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The assessment of input factors and technical efficiency of rice production at Integrated Agriculture Development Authority (IADA) Pekan and Rompin

Penilaian faktor input dan kecekapan teknikal (TE) pengeluaran padi di Kawasan Pembangunan Pertanian Bersepadu (IADA) Pekan dan Rompin

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Abstract

Additional input factors in rice production phase is one of the key factors contributing to increase in yield. However, nowadays, the increase in the additional input factors such as area, labour, fertilisers, pesticides and seeds did not seem to significantly increase rice yields. The relatively new IADA Pekan and IADA Rompin areas are among two of the twelve major granaries in Malaysia. The stability and potential increase in output production of these two areas had a great impact on the country's rice production and contributed to the sustainability and sufficiency of the nation's staple food. In addition to input factors, socioeconomic factors are also important issues in explaining dimensions that could contribute to the improvement in rice productivity. Therefore, this study was conducted to explain and study these factors as well as to determine the performance of the respective Technical Efficiency (TE) of the selected granaries. The data of the study was collected through face to face interviews using structured questionnaires. Random sampling was applied to the proportionate size of farmers' populations for each of the two granaries. A total of 77 responses were successfully attained from 40 respondents representing IADA Pekan and 37 respondents representing IADA Rompin. The study found that the additional internalisation of input factors did not give much significant impact to the yield increment (decreasing return to scale) for IADA Pekan while different results were obtained for IADA Rompin. Therefore, the conclusion of the study suggested different approaches and alternatives to be implemented for both granaries in securing the sustainability of rice production as well as for farmers' livelihood.

Introduction

The main focus of agriculture in the 11th Malaysia Plan was food security, productivity improvements, improved agribusiness skills and improved support and delivery services. Increased rice production in Malaysia is closely linked to the level of efficiency and productivity as well as technological advances. Government policies either recently or in the past mostly emphasised on the strategy which primarily included increasing domestic production, improving productivity, strengthening research and development activities, innovation and technologies, monitoring food prices, market access and stability (Serin et al. 2019) as well as incentives.

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Various incentives and subsidies have been provided by the government to farmers to increase productivity and thus increase the income of farmers. Government spending to subsidise inputs to the rice industry covered a total of RM1,446 per farmer per hectare. Providing these input subsidies undeniably helps many in reducing production costs among the farmers (Rajamoorthy and Munusamy 2015). However, the long term consequences of subsidies provision are widely discussed around the world. The policies need to be well structured and surely vital to be able to produce positive outcomes from the efforts undertaken without sacrificing the livelihood of the farmers.

Evaluation of the use of inputs in rice production and the relationship between the use of water, land and labour in the rice crop sector to assess the effectiveness of subsidised inputs by farmers in the countryside as well as the impact of subsidies on increasing the yields and farmers' income is always essential. However the dependability on the subsidies as well as semi-mechanisation practices should be in government consideration to continue to rely on for near future. It is because the intensification of rice production in Malaysia is strongly related to the efficiency and productivity level alongside with technological advancement (Parichatnon et al. 2017).

Furthermore, the instability in rice production which frequently occurred in the last decades will increase the risks among the farmers in the vulnerable and uncertainty of environmental factors (Firdaus et al. 2013; Masud et al. 2014; Vermeulen et al. 2011). Thus, the technological advancement should be able to cope up with the uprising of externalities to ensure the sustainability in rice production of the country. Other than the focus on increasing the output production, farmers certainly are in need of security on rice production activities so that it is not affected by unforeseen events that destroy their crops (Rahim et al. 2016).

Therefore, the general objective of this study is to evaluate the economics of inbred rice in the granary areas and particularly to identify factors that influence the country's crop yield gap and to assess the impact of inputs and subsidies on rice production.

Study area

In general, the total rice cultivation in Malaysia in 2019 was 681,559 hectares. The twelve main granary areas comprised 62% of the area with 425,613 hectares in total. In 2019, rice production from the country's major rice fields was 2.18 million mt with an average yield of 5.127 mt per hectare. This represents 62% of the total rice production of 3,513,235 mt nationwide. Average yield for recent 5 years was increased to 5.4% from 4.8 mt in 2015 to 5.1 mt per hectare in 2019 (DOA 2019).

