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Constraints of Paddy Production Among Smallholding Farmers

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ABSTRACT

The study was conducted in Samarahan Division, Sarawak to identify the production constraints faced by smallholding paddy farmers. This survey was conducted in four districts in Samarahan Division. All the respondents were selected randomly from the list of the registered paddy farmers obtained from Department of Agriculture Sarawak. There were 273 respondents from four districts participating in this study. Data were collected by using questionnaire survey. The obtained data were analysed by using correlation analysis and Multiple Linear Regressions (MLR) analysis. The finding reported that only physical and technology could be concluded as significant production constraint to the paddy production. Various suggestions of management practices also have been discussed to overcome the constraints towards a more sustainable paddy production.

Keywords: *Production constraints, paddy cultivation, management, Samarahan Division, Sarawak*

INTRODUCTION

Paddy or rice is one of the most important crops and a staple food for about half of the world population. Globally, rice is the second most important crop after wheat, with Asia being the largest producer and consumer (Yogambigai, Khalid, & Subramaniam, 2015). Majority of the people in the countries of Asia depend on rice as their main source of nutrition, as well as for income and employment (Makino, 2011). In Malaysia, rice is a strategically important industry and seriously emphasized by the government due to its importance as the country's staple food, and also because of its social, political, and economic importance (Najim, Lee, Haque, & Esham,2007). It is also the third most important crop in Malaysia after rubber and oil palm and ranks 25th in rice production with 2.4 million tonnes from a land area of about 600,000 hectares (Akinbile El-Latif, Abdullah, & Yusoff, 2011).

The cultivation of paddy in Malaysia can be classified as a rainfed or irrigated lowland crop (Herman, Murchie, & Warsi, 2015), and can be grown by using a broad spectrum of different agronomic techniques and within a wide range of environmental conditions (Mabbett, 2011). In the year 2016, it has been recorded that the nation produced a total of 2.7 million metric ton of paddy where 2.0 million metric ton of the total paddy produced was from the granary areas (Che, Shaharudin, & Tumin, 2016). Malaysia relies primarily on key granary areas where approximately 70% of the domestic supply is from the granary areas (Che et al., 2019). These granary areas are mostly in Peninsular Malaysia (Jamaludin, Amer, & Abu Hasan, 2010). It is mainly grown in states such as Kedah, Selangor, Pulau Pinang, Perak, Terengganu and Kelantan, which together control more than half of Malaysia's harvested area (Herman et al., 2015; Che et al., 2019).

In Sarawak, most of the paddy farms are still upland and rain fed where this paddy is popularly known by the local people as "padi huma" or "padi bukit". This type of paddy grows on the farms that have never been ploughed and there are no bunds around the rice fields to help retain the rain water (Kheng, 2005). These paddy fields are prone to floods, drought and other soil constraints. Due to these problems, farmers plant a single crop of rice per season and it depends heavily on rain as it is sensitive to dry weather. This paddy cultivation is the most important crop

for the rural communities in Sarawak as their livelihood depends greatly on paddy for their home consumption, and sometimes, they sell their surplus to earn some money (Musa, Azemi, Juraimi, & Tengku Muda Mohamed, 2009). There are more than 100 varieties of rain fed from various locations in Malaysia. For example, Lawi, Lentik, Sarikei, Kungkulob, Dorok, Sabak and Toyol (Musa et al., 2009). Usually, farmers select paddy varieties based on rice characteristics and their preferences on grain colours, fragrance, shapes, taste and texture (Kheng, 2005). Besides, the cultivation of rain fed paddy varieties requires 4–6 months to complete their growth and produce grains.

Moreover, the grain productions of paddy in Sarawak are low and have an unstable yield which is less than 2.0 metric ton per hectare as compared to paddy produced from granary areas in Peninsular Malaysia, which is above 5.0 metric ton per hectare (Che et al., 2019). This probably attributes to the traditional cultivation methods, poor technologies, and poor management of farm during the cultivation period (Sinton et al., 2019). Some farmers also leave their fields unattended after sowing which is also known as 3 'T's technology, namely: 'tanam' (plant), 'tunggu' (wait) and 'tuai' (harvest) (Kheng, 2005) without any monitoring on plant nutrient requirements and other critical aspects, such as weeds, diseases, insect-pest attacks, lack of water and mineral supply (Musa et al., 2009; Zainal, 2015). Besides, there may also be other factors that hinder the enhancement of this paddy production. Therefore, this study aimed to identify the production constraints faced by the paddy farmers in Samarahan Division, Sarawak.

