

Factors Affecting Paddy Production under Integrated Agriculture Development Area of North Terengganu (IADA KETARA): A Case Study

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Rice cultivation in Malaysia has been closely associated with the rural population and traditional farmers. The Malaysian government encourages domestic production of paddy because it is regarded as a security crop but the production levels are still low. A case study was conducted at IADA KETARA in the district of Besut, Terengganu that has 2,884 farmer participants to identify the factors that influence paddy production and its operational costs and to evaluate the perception of farmers about paddy production in future. A random sample of 10% of the farmers was selected and asked to answer a questionnaire. Significant differences in yield were found between gender, age groups, educational levels, length of working hours, years of experience, whether additional fertilizer was applied, and field condition. In addition, of all the farmers surveyed 40% agreed that paddy farming was a good business while 23% disagreed. Nevertheless 39% did not want their children to engage in it while 28% wanted them to do so. The average cost of production for IADA KETARA is RM1694.00 per hectare and cost to produce one kilogram of paddy is RM0.51. The major components of the cost were land preparation, harvesting and agricultural inputs. Finally, it was found that years of experience is the important factor that contributes to the yield because although farmers have low educational level the knowledge that they gained through their experience was more valuable. Productivity may be boosted by giving more subsidies of agriculture input, reducing the cost of production, increasing farm price, and increasing interaction between KETARA officers and the farmers.

INTRODUCTION

The Third Malaysia National Agricultural Policy, known as NAP3, sets out policy objectives that include assuring national food requirements, enhancing competitiveness and profitability, capitalizing on added-value opportunities and encouraging integrated development in the food sector. NAP3, which runs through 2010, is shifting policy from a commodity-based approach to a product-based approach that concentrates on market demand, demand potential and consumer preferences.

Although food production increased by about 4.2% a year during the 1985-95 periods, that growth did not keep up with domestic demand, a continuing trend. In NAP3, the government notes that "it is not in the long-term interest of the country to be increasingly dependent on external sourcing for food," but recognizes that economic factors limit Malaysia's ability to fully meet domestic food requirements. Income and population growth as well as changes in lifestyle resulting from urbanization have increased the demand for food; and generated changes in food habits, food purchasing and consumption patterns.

Local production of food had increased at about 4.2 per cent per annum during the 1985-95 period. This increase had not been able to match with domestic demand resulting in increasing imports especially during the same period.

Food import bill in 1999 stood at RM 11.0 billion, compared to RM 10.0 billion in 1997. Major food imports include wheat, rice, maize, sugar, dairy products, fish, vegetables, fruits, and meat products. The increasing deficit between domestic demand and local production is

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expected to continue. The recent financial crisis has highlighted the need to pursue more aggressive policies to enhance food security through expansion in domestic food production and lesser dependence on imports. It is also not in the long-term interest of the country to be increasingly dependent on external sourcing for food, as there is uncertainty in its long-term international supply.

In Malaysia, there has been a long history of planting rice under rain-fed conditions in pockets of areas located along the flood plains of rivers. In the early 1900s, large scale irrigation systems were first introduced, especially in the Kerian Irrigation Scheme and the Wan Mat Saman Scheme. In 1932, the Department of Irrigation and Drainage (DID) was established and together with the Department of Agriculture (DOA), formed the prime movers of organized and systematic irrigation development in the country. These included the development of new areas as well as the upgrading of existing schemes. In the 1960s, to meet the twin objectives of increasing food production and income levels of the rural poor, double cropping was widely introduced. Water resources development became an important component of irrigation projects with the construction of storage dams, barrages, and pumping stations, followed by extensive network of irrigation canals, drains, and farm roads (DID report, 2000).

The objectives of this research project were to determine the paddy yields achieved by farmers in IADA KETARA; to see how yields may be affected by various demographic factors of the farmers; to estimate the operational costs involved; and to evaluate the perception of farmers about paddy production in future.

LITERATURE REVIEW

Rice cultivation in Malaysia had been closely related with the rural population and traditional farmers but in the last 30 years, paddy was transformed into a commercial crop. Since paddy is considered a security crop, the government encourages its domestic production. Unfortunately, the national average yield is low at just over 3.5 tonne per hectare and local production can only provide around 60-65% of domestic requirements. Therefore, the shortage is supplemented by imported rice where about 40% of annual imported rice is from Thailand and the rest is from other various countries (CIAP, 2000).

