Group farming and productivity in the Muda Agricultural Development Authority of Malaysia

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Abstract

The paddy sector is a strategic sector in Malaysia. This is due to its importance in the context of rice self-sufficiency, income generation and job opportunities especially for the rural population. The Malaysian government has set the goal of achieving self-sufficiency level in rice production at about 65-70% of local consumption. In order to achieve the objective, the government has implemented many strategies, the group farming project in Muda Agricultural Devevelopment Area (MADA) is one such strategy. The study was conducted on four MADA areas representing three schemes, namely the 10 tones Project, Estate Paddy Project, and Model Farm Project. The proportionate multistage stratified random sampling technique involving the area sampling method and the systematic method was employed to select 664 respondents. A structured questionnaire was used as an instrument to elicit information from the respondents. An econometric model and other statistical techniques were used to estimate the effects of group farming project on productivity and farmers' income. The study shows that, in terms of economic return dimension, Model Farm Project is more successful in increasing the paddy production. The study makes a number of suggestions for improving the effectiveness of group farming projects. Recommendations are included in the project planning and implementation of group farming, and the importance of subsidy on paddy production for farmers in the study area.

Keywords: group farming, productivity, effectiveness

1.0 Introduction

At the most basic level, the key to ending poverty is to enable the poor to get their foot on the ladder of development. Capital is accumulated when households save a part of their current income, or have a part of their income taxed to finance investments by the government. Household savings are either lent to businesses (often through financial intermediaries such as banks) or invested directly in family businesses or equities traded in the market (Jeffrey, 2005). The household in agriculture sectors, such

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as paddy sectors also need saving and capital accumulation to increase their income and standard of living.

Agriculture has been playing an important role in livelihood and economic development and it is dissimilar with other economic activities. Unlike other economic activities, agriculture is very pivotal to human survival. This is because humans need food to continue their life and agriculture is the basis of eco-systems and rural development. In Malaysia, agricultural sector is considered as one of the largest contributors to the country s economy after manufacturing and service sector. This sector plays an important role in food security as well as in eradicating poverty in the country (Norsida, 2009). In its basic form, food security may be defined as "access by all people at all times to the food needed for a healthy life (Ali *et. al,* 2012). At one extreme, food security entails dependence on food imports which should be avoided. Nations which rely on food imports may have to pay heavy prices during times of food shortages (Najim *et. al,* 2011).

The agricultural sector is always seen as a sector that has high incidence of poverty due to low productivity and income. The income from agriculture sector is much lower as compared to other sectors. The problem of poverty is a factor that ruins the stability of rural communities. Low income in this sector is the reason why most people tend to work in industrial sectors which offer much higher income. As a result, agricultural sector faces the problem of lack of workforce and underutilized land (Redzuan and Aref, 2009).

Paddy cultivation is one of the activities in the agricultural sector. The term 'paddy' basically refers to rice cultivated in low land with irrigation. Rice cultivation in Malaysia could be considered as one of the first irrigated rice production system perceived in Asia. The average yield in the granary areas is about 6.1 t/ha (MADA, 2009). The total paddy planted area in Malaysia is about 415,781 ha where 204,578 ha is within the eight granary areas and about 211,2 13 ha is outside the granary areas (Ali *et. al,* 2012).

Kedah is the state that has the largest paddy planted area in Malaysia. It is popularly known as *Jelapang Padi Malaysia* or The Rice Bowl since most of its residents depend on paddy farming as their main source of income. From the total paddy planted area in Peninsular Malaysia, the paddy planted area in Muda Agricultural Development Authority (MADA) in Kedah is 96,558 ha, which is about 23% of the paddy planted area in Malaysia (MADA, 2009). Ali *et. al* (2012) stated that in MADA, there are approximately 55,130 paddy farmers who depend on paddy cultivation as their main source of income. The majority of the paddy farmers are small holders with an average farm size of 2.12 hectares (ha). In addition, these smallholders face the problem of high cost of production, low input and low yield of poor quality produce. Since the cost of rice production keeps increasing from year to year, the government undertakes surveys

of the farmers net income per hectare and implements appropriate actions in order to ensure that the returns earned by the farmers suit their effort and the total production obtained by the country is higher.