MATERIALS AND METHODS

Samarahan Division was purposively selected for this research study due to its low paddy production. This surveyed study was carried out in four districts in Samarahan Division. The primary data used for this study were randomly collected from the list of the registered paddy farmers obtained from Department of Agriculture at each district, using questionnaire survey to obtain relevant information from the respondents. There were 273 farmers who participated in this study.

The questionnaire was the instrument used for data collection and it was divided into four sections. The first section consisted of questions regarding socio-demographic and farm profile. The second section was on paddy production and this was followed by the third section on management activities. The last section comprised five possible constraints faced by the paddy farmers where they were asked to scale it according to five-point Likert scale based on their importance in affecting their paddy yield where 1 is strongly disagree and 5 is strongly agree. The first constraint was Socio-economic constraints which included the problem of high input cost, inadequacy of input, lack of labour and credit problem. The second constraint was Physical constraints which was the lack of suitable land and land or soil decline in fertilities. The third constraint asked for Biological constraints which included the problem of pest and diseases, drought or lack of water and climatic or environment problem which were uncontrolled factors. The fourth constraint was Technological constraints that consisted of lack of proper varieties, inadequate or unsuitable technologies and storage problem. The last constraint was Institutional constraints which referred to lack of government support, lack of extension services and poor infrastructure. Pilot tests and modifications of the questionnaire were carried out before conducting the survey in the four districts. The data collection was accomplished with the help of enumerators who had been trained based on the objectives of the study and the contents of the research instrument. Data extracted from the questionnaires were analysed using descriptive analysis, correlation analysis and multiple linear regressions.

RESULT AND DISCUSSION

Demographic Data

Table 1 below tabulates the descriptive statistics of demographic background for respondents involved in this study. Most of the respondents in this study area were male with 178 respondents (65.2%) while the remaining 34.8% were female respondents. About 32.2% of the respondents were aged between 50 and 59 years old and only 2.6% of the respondents were aged more than 80 years old. Paddy cultivation was mainly carried out by elderly people nowadays as the younger group was unwilling to work as farmers but would like to pursue better and higher

pay jobs in urban areas. Besides, many elderly farmers did not want their children to inherit their paddy production because they felt that paddy cultivation did not have good future for their children (Ibrahim & Mook, 2014). For status of marriage, 91.2% of the respondents were already married while 7.3% and 1.5% of the respondents were single and widowed, respectively. The highest number of respondents that participated in this study was Iban which was 214 respondents (78.4%) followed by Malay with 57 respondents (20.9%) and Chinese with 2 respondents (0.7%). For the education level, this study revealed that 25.3% of the respondents had no formal education, 45.8% had primary school education, and 26.4% had secondary school education, while the remaining 2.6% was university graduates (Table 1).

Table 1: Demographic Background

Variable	Frequency	Percentage (%)
Gender		
Male	178	65.2
Female	95	34.8
Age		
20 – 29	15	5.5
30 – 39	41	15.0
40 – 49	57	20.9
50 – 59	88	32.2
60 – 69	47	17.2
70 – 79	18	6.6
> 80	7	2.6
Marital Status		
Single	20	7.3
Married	249	91.2
Widowed	4	1.5
Race		
Malay	57	20.9
Iban	214	78.4
Chinese	2	0.7
Education Level		
Non formal Education	69	25.3
Primary School Education	125	45.8
Secondary School Education	72	26.4
University Graduates	7	2.6

Paddy Production

In this study, as high as 88.64% of the respondents produced paddy of less than 2 tonnes/ha, while 9.52% and 1.83% respondents produced 2-3 tonnes/ha, and more than 3 tonnes/ha, respectively (Table 2). Apparently, these farmers had lower yield as compared to paddy production in East Malaysia, which had an average annual production of 4.5 tonnes/ha (Department of Agriculture, 2016). According to Firdaus, Leong Tan, Rahmat, and Senevi Gunaratne, (2020), Malaysia's paddy cultivation has small farm size which is less than two hectares and this contributes to the low paddy production.

