



The ironies of new innovation and the sunset industry: Diffusion and adoption



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ABSTRACT

Agriculture plays a vital role in the Malaysian economy. Within the agriculture sector, paddy is considered important as it is the staple food for the nation. Innovation is considered as an important and necessary component in the development of agricultural activities, while communication is the powerful tool to further strengthen this sector. Technology adoption would only take place if innovation is driven by farmers' need. Innovation diffusion technology transfer and adoption are all inter-related facets in increasing crop production. This study examined the influence of innovation attributes, communication channels and awareness in aiding diffusion and adoption of green fertilizer technology innovation in paddy farming in Malaysia. Past innovation diffusion studies have had limited emphasis on the importance of communication for diffusion and adoption of green fertilizer technologies. Hence, there exists a gap that demands specific studies to be undertaken. This study adopted a quantitative method through survey dissemination to fulfil the aim and objective of this study. 366 paddy farmers were selected from Perak to be the respondents. Demographic and multiple regression analysis were carried out on the data. Examining these results is an important first step toward understanding factors that could make the paddy sector in Malaysia more sustainable. From the analyzed data, this study found that certain attributes which are compatibility, interpersonal communication, mass media and awareness have an influence on green fertilizer technology adoption among the local farmers in Malaysia. The results indicate that the level of farmers awareness and information about innovation in general, innovation diffusion process and the extent of attributes in innovation. The study have several implications for government agencies and policy makers in the agricultural sector. Impact of study on Malaysian context are also proposed.

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1. Introduction

In Malaysia, paddy rice is one of the most important agricultural crops besides oil palm and rubber, which is grown in both peninsular and East Malaysia. About 300,500 ha in peninsular Malaysia and 190,000 ha on Borneo Islands are designated for rice production (Haris et al., 2013). While, the total annual production of rice stands at 2.7 million metric tons (FAOstat, 2015). Rice cultivation area (rice bowl) is divided into two parts: the irrigated scheme and non-irrigated scheme. It is reported that Irrigated scheme could achieve higher yield as compared to the non-irrigated scheme

(DOA, 2012). The management of the rice production in the rice bowl area is called Integrated Agricultural Development Authority (IADA). According to Ministry of Agriculture and agro-based industry (MOA), IADA is the main producer that meets 72% of the demand of this country (MARDI, 2010). During the economic crisis in 2007, Asian countries including Malaysia turned to agriculture as one of their main income generators. Due to its strength in terms of shaping the socio-economic development of the community, agriculture has been mentioned in every Malaysian Plan as having brought more money into the country and the local community. In the Ninth Malaysian Plan (RMK-9), agriculture is declared as the third largest income generator for Malaysia. Therefore, a great deal of effort is needed to ensure that the agriculture sector can elevate the economic development of Malaysia.

Agriculture is the major driving source of Malaysian livelihood.

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Agriculture industry accounted more than 11.4% of GDP in Malaysian economy. Dr. Mahatir Muhammad former prime Minister of Malaysia mentioned that agriculture is the “sunset industry” for the nation (Goldthorpe, 2015). Malaysian government focuses more on paddy industry because agriculture remain an important part for the national budget in the new era as well as paddy is the staple food a part from palm oil and rubber (Elhadary et al., 2013) the rice production is not upto the consumption level. Consequently over the past decades, the major thrust for the nation policies was directed towards transforming paddy industry through rapid technological progress to increase the yield without damaging the environment. This led to widespread diffusion of “new innovation” with corresponding support in the provision of modern inputs to be significant for the next generation.

Arshad et al., (1999) and Alam et al., (2012) reported that there is no specific policy on food security in Malaysia. It has however been embedded under the self-sufficiency theme that refers to paddy or rice sector in the Malaysian plan. Since rice is the staple food in Malaysia, self-sufficiency level has been focused on paddy and production. About 10%–35% of the total required rice is imported from the neighboring countries, such as Thailand, Vietnam, Myanmar, India and Pakistan (Chung and Tan, 2015). However, the agriculture sector in Malaysia had achieved positive development upon implementation of the Eight Malaysia Plan. Similarly, the Ninth Malaysia Plan has also emphasized on the importance of agriculture to ensure the development of the sector. This is important to serve as the third engine of the economic growth. In line with the Malaysian plans, the Malaysian government has allocated a large sum of allocation of RM6 billion budget in 2010 for the agriculture sector. The Tenth Malaysia Plan (2011–2015) emphasized on the high value of agriculture activities such that the contribution to GDP increases to 2% by 2015 (Malaysia, 2011). During the period of 10th Malaysian Plan, no new areas will be developed for paddy cultivation and local production of rice will be set to fulfill a 70% level of self-sufficiency (Alam et al., 2012).