Basically, Muda area is located in two states which are Kedah and Perlis where these two states are involved in the Muda Irrigation Scheme with an area of 105,851 ha and 20,304 ha respectively. In overall, the total area of Muda comprising these two states is 126,155 ha. In the MADA area, the paddy planted area is 96,558 ha where 77,882 ha (80.66%) is located in Kedah while the remaining 18,676 ha (19.34%) is located in Perlis (MADA, 2010).

Since paddy cultivation is a sector where most rural people in Malaysia are involved, the government always undertakes new programmes such as modernization through the use of machinery, chemical fertilizer, insecticide, irrigation system and many more with the aim to achieve socio-economic objective which is to increase farmers standard of living as a whole. MADA had introduced the paddy yield expansion programme towards 10 tons or known as 10 Tons Project in 2001. This project was started by covering an area of 740 ha with 551 of paddy farmers participating in it. The implementation of the 10 Tons project involved the provision of farming inputs, soil analysis, and land flattening programmes as well as farm mechanization programmes. This project was carried out together with the Rice Check programme. With the implementation of this project, the average yield of paddy in the 10 Tons Project areas was higher and consistent at a minimum level of 5.5 t/ha. Based on the yield analysis of the 10 Tons Project until the year 2008, the average yield of paddy was 6.13 t/ha with the farm size of 35,257 ha.

In 2007, MADA implemented the Paddy Estate Project in order to ensure the management aspect of paddy cultivation activity is orderly managed. The rationale behind the implementation of this project is to increase the productivity of paddy production consistent with the new government policy which aims at increasing the self-sufficiency level of the country's rice from 73% in the year 2006 to 90% in the year 2010 (MADA, 2010). Paddy Estate is a business project managed centrally, systematically and efficiently, comprising at least 40 ha of paddy planted areas where the return is distributed to each shareholder or project participant (MADA, 2010). Basically, this project is under the patronage of Farmer Associations (FAs). FAs are responsible for setting up the Paddy Estate, providing budget to the implementation of the Paddy Estate, hiring workers to manage the Paddy Estate and providing credit to each participant of the project. At the beginning of the implementation of Paddy Estate MADA which was in the year 2007, there were only 37 estates with an area of 2,044 ha (MADA, 2010). However, the number of estates increased to 148 estates in the year 2008 with an area of 4,767 ha. This project had resulted in the increase of the average of yield to about 3.0% which is from 6.2 t/ha (2007) to 6.4 ton/ha (2008). This Paddy Estate Project gives lots of benefits to the participants. It can help farmers to reduce

the production cost and minimize the involvement of brokers in the process of planting and paddy harvesting. In addition, this project can also change the uneconomic size of land holding to the large scale holding in order to achieve the scale of economics in the level of production.

With the existence of the development programme strategy such as group farming in agricultural sector especially in paddy cultivation sector, farmers can enhance their knowledge regarding the technical system that is applied in it from time to time. These will then increase farmers productivity and income as well as improve their standard of living.

2.0 Motivation of the study

The technique of group farming was developed mainly through active participation of farmers and MADA officers. Basic questions about group farming productivity and yield risk effects thus remain unanswered. Nonetheless, findings from research centers and on-farm trials from Asia have shown that yields can consistently be increased with better management, use of good quality seeds and use of fertilizers. The results from increases in yields associated with group farming adoption have led many to believe that this method could improve the standard of living of farmers in the Muda area.

While some farmers in Muda areas have adopted and continued to practice group farming, many of the research communities observing group farming have been puzzled by the three facts that call into the often-asserted superiority of the method. First, the adoption rates were low. Second, some farmers who practise group farming continue to practice traditional methods on some of their land, and even after several years of experience, they do not seem to adopt the new method.

The objectives of the present study are to assess the impact of the implementation of group farming programme on the farmers standard of living in the Muda area. Specifically, it seeks to (a) determine the socio-economic effects of group farming, (b) estimate the effect of group farming on the total paddy production, and (c) measure the farmers standard of living before and after participating in group farming.