Table 2: Paddy Production

Yield of Paddy (tonnes/ha)	Frequency	Percentage (%)
Less than 2 tonnes	242	88.64
2 - 3 tonnes	26	9.52
More than 3 tonnes	5	1.83

Reliability Analysis

Table 3 below shows the result of reliability analysis. The consistency in measuring the instrument that we used can be checked by using a value, namely, Cronbach's Alpha. Hinton, Brownlow, McMurray, and Cozens (2004) suggested that there are four levels of reliability based on value of Cronbach's Alpha which are excellent reliability (0.90 and above), high reliability (0.70 – 0.90), moderate reliability (0.50 – 0.70) and low reliability (0.50 and below). Since Cronbach's Alpha value for variable Socioeconomic, Biology and Technology is more than 0.9, it means that the items used for these variables are excellently consistent while the reliability for other two variables are highly consistent since the value of Cronbach's Alpha is between 0.7 and 0.9.

Table 3: Results of Reliability Analysis

Variable	No. of Item	Cronbach's Alpha
Socioeconomic	5	0.912
Physical	2	0.893
Biology	4	0.906
Technology	5	0.906
Institution	4	0.874

Normality Test

In order to perform further analysis, a normality test needs to be done first. This test can be performed by using skewness value for the purpose of checking the normality of data. Pallant (2009) mentioned that data is said to be normally distributed if the skewness value is between – 2 and 2. Table 4 presents the summary of skewness value for all variables involved in this study. Since all values of skewness is from – 2 to 2, it can be concluded that all the variables are normally distributed.

Table 4: Summary of Skewness Value

Variable	Skewness
Paddy Production	1.130
Socioeconomic	– 1.419
Physical	– 0.459
Biology	– 1.151
Technology	– 0.713
Institution	– 0.780

Correlation Analysis

Pearson's correlation analysis for this study is tabulated as in Table 5. The result reveals that there is a significant positive moderate relationship between all predictor variables at 1% significance level. Institution has the strongest relationship towards paddy production compared to other constraints ($r = 0.216$, $p - value < 0.01$). It means that institution needs to play a big role in order to increase the production of paddy compared to the other factors. Institution here refers to the support from the government and infrastructure. Most respondents' complaint that no training programmes were organized for them had influenced the production of their produce. Usually, only leaders of the area were chosen to attend agricultural or any other training programs. Beside they revealed that fertilizer subsidies from the government were not enough, while they had financial shortfall to buy the expensive fertilizers, pesticides and herbicides at their own cost also caused their production to be low. Most farmers were not willing or unable to purchase additional fertilizers and pesticides at their own cost, in view of the ever-rising cost of these agricultural inputs (Shamsudin, Mohamed, & Radam, 2012; Fahmi, Samah, & Abdullah, 2013)

Apart from that, they also faced the problem of poor infrastructures in terms of no proper road system or poorly maintained roads for transportation of agricultural products and no irrigation/drainage system to retain water, they also had to depend on the rainy season for enhancing paddy growth.The results also indicated that physical which referred to the condition of the land used by the farmers to plant the paddy was also important to increase the production of paddy ($r = 0.203$, p – value < 0.01). The texture of the soil might strongly influence the production of paddy as it also influenced the water and nutrient content in the soil. The respondents also revealed that they had difficulties in managing their land as they still practiced traditional system for paddy cultivation. The other three factors such as socioeconomic, biology and technology also can be constraints to the paddy production.