The rice area is divided into the northern, western and eastern zones. In this study, the focus will be on two granaries located in the east coast of Peninsular Malaysia, Integrated Agriculture Development Area (IADA) Pekan and IADA Rompin. The rice cultivation area in IADA Pekan has not changed much between 2015 and 2019 with an area of about 6,500 to 6,900 ha. Similarly, IADA Rompin showed fluctuations in total area of 5,100 to 5,250 ha for the same period (*Table 1*).

Rice production at IADA Pekan in 2018 was the highest at 17,550 mt over five years until 2019. In 2017, the granary experienced the lowest rice production at 10,286 mt averaging 1.5 mt per hectare followed by an average yield of 1.66 mt per hectare in 2019. While at IADA Rompin, the highest yield was 4.0 mt per hectare in 2015 followed by 3.68 mt per hectare at 2019. From 2015 to 2019, rice cultivation areas at IADA Rompin also varied from year to year. Rompin's rice production seemed to be high in 2015 followed by a decline in the following year and increased again in 2017 (*Table 2*).

Table 1. Rice cultivated area at IADA Pekan and IADA Rompin

Granary (IADA)	Cultivated area (ha)				
	2015	2016	2017	2018	2019
Pekan	6,763	6,541	6,832	6,517	6,851
Rompin	5,218	5,169	5,101	5,026	5,115

Source: DOA (2019)

Table 2. Production and average yield of rice at IADA Pekan and IADA Rompin

Granary (IADA)	Rice production (mt)				
	2015	2016	2017	2018	2019
Pekan	17,387	13,425	10,286	17,550	11,379
Rompin	20,944	14,437	17,028	14,615	18,837
	Average yield (kg/ha)				
Pekan	2,571	2,052	1,506	2,693	1,661
Rompin	4,014	2,793	3,338	2,908	3,683

Source: DOA (2019)

Methodology

This study was conducted on 77 farmers in two areas, namely, IADA Pekan and IADA Rompin. Respondents were selected using stratified convenience sampling methods by area, region and zone. The selection of respondents was built based on high, medium and low-income categories as well as the use of service providers in cultivation phases. A focus group discussion was organised in each of the selected areas to identify the parameters in order to develop the questionnaires for employed farmers. This group consisted of farmers, service providers and expansion officials. Information and data collected included date of cultivation, soil type, rice varieties, service provider categories and practices of rice cultivation in each selected area. Extensive information on costs of production and the particular details of respondents' activities in rice cultivation were collected. As the detailed information gathered, targeted responses and representatives selected by all areas within the granaries were assumed to be considered appropriate.

The questionnaires were developed based on the findings of the focus group discussion. Information and data collected through the questionnaire forms included repertoire profiles, field characteristics, rice cultivation practices, technologies used, production costs, yields and factors that influenced productivity. Prior to the field survey, a pilot study was undertaken to test the developed questionnaires. The survey was carried out by enumerators assigned to the selected areas towards the farmers and service providers for the two planting seasons, namely, off-season of 2018 and the main season of 2019/2020. The face-to-face surveys were carried out by the cooperative agencies of IADA Pekan and IADA Rompin staffs appointed according to the areas.

The data were analysed using descriptive methods to get a broad overview of respondents' profiles and fields. The technical efficiency (TE) analysis was performed using the Cobb-Douglas production function method using the FRONTIER 4.1. A multiple regression analysis was also performed to identify factors that influenced the yield of each granary.

Technical efficiency and elasticity

The combination of inputs in rice production will generate the optimal level of outputs for each field (Enwerem and Ohajianya 2013). Generally, inputs involved included seeds, fertilisers, pesticides, labour, capital and land. All of these factors of production were considered to be variable inputs, where an increase in one input resulted in an increase in an output at a reduced rate and eventually, a negative effect will occur if the input continues to increase. Technical efficiency (TE) analysis was performed to measure the most efficient use of resources in the granary areas of IADA Pekan and IADA Rompin. The TE levels of each farmer was categorised by grading as in the previous study of productivity by Lin et al. (2010). *Table 3* shows the efficiency level based on the percentage of efficiency scale.