3.0 Literature review

According to Najim *et. al* (2011), efficiency is defined as a Pareto optimal allocation of resources. The term 'Pareto efficiency' is named after Vilfredo Pareto, an Italian statistician and economist who used this term in his research of income distribution and economic efficiency. Given an alternative allocation for individuals, an allocation shift from one individual to another can make the former better without worsening the later. This is often called a Pareto optimization or Pareto improvement.

Groups are important as a way to develop a collective action to farmers which provide resources such as credit, labor and information. Groups enable farmers to apply new technologies, to gain benefits from economies of scale, to have stable relationships with suppliers, and to set rules for the management of natural resource (Place et al., 2002; Davis, 2004). Donors are seeing the value of farmer groups, such that they are sometimes a prerequisite for various agricultural projects (Davis, 2004).

Conceptually, group farming refers to the situation where two or more farmers working together in farm production (Bartholomaeus and Powell, 1979). A group farm which is fully integrated involves the putting together of all the production resources of a few farms into one business organisation (Bartholomaeus and Hardaker, 1981). There are four types of resources which are land, capital, labor and management. Ownership of land is preserved by the individuals who lend out their land to the new operating unit. Capital such as machinery and livestock is contributed by the individuals involved as the source of the new business unit. The individuals involved then supply their labor and management skills to the farm group.

Group farming was carried out as a way to solve problems faced by small farmers. It was basically formed by the farmers voluntarily to gain more benefits than individual farming. The main objective of group farming is to make use of the scarce resources such as labor, land and capital more efficiently. This could only be achieved by greater participation of farmers, more effective inputs delivery and other support services, for instance credit, better utilization of farm machinery and agricultural facilities as well as better marketing of farm outputs. Group farming might also be called as a special form of cooperative or collective farming in most literatures. It was also known as joint farming where farmers jointly use the farm inputs. As stated by Engindeniz and Yercan (2002), The group farming is characterized by jointly using land and agricultural inputs.

Farmer groups have proven to be a useful way to get approach to a community and to spread out knowledge to other farmers. Group acts as an efficient way for farmers to share information and experience. Rouse (1996) noticed that being part of a group contributed to knowledge sharing, empowerment as well as confidence and ability to make decisions among members. Davis (2004) stated that 63% of farmers surveyed in Embu Central, Kenya preferred to join groups rather than individual farmers for information on tree planting. The group farming technique was developed mainly through participatory, on-farm research by practitioners, with research scientists joining the process at the same time. However, basic questions about group farming s true productivity and yield risk effects thus remain largely unanswered.

4.0 Methodology

This study used primary data from 664 paddy farmers in the Muda Agricultural Development Authority (MADA). Surveys were conducted between January and July

2010. The multistage sampling technique involving the area sampling method and the systematic list sampling method was employed to select the respondents from the Paddy Estate Project, 10 Tones Project and Model farm project. Basically, there are many factors influencing the farmers' total production of paddy. This study's framework is consistent with the research of Oluyole and Sanusi s (2009) and Olujenyo s (2008) models which consist of independent variables that have a relationship with dependent variable to gain a significant result. The brief explanation about the model is as follows:

$$T\_Prod_i = f(PEP_i, TTP_i, MFPi, Age_i, Gender_i, M\_Status_i, H\_size_i, Edu_i, Exp_i, L\_Ownership_i, F\_Size_i, Subsidy_i) \quad \ldots (1)$$

(T_Prod)	=	Total production of paddy
PEP	=	Paddy Estate Project
TTP	=	10 Tons Project
MFP	=	Model farm project
Age	=	Age
Gender	=	Gender
M_Status	=	Marital status
H_size	=	Household size
Edu	=	Level of Educational
L_Ownership	=	Land ownership
F_Size	=	Farm size
Subsidy	=	Subsidy