Paddy production represents 30% of the world cereal production. It has doubled in the last 30 years, in part due to the introduction of new varieties but its present growth barely follow consumption; in 2025 there will be 4.6 billion people depending on rice for their daily nourishment, compared with three billion presently. At the same time, small producers will have to use land that is less favorable for cultivation (FAO, 2005).

According to the Food and Agriculture Organization (FAO), global paddy output in the 2001 season was 591.1 million tonne, about 7 million tonne less than in 2000 and 19 million tonne below all the time high reached in 1999. The fall in 2001 reflected to a large extent a change of policies in China. Confronted with huge rice inventories and the need to prepare for an increase in cereal imports following the country's accession to the World Trade Organization (WTO), most producing provinces had started reducing the level of support or protective rice prices in 1999. In the rest of Asia, paddy output fell in Indonesia, the third largest producer, reflecting a shift in plantings and recurring flooding problems. Production also fell in Japan, Sri Lanka and Thailand. On the other hand, relatively good monsoon rains boosted production in India to 135 million tonne, the highest performance in history. Favorable growing

conditions combined with government support to the sector also sustained increases in Bangladesh, Myanmar, Philippines, and the Republic of Korea.

Malaysia is a small rice producer. The total rice output in the country is estimated to be just 0.4% of total world output. Smallholders with an average farm size of about 1.06 hectare mainly produce paddy. There are approximately 296,000 paddy farmers of which 116,000 are full time farmers depending on paddy cultivation for their livelihood. Sixty five percent of the paddy farmers have farms of less than one hectare while only four percent have more than three hectares (Malaysian National Committee of ICID, 2002).

In Peninsular Malaysia, rice production is concentrated mainly in eight rice producing areas, known as main granaries as shown in Table 1. These areas are actually major irrigation schemes, which account for 70% of total cultivated paddy area and 83% of total paddy production in Peninsular Malaysia. The increase was the result of yield improvements, increased cropping intensity and better farm management practices. Productivity growth of between 0.9% and 4.9% per annum for each granary was registered. Paddy is also grown in the second or mini granary areas that are supported by small and medium scale irrigation facilities with varying degrees of double cropping capacities. Currently, there are 74 secondary granaries and 172 minor granaries in operation, with a total paddy area of 28,441 and 47,653 hectares, respectively and eighty percent of these areas are located in Peninsular Malaysia. Together with the main granaries, they constitute about 85% of total paddy cultivated areas. The balance of another 15% stand for the non irrigated areas, which include rain fed paddy fields and hill or upland paddy, which are mainly concentrated in Sabah and Sarawak. In these areas, single cropped paddy cultivation is widely practiced with little or no inputs.

Cost of production

Compared to other rice producing countries, Malaysia's cost of rice production can be considered high. The average cost of production is shown in Table 1 below. It ranges from RM954 per hectare in KADA to as high as RM2028 in Northwest Selangor (Barat Laut Selangor). The average cost of production for Peninsular Malaysia is RM 600 to RM1500 per hectare and cost to produce one kilogram paddy ranges between RM0.28 and RM0.40. The major components of the cost are land preparation, harvesting, agricultural inputs and land rental. Together, they represent about 52% of the total cost of production. As a high cost producer, Malaysia is certainly not a competitive producer, especially when the world price is low. This is further aggravated by the continued increase in the prices of inputs including wages, land rent and agricultural inputs (Arif, 1999).

As reported by Melissa, 2001, paddy farmers are helped by the government to reduce cost in their production where they receive government fertilizer subsidies and price support programs. According to the Ministry of Agriculture, the fertilizer support program has not been as effective as price and other indirect support programs in increasing paddy production and farmer incomes, because of administrative difficulties and high public costs. In the past, the rice self-sufficiency goal was 70%, and the government set price subsidies at high levels to encourage reaching the target. Over the 1985-98 periods, domestic production accounted for about 77% of total domestic consumption.