Table 3. Level of TE of granary

Percentage efficiency	Level of efficiency
<25%	Very low
Between 25 and 50%	Low
Between 50 and 75%	Moderate
>75%	High

Source: Lin et al. (2010)

The estimated coefficients of the Cobb-Douglas function were used to calculate the elasticity (ε) value of the whole area. The calculation of these elasticity values was to determine the category of return of each field according to three categories (Serin and Radam 2009) as shown below:

- The increasing return to scale that is when the value is ε >1
- The constant return to scale is ε = 1
- Decreasing return to scale of ε <1

Results and discussions

The results of the study were analysed and presented using descriptive statistics, Cost Benefit Analysis (CBA) and multiple regression exercises (Cobb-Douglas and socioeconomic factors).

Demographic characteristics of IADA Pekan and IADA Rompin

Descriptive statistics were based on 77 respondents including 40 people from IADA Pekan and 37 people from IADA Rompin. A total of 30% and 40.5% of the respondents were in the 41 – 50 age group at IADA Pekan and IADA Rompin respectively. In IADA Pekan, 10% of the respondents were women farmers and 100% were Malays while in IADA Rompin, 16.2% were women farmers. The majority of the respondents completed their studies at the lower secondary level (SRP/PMR) at the SPM level and only a small number had graduated with degrees (IADA Pekan = 10% and IADA Rompin = 2.7%).

It was found that the majority of respondents (IADA Pekan = 45% and IADA Rompin = 59.5%) had 4 – 6 family members. IADA Pekan (47.5%) had less than 3 dependent family members while IADA Rompin (54.1%) had 4 – 6 dependent family members. The majority of respondents were also full-time rice growers (IADA Pekan = 72.5% and IADA Rompin = 91.9%). Most of them also did other side jobs such as farming (non-rice), trading and working in public and private sectors.

The majority of respondents (IADA Pekan = 80% and IADA Rompin = 48.6%) had less than 20 years of experience in rice cultivation. In spite of that, there was a relatively large number (43.3%) of farmers at IADA Rompin who had over 20 years of experience in rice cultivation. In terms of family involvement in rice cultivation, it was found that the majority (IADA Pekan = 85% and IADA Rompin = 48.6%) of the respondents used family members as labourers with less than 3 persons per farmer (*Table 4*).

According to *Table 5*, it was found that farmers at IADA Pekan cultivated rice in an area between 2 and 4 hectares (35%) on average compared to IADA Rompin. Farmers at IADA Rompin cultivated rice in less than 2 hectares (89.2%) on average. The study also found that the majority of farmers at IADA Pekan (52.5%) and IADA Rompin (45.9%) had an average yield of between 2 and 4 t/ha but some respondents (IADA Pekan = 35% and IADA Rompin = 51.3%) had an average yield of more than 4 t/ha.

The rice production cost and benefits of IADA Pekan and IADA Rompin

The analysis of the cost of production and the benefits to the farmers including the subsidies provided by the government were carried out for IADA Pekan and IADA Rompin granaries.

IADA Pekan

The average yields at IADA Pekan were 3.2 and 3.5 tonnes for the main season and the off-season respectively. The average cost of production of owners with and without subsidies were RM2,523.84 and RM3,989.84

Table 4. Farmer's demographic profiles at IADA Pekan and IADA Rompin

Granary/Category	IADA Pekan		IADA Rompin	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Respondent	40	51.9	37	48.1
Age				
≤ 30 years old	6	15	0	0
31 – 40 years old	6	15	6	16.2
41 – 50 years old	12	30	15	40.5
51 – 60 years old	7	17.5	7	18.9
≥ 61 years old	9	22.5	9	24.4
Total	40	100	37	100
Gender				
Male	36	90	31	83.8
Female	4	10	6	16.2
Total	40	100	37	100
Race				
Malay	40	100	100	100
Others	0	0	0	0.0
Total	40	100	100	100
Education level				
Primary school	12	30	11	29.7
Secondary school (SRP/PMR)	4	10	12	32.4
Secondary school (SPM)	14	35	10	27
Diploma/STPM	6	15	1	2.7
Degree and above	4	10	1	2.7
Total	40	100	35	94.5
Household size				
≤ 3 people	7	17.5	6	16.2
4 – 6 people	18	45	22	59.5
7 – 9 people	12	30	8	21.6
≥ 10 people	2	5	1	2.7
Total	39	97.5	37	100
Number of dependent family members				
≤ 3 people	19	47.5	13	35.1
4 – 6 people	14	35	20	54.1
7 – 9 people	3	7.5	4	10.8
≥ 10 people	0	0	0	0
Total	36	90	37	100