From the models, the dependent variable is the total production of paddy (*T_Prod)*. There are 12 independent variables chosen which are Paddy Estate Project (*PEP*), 10 Tons Project (*TTP),* Model Farm Project (*MFP*), socio-economic variables (*age, gender, M_Status, H_size, Edu, Exp, L_Ownership, and F_Size)* and subsidy. By using the maximum likelihood estimation of the stochastic frontier production function, Ahmadu & Erhabor (2012) revealed that socio-economic characteristics of the rice farmers, such as age, gender, family size, level of education and farming experience were found to have significant effects on the farmer's technical inefficiency. Inefficiency in rice production would be minimized if the socio-economic conditions of the farmers are improved. Moreover, Huynh & Mitsuyasu (2011) also revealed that farmers with well irrigation produce more efficiently than those without irrigation. On the other hand, the study also revealed that farmers who feel that they get more benefits from government policies have the score of production technical efficiency lower than those who have not perceived benefits from the government policies. In this study, the variables namely Paddy Estate Project, 10 Tons Project and Model Farm Project are considered as proxies for the government policies variable.

4.1 The dependent variable: Productivity

Maintaining higher levels of productivity for different aspects involved in rice production is important in the process of improving efficiency and sustainability.

Productivity could be defined generally, as the optimum use of available resources to maximize returns. Farm efficiency is an important consideration in rice production, and is related to economics, the size of the farm, technological adaptations, and the overall levels of input usage in the agricultural sector (Davendra and Abdul Aziz, 1994).

The speed of completion of field operations will enhance the productivity. When irrigation and other facilities are adequate, the quantity of rice production will depend on the speed of field operations such as land preparation, crop establishment, and harvesting. This could only be achieved with the application of proper farm management, machinery and plot sizes.

4.2 Independent variables: Determinants of farm productivity

Based on empirical studies, the independent variables in this study are determinants of farm productivity. Three groups of independent variables are analyzed in this study, as described below:

Individual characteristics

Age. This is used to capture the life cycle effect on productivity. The variable predicted parameter is expected to have a negative sign to indicate that after a certain age the productivity of farmers will decline.

Gender. This dummy variable represents the gender segregation between men and women among household members. The estimated sign of this variable is expected to be positive, which indicates that men are more likely to be more productive compared to women.

Level of education. This represents human capital endowment. It is expected that an increase in individual years of schooling will increase the tendency of the farmers to adopt the new technology.

Family characteristics

Household size. This is the number of individuals living in a household. Having more people living in a household indicates a greater burden on the farmers, which is expected to increase the likelihood of efforts to be more productive in producing of rice.

Farm characteristics

Farm size. This is the size of any farmland owned by the household, in hectares. Besides capital, this variable indicates land ownership, which reflects asset

holding related to productivity. It is assumed that a small farm size is related to a poor farm household and vice versa. Thus, it is expected productivity is positively correlated with individuals owning larger farms. Inadequately sized uneconomical plots are often seen as one of the greatest obstacles to increase rice productivity. Small plots hinder the operation of machinery and optimum use of other inputs. Fragmentation of land in some areas due to population pressure, industrialization and urbanization has reduced the size of land owned or operated by a single farmer. The units have become so small that these are no longer economically viable.

Group farming project

The group farming project in Muda Agricultural Devevelopment Area (MADA) representing three schemes, namely the 10 tones Project, Estate Paddy Project, and Model Farm Project. MADA has rented many unproductive and neglected lands from farmers and started rice farming pooling land to an estate. They could do this because most of the farming activities are mechanized. The roads were improved to withstand heavier machinery and fields were resized to maximize machine efficiency. In order to cope with the mechanization, the canal, drain and road densities were improved to 30 to 35 m/ha.

4.3 *Measurement of variables*

Total production of paddy is the dependent variable in this study. It is basically measured in term of ton per *hectare* or ton per hectare as made in many research studies. However, in this study, the farmers total production of paddy will be measured in Ringgit Malaysia (RM) since many respondents answered the questionnaire by giving their total paddy yield in this measurement. The definition and measurement of the independent variables are as indicated in the Table 1.