Table 1: Cost of production

Granaries	Yield (t/ha)	Cost (RM/ha)	Cost (RM/kg)
MADA	4.16	1079	0.30
KADA	3.42	954	0.28
Seberang Perai	2.91	1176	0.40
Kerian/ Sg. Manik	3.25	1069	0.33
Barat Laut Selangor	4.5	2028	0.45
Kemasin Semerak	2.99	1208	0.40
KETARA	3.4	1355	0.40

(Source: MARDI, 2000)

IADA KETARA

The Integrated Agricultural Development Project Besut (IADA KETARA) is a government agency responsible for agricultural development in Besut District. This district is located in Northern Terengganu bordering Kelantan. It occupies an area that is 9.52% of the total area of Terengganu. Topography of this district was sloping in the north and undulating in the south. The hilly area in the south has an elevation center higher than 200 m in the middle of Tebu Mount and Pelagat Reserve Forest. The administration center of this district is located at Kampung Raja and main towns are Jerteh and Kuala Besut. Bukit Payung, Pasir Akar, Kg. Renek, Jabi, Apal and Tembila are smaller communities or villages. Land use of this district is divided into agricultural 33,089 ha, industrial 517.5 ha, forest 56,243 ha, building 27,761.9 ha, federal land 733.5 ha and others 204 ha. In order to develop the agricultural sector, new modern production and management techniques were introduced to optimize production per hectare. IADA KETARA is responsible for the development of the agricultural sector in North Terengganu and to reduce the poverty rate among residents involved in agricultural activities especially paddy farmers.

METHODOLOGY

This study was carried out at IADA KETARA in the district of Besut, Terengganu with 2,884 farmers involved under this scheme. This research was conducted from June to September 2008. During this study, a questionnaire was personally administered to a random sample of respondents that corresponds to 10% of the target population. There are three sections in the questionnaire. The first section consisted of closed questions that would ask the respondents to make choices among a set of alternatives given by the researcher. A second section consisted of questions where the respondents were asked to rate their responses using a 5 point Likert scale. The third section allowed respondents to answer questions in an open-ended manner.

The raw data from the questionnaires was entered into a spreadsheet to be summarized before it was analyzed using the Statistical Package for Social Science (SPSS) software. The results from the questionnaires were summarized into easily understandable forms such as frequency tables, pie charts, bar charts, histograms, and others. The statistical techniques used to analyze the data were cross tabulation, one-sample t test, and one-way Analysis of Variance (ANOVA).

RESULTS AND DISCUSSIONS

The survey was conducted as planned and questionnaires were distributed to the sample of 300 farmers under IADA KETARA and collected on same day. All the information gathered was entered into Microsoft Excel to develop various graphs and charts. Then, the data was transferred into the Statistical Package for Social Study (SPSS) for further statistical analyses such as T- test, cross tabulation, chi square test, and ANOVA followed by Duncan Multiple Range Test (DMRT) when necessary.

From the survey conducted, it was found that the common varieties grown were MR219, MR220 and MR232 because they are more high yielding and resistant to pests and diseases. Besides, 75% of the respondents had cultivable area less than 1 ha and the average land size was about 1-2 acre (0.4-0.8 ha) only for each farmer. In addition 60% of respondents had another job and did not depend on paddy production as their only source of income. Other than that, 60% of respondents used manual direct seeding, 28% used mechanized direct seeding, 10 % used both types; and the remaining 2 % used transplanting machine for seeding.