Granary/Category	IADA Pekan		IADA Rompin	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Main job				
Rice farmer	29	72.5	34	91.9
Farmer (non-rice)	1	2.5	0	0
Business	3	7.5	0	0
Government	0	0	1	2.7
Private	4	10	2	5.4
Others	3	7.5	0	0
Total	40	100	37	100
Part-time job				
Rice farmer	11	27.5	5	13.5
Farmer (non-rice)	7	17.5	6	16.2
Business	3	7.5	1	2.7
Government	0	0	0	0
Private	1	2.5	1	2.7
Others	6	15	20	54
Total	28	70	33	89.1
Experience in rice cultivation				
≤ 20 years old	32	80	18	48.6
20 – 40 years old	5	12.5	16	43.3
≥ 40 years old	2	5	3	8.1
Total	39	97.5	37	100
Number of family labour for rice production				
≤ 3 people	34	85	18	48.6
4 – 6 people	3	7.5	3	8.1
7 – 9 people	0	0	0	0
≥ 10 people	1	2.5	0	0
Total	38	95	21	56.7

Source: Primary data

per hectare respectively in season 1 while in season 2, there was a slight decrease in production cost with an estimated RM70 per hectare with an average increase of yield by 0.3 t/ha. The cost of rice production for renter with and without subsidies varied by an average of RM377.18 per hectare for the first season and RM393.72 per hectare for the second season.

In season 1, without subsidies, farmers had a loss of – RM240.48 per season if they cultivated their own land and if they rented, a higher loss amounting to RM617.66 per season was experienced. However, in season 2, with an average yield increase of 0.3 t/ha and without subsidies, farmers earned a better average net income of RM161.31 and –RM232.41 per hectare (owners and tenants) respectively

compared to season 1. The cost-benefit ratio (BCR) value is below 1, indicating that farmers were highly dependent on subsidised-incentives to generate their income (*Table 5*).

IADA Rompin

The findings at IADA Rompin showed that average yields were 3.2 and 3.5 tonnes per season for the main season and the off-season respectively. In season 1, the average cost of production of subsidised and non-subsidised owners was RM1,657.66 per hectare and RM3,123.66 per hectare respectively, while an average increase in production cost of around RM134.61 per hectare with an average yield increase of 0.7 tonnes per hectare could be seen in season 2. In this regard, the net income of farmers who own their own rice fields seemed to be relatively stable without incentives and subsidies.

However, if the farmer rented a field and did not receive subsidies, net income per hectare showed a negative value of season 1 (–RM203.92) with a slight increase in season 2 (RM587.28). This was due to the increase in average rental costs of RM587.70 per hectare in season 1 and RM555.56 in season 2 and this directly affected the net income per hectare. For both seasons at IADA Rompin, farmers received a cost benefit ratio (BCR) of more than 1 unless farmers carried out cultivation activities on rented land and did not receive subsidies (*Tables 6a* and *6b*).

Input factors and TE at IADA Pekan and IADA Rompin

The Cobb-Douglas production function is a specific function, which is widely used to describe the technological relationship between two or more inputs (mainly physical and labour capital) and the amount of output that can be produced (Singh et. al. 2017). This study used this function to measure the significance of inputs such as the area of rice cultivation, the number of seeds used, the quantity of labour and the quantity of fertilisers and pesticides concerning the yield of each granary, namely, IADA Pekan dan IADA Rompin.

IADA Pekan

The independent variables in the regression exercise conducted towards yields for IADA Pekan consisted of important inputs such as area, seeds, labour, fertilizers and pesticides. The regression model was significant with an F value of 4.364 value and the measured variables included in the regression model accounted for 49.7% (Adjusted $R^2 = 0.497$).