Table 1

Definition and measurement of independent variables

Independent Variables	Definition	Measurement
Paddy Estate Project (PEP)	Participation of farmers in the Paddy Estate Project.	0 if a farmer does not join the Paddy Estate Project. 1 if a farmer joins the Paddy Estate Project.
10 Tons Project (TTP)	Participation of farmers in The 10 Tons Project	0 if a farmer does not join the 10 Tons the Project. 1 if a farmer joins the 10 Tons Project

(continued)

Independent Variables	Definition	Measurement
Model Farm Project (MFP)	Participation of farmers in the *Model farm project*	0 if a farmer does not join the *Sample Farm Project*. 1 if a farmer joins the *Sample Farm Project.*
Age	Age in year.	Direct measurement with ratio scale.
Gender	Gender of farmers.	0 if a farmer is female. 1 if a farmer is male.
Marital status	Marital status of farmers.	0 if a farmer is married. 1 if a farmer is single.
Household size	Number of farmers family members.	Direct measurement with ratio scale.
Level of education	Educational level of farmers.	Direct measurement with ratio scale.
Land ownership	Farmers ownership of land.	0 if a rented land. 1 if an own land.
Farm size	Size of farmers farm in *hectare*.	Direct measurement with ratio scale.
Subsidy	Amount of subsidy obtained by farmers in Ringgit Malaysia (RM).	Direct measurement with ratio scale.

5.0 Results and discussion

The empirical results and discussions are presented in the following two subsections. In the first subsection, the descriptive analysis is used to describe the basic features of the data in this study. Meanwhile, the second subsection looks into the regression analysis to study the factors that influence productivity of paddy farmers.

5.1 Descriptive analysis

In order to conduct this study, information on the farmers and paddy cultivation background as well as their standard of living was collected from the respondents. In this study, 664 questionnaires were distributed to the selected farmers in the two residential areas which are located in the Muda area.

5.2 Socio-economic status of farmers

Table 2 presents the socio-economic profile of respondents. Only three (1.6%) of respondents were younger than 30 years of age; 75 (39.3%) were between 51 and 60; 54 (28.3%) were between the age of 41 and 50; and 34 (17.8%) were 60 or older. It is evident that majority of respondents are between 41 and 60 years of age.

Majority of farmers choose to get involved in Paddy Estate Project. Out of 664 respondents, 264 (40%) of respondents participate in Paddy Estate Project, 146 (22%)

participate in the 10 Tons Project, 133 (20%) participate in the *Model Farm Project*, and 121 (18%) participate in other projects.

Of the total respondents in all study areas, 533 (80%) were male and 131 (20%) female. This suggests that paddy farming is dominated by male farmers within the granary areas under study. Of the respondents, 34 respondents (17.8%) get involved with paddy plantation more than 60 years.

The average of farmers income before and after they engaged in the group farming programmes shows that 10 Tons Project experienced an increase in income about RM484 (33.8%), followed by Model Farm Project RM498 (31.8%), Paddy Estate Project RM379 (27.1%), and others RM367 (26.0%). The findings thus suggest that engagement with group farming programmes has a positive effect on farmers income.

Table 2

Descriptive analysis of respondents

Characteristic	**Frequency**	**Percentage**
Type of group farming		
Paddy Estate Project	264	40
10 tons Project	146	22
Model Farm Project	133	20
Others	121	18
Gender		
Male	533	80
Female	131	20
Age (year)		
< 30 year	3	1.57
31 40 year	25	13.09
41 50 year	54	28.27
51 60 year	75	39.27
>60 year	34	17.81
Experience		
< 5 year	8	4.19
5 10 year	19	9.95
11 15 year	19	9.95
16 20 year	37	19.37
21 25 year	16	8.38
26 30 year	41	21.47
>30 year	53	27.75
Marital Status		
Married	195	97
Single	6	3

(continued)

Characteristic		**Frequency**	**Percentage**
		Frequency	Mean
Monthly household income (mean)			
Paddy Estate Project		263	RM3,622
10 Tons Project		145	RM3,185
Model Farm Project		133	RM3,697
Others		121	RM3,500
	Before	After	Difference
Monthly household income from paddy plantation			
Paddy Estate Project	RM1,400	RM1,779	RM379 (27.1%)
10 Tons Project	RM1,431	RM1,915	RM484 (33.8%)
Model Farm Project	RM1,567	RM2,065	RM498 (3 1.8%)
Others	RM1,411	RM1,778	RM367 (26.0%)

5.3 OLS regression analysis

An OLS regression was used to estimate the relationship between productivity factors that influenced the productivity among the paddy farmers. Based on the regression result in the Table 3, the R-squared is 0.113091 which means that only 11.3% of the variation in the total production of paddy is explained by the independent variables. However, since the p-value for F-test is less than the significance level of 0.05, thus, the null hypothesis is rejected. This indicates that there is a linear relationship between the total production of paddy and the independent variables. Hence, the OLS regression line fits the data statistically and the overall equation is significant. Also, the result shows that, out of 11 independent variables, eight variables are significant.