FACTORS AFFECTING YIELD

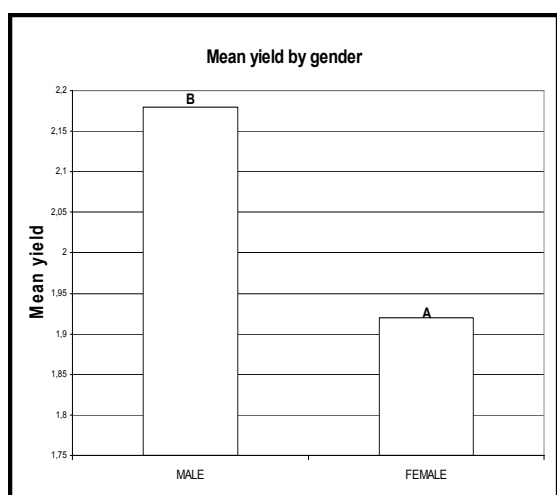


Figure 1: Mean yield by gender

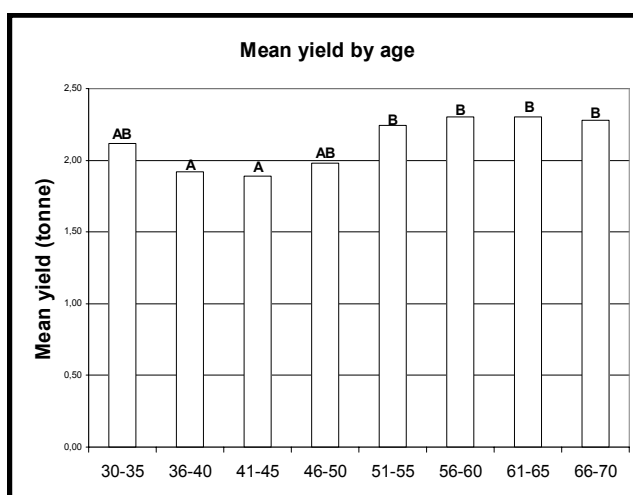


Figure 2: Mean yield by age groups

1. Gender

The survey showed that 60% (181 respondents) of the respondents were male and other 40% (119 respondents) were female. The average yield of 2.182 tonne/ha produced by male farmers was significantly ($t=4.301$, $p=0.000$) greater than the 1.934 tonne/ha produced by their female counterparts (Figure 1). This may be because the men worked in their field longer than the women and had more experience in paddy production. The women tended to be housewives after they were married and only began to help their husbands in the field after their children have grown up.

2. Age Groups

Significant differences in yield was also seen between the various age groups ($F=5.013$, $p=0.000$). Farmers between the ages of 51-70 produced significantly greater yields than those between 36-45 years old (Figure 2). Generally older farmers have many more years of experience.

3. Years of Experience

Based on the survey conducted, it was found that 10% of respondents had planted paddy for less than 5 years; 37 % for 6-10 years; 9 % for 11-15 years; 13% for 16-20 years; 16% for 21-25 years; 7% work for 26-30 years; and 8% for more than 30 years.

The ANOVA showed significant differences in yield between the age groups ($F=15.179$, $p=0.00$). Pairwise comparisons indicated that those in the 26-30 years group produced significantly greater yield than the rest (Figure 3). However those with more than 30 years of planting experience produced yields that were significantly lower than all other age groups.

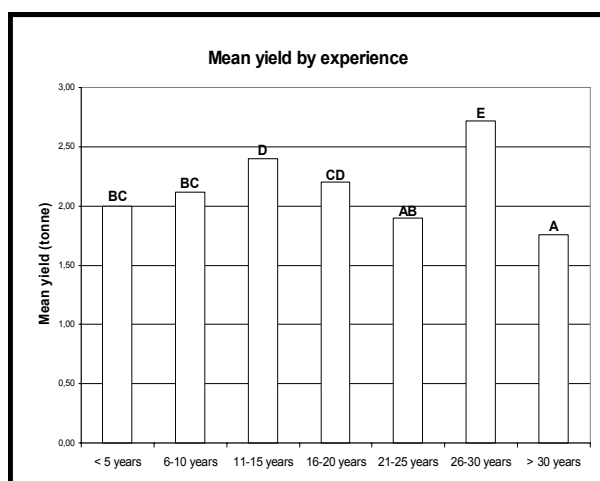


Figure 3: Mean yield by experience

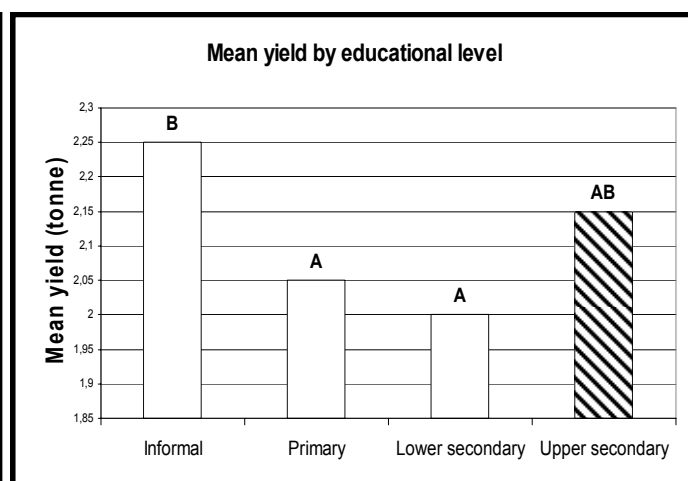


Figure 4: Mean yield by educational level

4. Educational Level

19% of the respondents had informal education, 20% had primary education, 32% had lower secondary education, while the remaining 29% had upper secondary education. The ANOVA indicates there were significant differences in the yield produced by different level of educational ($F = 4.136$ $P = 0.007$). Figure 4 shows that the highest yield was achieved by farmers with informal education. Again, most farmers with informal education were older people and their past experience may have enabled them to produce more.