Technologies which contain complicated components also require more time and more labor, making them difficult for old farmers to apply. A study conducted by Truong (2008) focused on rice farmers’ adoption of technology in the Mekong Delta. In his study discussion, Mekong Delta is a very well-known and successful paddy area development in the region and it is a hope that similar success can be adopted in other areas in the region. Truong (2008) shows that there are some technologies that benefit both farmers and the industry. Technologies in his study includes Integrated Pest Management (IPM), “three reductions-three gains”, row seeding, harvesting by machine and rice dryers which have been proven to increase paddy yields.

In a number of local studies by Salleh et al. (2009), Hayrol Azril et al. (2009a,b), Abu Samah et al. (2009) have agreed with findings by Truong (2008) which accentuated on factors such as education, negative perceptions, lack of capital, small land areas, ineffective infrastructure facilities and limited capacity of extension workers as the main drivers that led to low technology adoption. Additionally, factors such as the knowledge level of extension workers, methods of organization and management of extension programs and local conditions are also highlighted as the drivers for technology adoption. Mufara (2009) and Clark et al. (2015) stated that elderly people in farming become one of the challenges in agricultural field. They face difficulties in understanding the new innovations of paddy farming. This is where education and knowledge play an important role to supervising old farmers in the adoption of innovation. Based on a study conducted by Truong (2008), there are many obstacles to running a successful technology strategy. The main reasons for non-adoption of technology are weak perceptions

of technology and low education of farmers, low teaching capacities, limited knowledge among extension workers, disorganization, geographical conditions and inadequate resources and funds. Furthermore, farmers should have a certain level of education and should be very familiar with rice farming in order to be motivated to learn new technology.

Rice industry in Malaysia have been highly subsidized. Malaysia government in general spent RM 300 million USD per year for fertilizer alone (Rizal, 2015). There are also several other subsidies from the government in form of grants, agriculture input and direct cash. The highly-subsidized sector is due to the fact that rice is the staple food in Malaysia and the government would like to ensure it as part of the food security for the country (Ramli et al., 2012). However, this reliance on subsidized inputs and other forms of assistance has had some perverse consequences. One of it is the over reliance of farmers on subsidy. It affects the willingness for the farmers to seek new technology which might increase their yield. The economic assistance which aim to increase yield of paddy resulted in over reliance among the farmers on the government assistance (Rizal, 2015). Muller, Peres and Mahajan (2009) highlighted that one of the obstruction for innovation to grow is high knowledge gap in the market. The rice industry in Malaysia suit the observed situation.

Other than that, age factor could also be a factor in influencing technology adoption, as majority of the farmers in Malaysia are the elderly. Aging is the main problem for creating awareness on technologies to old farmers in Malaysia. Moreover, old farmers still rely on traditional methods of agricultural production and processing, instead of using modern and efficient technology. Due to this reason, the age of the farmers can either influence or demotivate to adopt new technologies. Regardless of farmers’ experience, most of them could not understand the benefit of adopting innovations in increasing paddy farm production (Tilman et al., 2002). Hayrol Azril et al. (2009a,b), Ezhar et al. (2007) and Alam et al. (2010) have shown that the average age of farmers in Malaysia is in excess of 46 years. In addition, Anderson and Dillon (1992) and Tambo and Abdoulaye (2012) stated that old farmers face difficulties in acquiring technical skills that would lead to adoption discontinuity of new innovation or ideas. In contrast, if they have the technical skills needed to operate the related tools then they will continue to adopt the innovations or ideas. Hence, if training programs are provided to ensure that the farmers are able to operate the related tools and ideas, the ability of farmers can be improved. Hence, the industrialization in the country and youth migration to cities have created a serious shortage of agricultural workers in the country.

Consequently, this situation reflects that Malaysia needs to attract and retain more young people within the agriculture community. Norsida (2009) stated that continued decline in the cultivated areas, negligible gains in productivity, continued increase in the cost of production and decreasing profitability have caused the rice production in Malaysia to become a sunset industry. Thus, the main objective of this study is to examine the influence of innovation attributes, communication channels and awareness on new fertilizer technologies among paddy farmers. The present paper aims to provide insights on an issue that is still not fully resolved in the innovation diffusion of new technologies among farmers. It also encounters the extent of their perceived adoption on improved technologies to increase crop yield in the Malaysian paddy sector. Next section discusses the innovation attributes followed by relative advantage, compatibility, complexity, observability, trialability, communication channels followed by interpersonal, mass media and awareness and its influence on perceived adoption.

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