Compared to farmers who are in other group farming programmes, the total paddy production of farmers in MFP is higher by RM46.55 per *hectare*. The variable *MFP* is positively significant in influencing the total production of paddy. This is probably due to the fact that the management of farm in this project is much better as compared to the other projects which then leads to the higher production of paddy yield.

Variable *Age* has a negative relationship with the total production of paddy. The coefficient value is -4.72319 which mean that with one year increase in a farmer's age, the total production of paddy will decrease as much as RM4.72 per *hectare* with the assumption that other variables are constant. The inverse relationship between *Age* and total production of paddy is contrary to a prior expectation. This is probably due to the fact that the older the age of a farmer, the less ability to work and hence the less will be the productivity of the person. The result also shows that the variable *Age* is significant to influence the total production of paddy.

Table 3

Model OLS 1

OLS estimates using 650 observations 1-650
Dependent variable: T_Prod

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	1697.2	141.246	12.0159	<0.00001	***
PEP	40.4512	41.2794	0.9799	0.32749	
TTP	46.8725	32.0895	1.4607	0.14460	
MFP	214.935	46.5512	4.6172	<0.00001	***
Age	-4.72319	2.66483	-1.7724	0.07680	*
Gender	7.96628	44.0384	0.1809	0.85651	
Marital Status	-245 .058	114.505	-2.1401	0.03272	**
Household Size	21.1435	10.0627	2.1012	0.03602	**
Level of Education	30.3358	18.3224	1.6557	0.09828	*
Land ownership	137.394	40.5882	3.3851	0.00076	***
Farm Size	-8.69825	4.01128	-2.1684	0.03049	**
Subsidy	0.044311	0.0121381	3.6506	0.00028	***

Unadjusted R2 = 0.113091
F-statistic (12, 637) = 6.768751 (p-value < 0.00000)
Note: *** Significant at 1% level
** Significant at 5% level
* Significant at 10% level

Variable *Marital Status* has a negative relationship with the total production of paddy. The coefficient value is -245.058 which means that compared to married farmer, the total paddy production of single farmer is lower by the amount RM 245.06 per *hectare* with the assumption that other variables are constant. This could be due to fact that married farmers tend to work hard to increase their paddy yield in order to earn higher income to support their family as compared to the single farmers.

Variable *Household Size* has a positive relationship with the total production of paddy. The coefficient value is 21.1435 which means that with the additional one member of the household, the total paddy production will increase as much as RM21 .14 per *hectare* with the assumption that other variables are constant. This is so because the larger the size of household, the more paddy will be produced by the farmers in order to feed their family.

Variable *Level of Education* has a positive relationship with the total production of paddy. The coefficient value is 30.3358 which means that with one year higher in educational level, the total paddy production will increase as much as RM30.34 per *hectare* with

the assumption that other variables are constant. The variable *Edu* significantly affects the total production of paddy in the study area. This is due to the fact that the more a farmer is formally educated, the more the ability to be efficient and thus the more will be the productivity of the person.

Variable *Land Ownership* has a positive relationship with the total production of paddy. The coefficient value is 137.39 which means that compared to farmers who do not own the land, the total paddy production of farmers who own the land is higher by RM137.39 per hectare with the assumption that other variables are constant. This is probably due to the fact that owned land is more fertile as compared to the rented land and thus, the paddy yield obtained by the farmers is higher. Farmers who work in their own land maybe tend to use high quality of fertilizer in order to obtain higher yield.