Table 5. IADA Pekan and IADA Rompin granary profiles

Granary profile		IADA Pekan (%) n = 40	IADA Rompin (%) n = 37
Area	< 2 ha	27.5	89.2
	2 – 4 ha	35	10.8
	4 – 6 ha	17.5	0
	6 – 8 ha	2.5	0
	> 8 ha	17.5	0
Yield	< 2000 kg/ha	22.5	2.7
	2000 – 4000 kg/ha	52.5	45.9
	4000 – 6000 kg/ha	12.5	24.3
	6000 – 8000 kg/ha	10	24.3
	> 8000 kg/ha	2.5	2.7

Source: Primary data

Table 6a. Farmer's production cost and benefits at IADA Pekan

Item		Season 1		Season 2	
Average area (ha)		4.4		4.4	
Average yield (mt/ha)		3.2		3.5	
Deduction (%)		24%		23%	
Gross income (RM/ha)		3,749.36		4,079.23	
		Owner	Tenant	Owner	Tenant
Production cost (RM/ha)	With subsidy	2,523.84	2,901.02	2,451.92	2,845.64
	Without subsidy	3,989.84	4,367.02	3,917.92	4,311.64
Net income (RM/ha)	With subsidy	1,225.52	848.34	1,627.31	1,233.59
	Without subsidy	–240.48	–617.66	161.31	–232.41
BCR	With subsidy	1.49	1.29	1.66	1.43
	Without subsidy	0.94	0.86	1.04	0.95

Source: Primary data

Table 6b. Farmer's production cost and benefits at IADA Rompin

Item		Season 1		Season 2	
Average area (ha)		1.3		1.3	
Average yield (mt/ha)		3		3.7	
Deduction (%)		24%		23%	
Gross income (RM/ha)		3,498.44		4,401.11	
		Owner	Tenant	Owner	Tenant
Production cost (RM/ha)	With subsidy	1,657.66	2,236.36	1,792.27	2,347.83
	Without subsidy	3,123.66	3,702.36	3,258.27	3,813.83
Net income (RM/ha)	With subsidy	1,840.79	1,262.08	2,608.84	2,053.28
	Without subsidy	374.79	–203.92	1,142.84	587.28
BCR	With subsidy	2.11	1.56	2.46	1.87
	Without subsidy	1.12	0.94	1.35	1.15

Source: Primary data

There were 50.3% unmeasured factors that could potentially contribute to the yield performance at IADA Pekan which were not included. There were 3 significant input variables, namely, area (β-coefficient = 0.806), seeds (β-coefficient = –0.712) and fertilizers (β-coefficient = 0.502). Negative coefficient values indicated that they were contrary to the expected outcome. It was found that a 1% increase in the number of seeds in cultivation indicated a 0.333% decrease in the yield. However, if there was a 1% increase in area and fertilizers, there will be an increase of 0.550% and 0.321% in yield respectively (*Table 7*).

The TE at IADA Pekan was found to be 76.7% which was at a moderate level with an elasticity of $\varepsilon = 0.92$. The value of less than one indicated that rice cultivation in Pekan was in decreasing return to scale. In other words, for every 1% increase in input in this area, there was less than 1% increase in revenue. This finding was consistent with the results shown in the

Cobb-Douglas production function finding which indicated that seed was negatively significant with yield.

Regression analysis was also carried out to identify the socioeconomic factors that could potentially influence the yield of rice at IADA Pekan. *Table 8* shows that farmers with a higher level of education (β-coefficient = 0.359) were expected to experience higher yields. On the other hand, the household size (β-coefficient = – 0.302) was negative at 10% indicating that as family members increase, the rice production will decline at IADA Pekan.

IADA Rompin

The independent variables in the Cobb-Douglas production function were also regressed towards the yield for IADA Rompin. The regression model was significant at 5% with a F value = 14.513 and the overall variables included in the regression model accounted for 91% (Adjusted R^2 = 0.912) of the total factors that could potentially influence yield. There were only 7.8% other factors that were still not accounted for in the exercise. The results in *Table 9* shows that an input variable of labour (β-coefficient = 1.129) was significant at 1%. A positive coefficient value indicated that there will be an increase in rice production in the event of percent increase in labour input. In other words, 1% increase in the use of labour in this area in any of the relevant rice cultivation phases would indicate an increase of 2.115% in rice yield.