Table 5: Correlation Analysis

	Paddy Production	Socio-economic	Physical	Biology	Technolo	Institution
Paddy Production	1					
Socio-economic	0.192 (0.001)**	1				
Physical	0.203 (0.001)**	0.553 (0.000)**	1			
Biology	0.198 (0.001)**	0.751 (0.000)**	0.588 (0.000)	1		
Technology	0.097 (0.109)**	0.690 (0.000)**	0.741 (0.000)	0.695 (0.000)*	1	
Institution	0.216 (0.000)**	0.775 (0.000)**	0.621 (0.000)	0.701 (0.000)*	0.709 (0.000)**	1

**Correlation is significant at the 0.01 level (2-tailed)

Multicollinearity Analysis

Another test namely multicollinearity analysis had been done for assessing the problem of multicollinearity among predictor variables. Multicollinearity problem occurs if value of variance inflation factor (VIF) is greater than 10 and tolerance value is less than 0.1 (Hair, Black, Babin, & Anderson, 2010). Result in Table 6 shows that all values of VIF are less than 10 and tolerance value is greater than 0.1. It means that there is no existence of multicollinearity problem among predictor variables.

Table 6: Results of Multicollinearity Analysis

Variable	Tolerance	VIF
Socioeconomic	0.305	3.276
Physical	0.428	2.338
Biology	0.362	2.759
Technology	0.308	3.248
Institution	0.323	3.098

Multiple Linear Regression Analysis

Analysis was continued with Multiple Linear Regression (MLR) for the purpose of determining which predictor variables had significantly affected the production paddy in Samarahan Division. Table 7 below exhibits the result of MLR. Only 8.7% of the total variation in paddy production can be explained by all the predictor variables involved in this study while the other 91.3% can be explained by other constraints. The result also reveals that the model is significant with F – test of 5.100 (p – value < 0.05). However, only physical and technology can be concluded as significant constraints to the paddy production for this study (p – value < 0.05). Most of the respondents in this study area are still using traditional and semi traditional tools and method in paddy cultivation, paddy harvesting and rice grain processing. This is due to the lack of technology which might influence or affect paddy production. Apart from that, the land condition and the land size also make the use of technology become complicated. Besides, the technique and equipment that can help the farmers to increase their production are expensive and difficult to utilize in the small farm (Daniel, Norizan, Salfarina, & Tarmiji, 2017).

Table 7: Multiple Regression Analysis

Variables	Result of Multiple Regression				
	Coefficient	t	p-value	R^2	F Test
Constant	563.039	3.015	0.003	0.087	5.100 (0.000)
Socioeconomic	57.012	0.692	0.489		
Physical	146.341	2.572	0.011		
Biology	86.546	1.199	0.232		
Technology	– 234.681	– 3.014	0.003		
Institution	115.532	1.550	0.122		

**Significant at 5% level of significance

CONCLUSION AND RECOMMENDATION

Paddy cultivation in Sarawak is mainly managed by male farmers with lower education level. Overall, all the predictor variables have a significant relationship towards paddy production. Among five production constraints used in this study, physical and technology factors were found to be the constraints in paddy production in Samarahan Division. Physical constraints related to the lack of suitable land or soil decline in fertilities for paddy cultivation. This was due to most of the paddy farmers were not willing or unable to purchase additional fertilizers at their own cost to improve the quality of soil in their field at the same time improve paddy yield. In addition, farmers were too dependent on the government supports and incentives, which could be none for very rural areas, or not sufficient for optimum paddy production. Apart from that, farmers with no formal education or just primary level education might not be knowledgeable on the suitable types of fertilizers to overcome physical problems faced in their fields. Technology factors referred to the lack of suitable technology and machinery used in their paddy farming especially for the post-harvest technology, lack of proper varieties and storage problem. This was due to their unsuitable plot size. Increase or high paddy production might only be achieved with proper plot size and suitable technology as well as machinery with proper plot size. Poor quality and the variety that was susceptible to pest and diseases caused yield losses. Paddy farmers also revealed that improper storage and technique used caused more humidity to rice grain, more loss and reduce quality. Alternatively, the government should gazette a large area for the paddy farmers in Samarahan Division to implement higher technology and apply machinery in paddy fields. Further studies are needed to gain information on other constraints influencing paddy production in Samarahan Division, for example, on the improved technical and effectiveness of extension services offered to farmers, or new policies, in an attempt to bring this industry to a greater height and be more sustainable.

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