Variable *Farm Size* has a negative relationship with the total production of paddy. The coefficient value is -8.69825 which means that with the increase one *hectare* on size of farm, the farmers total paddy production will decrease by RM8.70 per *hectare* with the assumption that other variables are constant. The inverse relationship between the total paddy production and farm size is unexpected. This could be due to poor farm management and poor soil fertility resulting from lack of land improvement.

Variable *Subsidy* has a positive relationship with the total production of paddy. The coefficient value is 0.044311 which means that with the additional RM1 subsidies obtained, the farmers total paddy production will increase by RM 0.04 per *hectare* with the assumption that other variables are constant. This is so because the higher subsidy the farmers get, the higher the ability of farmers to buy inputs such as paddy seed and fertilizer. Such inputs then could be used to increase their paddy yield.

6.0 Conclusion and suggestions

The study analyzed the effectiveness of the group farming programmes and its contribution to the paddy farmers in two residential areas in the Muda area. Data were collected with the aid of structured questionnaires from 664 respondents selected through random sampling technique. The descriptive analysis was used to describe the socio-economic status of the respondents. The parameters were estimated using the Ordinary Least Square (OLS) analysis.

From this study, it can be concluded that most of the paddy farmers are male, married, old, have large household size and generally have low level of education. They also have long years of experience in paddy cultivation. Also, most of the respondents cultivate small farm holdings, with the respondents being knowledgeable in aspects of seed selection and sowing as well as fertilizer application. The study also shows

that most of the farmers in the study area possess owned house, have access to basic necessities such as water and electricity supply as well as possess home equipments and telecommunication tools.

Besides, the study has shown that farmers are responding appreciably to the projects that promote the cultivation of paddy in the area. The overall average yield (RM 1866 per *hectare*) for the study area has indicated that the group farming programmes are yet to have an appreciable impact on productivity. The result shows that *MFP* appears to be important determinants of the total paddy production. The estimated coefficients in the model indicate that all the three projects positively affect the total paddy production in the area. However, only *MFP* project is significant while *PEP* and *TTP* are insignificant in influencing the total paddy production. This is probably due to the fact that the implementation of these programmes is still at the beginning stage and thus, the yield of the project still could not be observed.

Besides *MFP*, the socio-economic factors as well as subsidy also influence the farmers' total paddy production. The socio-economic factors such as household size, level of education, and subsidy had shown a positive relationship while age, marital status and size of farm had shown a negative relationship to the total paddy production. In paddy communities, people tend to use whatever mechanisms available to them. A defining feature of such communities is limited access to social networks, except that with the involvement with Farmers Organisation. Through Farmers Organisation, farmers develop strong ties and a working relationship based on shared values, goals and objectives. Social networks play a critical role in determining the way organisations are run, visions are achieved and problems are solved. Even though gender, PEP and TTP had a positive sign, but, they were not significant to influence the total paddy production. On the other hand, the factors of age, marital status, household size, level of education and land ownership were important to influence the total paddy production.

Government needs to implement more group farming programmes for farmers since production level was found to have a significant positive relationship with *MFP*. Group farming programmes enable farmers to manage their farm effectively through the improvement of land which leads to the increase in soil fertility and the use of high quality of farming inputs. Besides, it also could change the uneconomic size of land holding to the large scale holding which then will lead to the achievement of scale of economics in the level of production.

Since the productivity level of old farmers is found to be lower as compared to young farmers, thus it is a need for government to provide a scheme that enables them to retire earlier. Old farmers who have low level of productivity are encouraged to join this scheme while their land is transferred to MADA to be operated. Then, the compensation will be given to them. However, government needs to ensure that the removal of older farmers from the industry would produce benefits that exceed the additional costs incurred.

Nowadays, most of the farmers face with the problem of high production cost and low paddy yield. Since paddy production level was found to have significantly affected by subsidy, thus, government needs to put down an effective framework for ensuring that agricultural input subsidies are enjoyed by the target audience in the distribution of improved seedlings, fertilizer, loans or credits. This is because, by giving them subsidies, they would be able to purchase more yield-increasing inputs such as paddy seed and fertilizer with lower price. Consequently, this will help them to enhance their productivity and invariably increase their farm income.

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