Technical efficiency at IADA Pekan was at a relatively high level (83.9%) with an elasticity of ε = 1.50. Values of more than one indicated that rice cultivation at Pekan provided an increasing return to scale condition. In other words, for every 1% increase in input in this area, there will be more than 1% increase in yield.

Table 7. Cobb-Douglas production function and TE of IADA Pekan

Model	Unstandardised coefficients		Standardised coefficients	t	Significance
	β	Std. error	β		
(Constant)	8.192	2.043		4.01	0.002***
Ln_area	0.550	0.199	0.806	2.771	0.017**
Ln_seeds	–0.333	0.139	–0.712	–2.393	0.034**
Ln_fertilizers	0.321	0.124	0.502	2.58	0.024**
Ln_pesticides	–0.084	0.125	–0.135	–0.67	0.515
Ln_labour	0.045	0.191	0.068	0.236	0.817
F value		4.364**			
R^2 value		0.645			
Adjusted R^2 value		0.497			
TE*		76.7%			
Elasticity		0.92 (Decreasing return to scale)			

*TE calculation is average for both seasons
***Significant at 1%
**Significant at 5%
*Significant at 10%

Table 8. Socioeconomic factors affecting yield performance at IADA Pekan

Model	Unstandardised coefficients		Standardised coefficients	t	Significance
	β	Std. error	β		
(Constant)	3578.03	4076.63		0.878	0.387
Gender	672.03	1345.45	0.090	0.499	0.621
Education level	633.75	372.08	0.359	1.703	0.099*
Household size	–393.23	225.16	–0.302	–1.746	0.091*
Number of dependents	160.86	373.22	0.097	0.431	0.670
Primary job	–234.48	375.85	–0.149	–0.624	0.537
Part-time job	285.55	290.03	0.21	0.985	0.333
Experience (rice cultivation)	48.27	49.41	0.171	0.977	0.336
Family members involved with rice	124.79	270.44	0.096	0.461	0.648
F value	2.178*				
R^2 value	0.367				
Adjusted R^2 value	0.199				

*Significant at 10%

Table 9. Cobb-Douglas production function and TE at IADA Rompin

Model	Unstandardised coefficients		Standardised coefficients	t	Significance
	β	Std. error	β		
(Constant)	–4.103	2.293		–1.789	0.117
Ln_area	0.12	0.152	0.126	0.794	0.453
Ln_seeds	–0.481	0.332	–0.233	–1.446	0.191
Ln_fertilizers	0.278	0.185	0.428	1.498	0.178
Ln_pesticides	–0.159	0.105	–0.392	–1.508	0.175
Ln_labour	2.115	0.276	1.129	7.672	0.000***
F value		14.513**			
R2 value		0.912			
Adjusted R^2 value		0.849			
TE*		83.9 %			
Elasticity		1.5 (Increasing return to scale)			

*TE calculation is average for both seasons
***Significant at 1%
**Significant at 5%
*Significant at 10%

There were 2 socioeconomic factors that could potentially influence the yield of rice at IADA Rompin. Experience in cultivating rice (β-coefficient = 116.983) was significantly positive at 10% on increasing the yield. The more experienced the individual farmers were, the greater the potential for the increase in rice production. At the same time, the number of family members involved with rice (β-coefficient = –0.641) was found to negatively influence rice production (*Table 10*).

Conclusion

The findings of the economic evaluation study at IADA Pekan and IADA Rompin showed some of the dimensions that needed to be taken into account and required action from a technical point of view and policy formulation that impacted the sustainability of rice production in these areas. Demographic profiles structure from the study showed unbalanced characteristics among the farmers which might have affected the performance of rice cultivation. Therefore, there is a need for efforts to ensure that the successors in rice cultivation from the selected granaries are more educated and younger in future. The continuity should be blended with the experiences of the elders and higher education levels for more advanced technological usages which are assumed for better productivity and efficiency in rice cultivation.

