food security.

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