5. Fertilizer Application

Only 37% of respondents applied additional fertilizer apart from subsidy fertilizer given by the government. Farmers who applied additional fertilizer produced higher yield (Figure 5) than those who did not ($t = 7.102$, $p = 0.000$). The respondents understood that additional fertilizer application could double the yield of their fields but they were unable to follow this practice because they could not pay for the additional input.

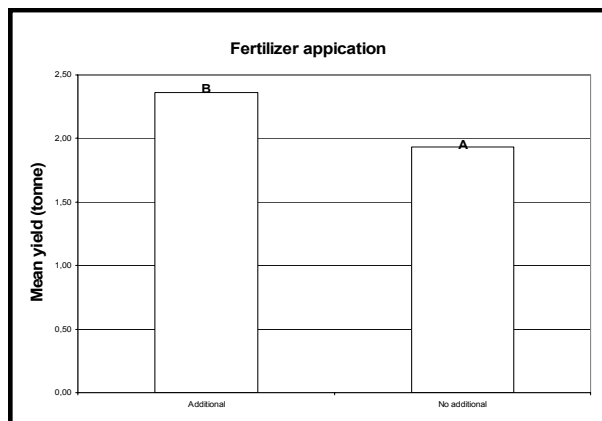


Figure 5: Mean yield by additional fertilizer

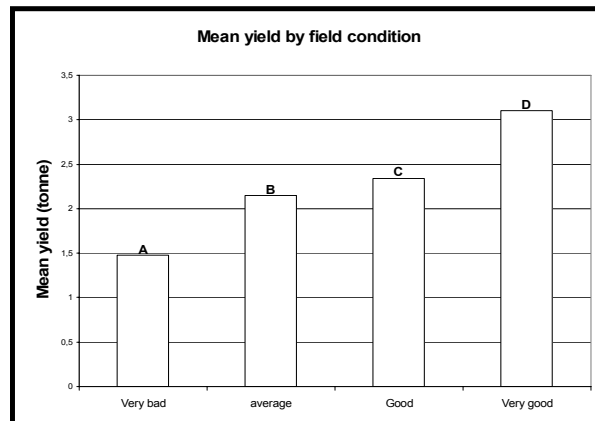


Figure 6: Mean yield by field condition

6. Field condition

Field conditions such irrigation, drainage, field road, water retaining boundaries and field dryness before harvesting are factors affecting productivity. Farmers were asked to rate the condition of their field and based on their self assessment, significant increases in yield were observed as field conditions changed from very bad to average, good and very good (Figure 6). The strong relationship between yield and field conditions clearly indicates that the farmers were very good at evaluating the condition of their fields.

7. Cost of production

Table 2 shows the costs per hectare that must be paid by the farmers for each season of production at KETARA.

Table 2: Production cost per hectare at KETARA

#	Item	Cost (RM)	% of Total Cost
I	Input costs		
a	Seed	138.00	8.14
	Fertilizer (including subsidy)	162.00	9.56
	Herbicide	227.00	13.40
	Pesticide	188.00	11.10
		715.00	42.21
II	Operation and labour costs		
	Land preparation	200.00	11.81
	Seed preparation	33.00	1.95
	Manuring	111.00	6.55
	Pest and disease control	135.00	7.97
	Harvesting and transportation	500.00	29.52
		979.00	57.79
	TOTAL I + II	1694.00	100.00

The average cost of production for IADA KETARA was RM1694. 00 per hectare and cost to produce one kilogram paddy was RM0.51. The major cost components were land preparation,

harvesting and agricultural inputs. The cost was same among all farmers except if they applied additional fertilizer and chemicals. Most of the respondents felt that the operational cost of paddy production was high and was a burden to them especially when price of paddy was low.

8. Perception of paddy cultivation as a good business

Farmers who felt that paddy production was a good business produced higher yields compared those who did not (Figure 7). It would be interesting to find out whether the perception is the effect of better yields or its cause.