Average rice production at both IADA Rompin and IADA Pekan was at a moderate level and is in dire need of government subsidies for the continued success of rice cultivation. At IADA Pekan, the average increase in production can be achieved by increasing inputs of fertilizers and growing areas while at IADA Rompin, increasing labour inputs positively impacted yields. The relatively low cost of production as well as the average moderate output production of these 2 granaries could ensure a positive financial viability even without government subsidies. Rice production output has the potential to be improved with increased

Table 10. Socioeconomic factors affecting yield performance at IADA Rompin

Model	Unstandardised coefficients		Standardised coefficients	t	Significance
	β	Std. error	β		
(Constant)	3678.698	4257.83		0.864	0.400
Gender	71.77	892.739	0.02	0.08	0.937
Education level	1330.269	1267.804	0.399	1.049	0.309
Household size	–123.483	675.756	–0.177	–0.183	0.857
Number of dependents	107.77	584.447	0.157	0.184	0.856
Primary job	–329.405	482.512	–0.272	–0.683	0.504
Part-time job	–220.35	190.65	–0.395	–1.156	0.264
Experience (rice cultivation)	116.983	57.906	0.970	2.02	0.059*
Family members involved with rice	–673.059	357.98	–0.641	–1.88	0.077*
F value	2.591*				
R^2 value	0.578				
Adjusted R^2 value	0.355				

*Significant at 10%

inputs. At IADA Pekan, the average farm efficiency was at a moderate efficiency (76.7%) and also having an elasticity value of less than 1 ($\varepsilon < 1$) implying the decreasing return to scale pattern. Increasing one input unit will produce less than one output and this indicated that technology injection is needed to improve farm yield and efficiency.

However, at IADA Rompin the efficiency value was higher at 83.9% and the elasticity value was greater than one which showed an increasing return to scale. Increasing 1 input unit will increase output by more than one. Thus, farmers at IADA Rompin need to be more efficient in managing inputs that will increase average rice yield. The majority of farmers will have difficulty in ensuring the sustainability of rice production in this area as it relies heavily on the government's assistance in handling the cost of producing rice per hectare. The sustainable rice sector will contribute to the income and social stability of the farmers. Implementation of policies should be accurate and effective so that the farmer's livelihood is in line with the country's rapid development.

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Abstrak
Faktor input tambahan dalam fasa pengeluaran padi adalah salah satu faktor utama yang menyumbang kepada peningkatan hasil. Namun, pada masa ini, peningkatan faktor input tambahan seperti keluasan, tenaga kerja, baja, racun perosak dan benih nampaknya tidak meningkatkan hasil padi secara signifikan. Kawasan IADA Pekan dan IADA Rompin yang agak baru adalah antara dua daripada dua belas jelapang utama di Malaysia. Kestabilan dan peningkatan potensi pengeluaran hasil kedua-dua kawasan ini memberi kesan yang besar terhadap pengeluaran beras negara dan menyumbang kepada kelestarian dan kecukupan makanan negara. Selain faktor input, faktor sosioekonomi juga merupakan isu penting dalam menjelaskan dimensi yang dapat menyumbang kepada peningkatan produktiviti padi. Oleh itu, kajian ini dilakukan untuk menjelaskan dan mengkaji faktor-faktor ini serta untuk menentukan prestasi Kecekapan Teknikal (TE) masing-masing dari jelapang terpilih. Data kajian dikumpulkan melalui temu ramah bersemuka dengan menggunakan soal selidik berstruktur. Pensampelan rawak diterapkan pada ukuran populasi petani yang mewakili kedua-dua jelapang. Sebanyak 77 responden berjaya ditemuramah iaitu 40 responden mewakili IADA Pekan sementara 37 responden mewakili IADA Rompin masing-masing. Kajian ini mendapati bahawa internalisasi tambahan faktor input tidak memberikan banyak kesan yang signifikan terhadap kenaikan hasil (pulangan penurunan ke skala) untuk IADA Pekan sementara hasil yang berbeza telah didapati untuk IADA Rompin. Oleh itu, kesimpulan kajian mencadangkan pendekatan dan alternatif yang berbeza untuk dilaksanakan untuk kedua-dua jelapang kajian untuk menjamin kelestarian pengeluaran padi dan juga kemaslahatan kehidupan petani.