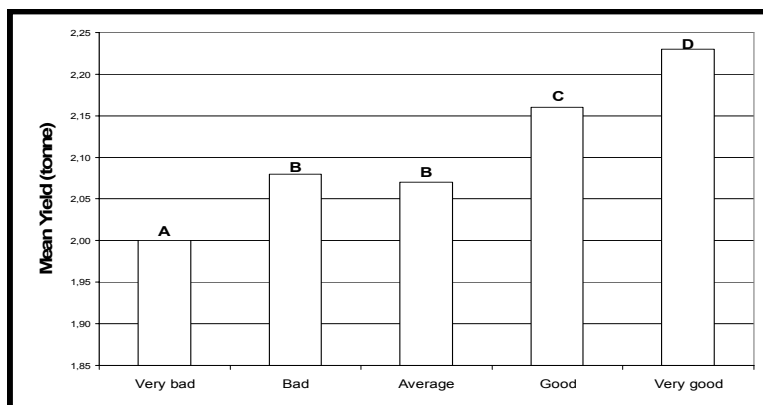


Figure 7: Mean yield by perception of paddy planting as a good business

9. The perceived future of paddy cultivation

When farmers were asked if they would want their children to inherit their paddy production, 11% highly disagreed, 28% of them disagreed, 35% of them said probably, 22% agreed, and 4% highly agreed. The majority of the respondents disagree because they themselves did not produce good yield and for them paddy cultivation did not have good future especially for the younger generation. The younger farmers might be continuing the business because they were not trained to do anything else. The older farmers might be working the fields because they felt it was their duty to till the land left by their ancestors.

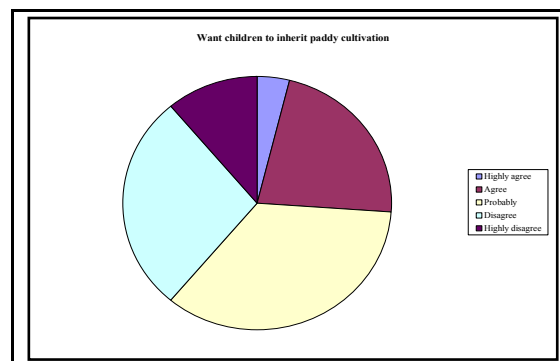


Figure 8: Perceived future of paddy cultivation

CONCLUSIONS AND RECOMMENDATION

From the result of the study, it can be concluded that demographic background and their practices were influence the yield of paddy production. The majority of farmers under IADA KETARA scheme were men and they produced greater yield compared to the women because they spent more time in the paddy field every day. Other than that men also had more years of experience in paddy production because they became farmers earlier than women, that is, soon after they finished primary or secondary school and it was the only work available in the village but women only started after their children have grown up.

Besides, farmers from the older group, the majority of whom had informal education, produced greater yield compared to young group. Even though they were less energetic than their younger counterparts, the experience that they had was invaluable in their decision making. Generally, years of experience was the major factor that affected the paddy yield – farmers with more experience tended to have higher yields.

REFERENCES

- Aheeyaar, M. Henegedara, G.M. Rupasena, L.P. (2005). The Cost of Production of Rice in Kegalle and Kurunegala Districts of Sri Lanka. Agrarian research and Training Institute Colombo, Agronomy Journal Volume 2, pp. 1-5.
- Ariff, T. Ariffin, T., (1999). Effect of Trade Liberalizations on Agriculture in Malaysia. Working Paper Series, pp. 27-35.
- Bagheri, A., Shabanali H. (2008). Perceptions of Paddy Farmers Towards Sustainable Agricultural Technologies: Case of Haraz Catchments Area in the Mazandaran Province of Iran, American Journal of Applied Sciences, Volume 10, pp. 1384-1390.
- Dept. of Irrigation and Drainage, Annual Report (2000). pp. 15-25.
- FAO (Food and Agriculture Organization of the United Nation) (2005). Annual Report, pp. 4.
- Joachim, V.B and María, S. (2004). The Changing Economics and Politics Of Rice: Implications For Food Security, Globalization, and Environmental Sustainability. Journal Rice is Life: Scientific Prospectus for the 21st century, pp. 7-19.
- Sanzidur, R. (2006). Productivity and soil fertility relationships in rice production systems, Bangladesh. Journal of Agriculture System, Volume 92, pp. 318-333.
- The Third National Agricultural Policy Executive Summary Handbook, (1998). pp 1-30.
- Uma, S. (2003). Research Methods for Business a Skill Building Approach, 4th edition, pp 236-249.
- Zainol, A. (2005). Acceptance of Rice Farming Technology by Paddy Growers in Granary Areas of Integrated Agricultural Development Project (IADP), Penang: A Case Study, pp 3- 50.