Journal of Contemporary Issues in Business and Government Vol. 27, No. 3, 2021
https://cibg.org.au/
P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.03.046

A Review of Organic Agriculture Industry in Malaysia and Gross Margin between Organic and Conventional Plantation

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Abstract: The objective of this study are 1) To review the definition of organic farming 2) To investigate the international and local standard for organic food and 3) To compare gross margin between organic and inorganic paddy farming. Using field evaluation and interview techniques, this study conducted a study on 3 organic farms and 27 inorganic paddy farms in Malaysia. Two leading organic agriculture regulators in the world are IFOAM and USDA, IFOAM allows private standard setters to define their additional criteria and USDA does not allow others to set a standard that is above the federal. This study also laid out a few organic accreditations in several Asian countries including Thailand, Indonesia, Cambodia, Japan, India, and China. Field evaluation of conventional and organic paddy plantation are discussed and it is found that organic plantation earned less gross margins (13.5 %) as compared to inorganic farming. This study may give some inputs for the Research and Development (R&D) department to improve the organic farming activities and how to reduce its cost and increase its gross margin. Organic farming is important as it is sustainable to lure bio-economy strategy and food security in Malaysia as laid out in National Agricultural Policy.

Keywords: Food security, governance, organic farming, organic accreditation, paddy farming, system of rice intensification (SRI)

INTRODUCTION

Food security and food supply have become an important issue to be dealt with by the international organization as well as governments across the globe in these times of the overgrowing population. The growing population means growing food demand which needs to be met by the food supply to ensure everyone's survival. This issue was first pointed out back in 1798 by the British economist named Thomas Malthus in his work entitled An Essay on the Principle of Population. Malthus argued that the population grows at an exponential rate while food supply grows at an arithmetic rate over time, and he predicted that over time it will create a shortage of food supply. Since the theory was proposed in 1798, it may not be probable with the current era as it does not take into account the important variables such as wars, climate change, technological advancements, and more (Paul, 2013). However, organic farming is of vital significance while providing the food supply. The idea of organic farming dates back to the early 1920s, but it has recently attained a worldwide concern due to food contamination in raw food and the increase of pesticide residues (Somasundram et al., 2016). Although organic farming at the current stage is only a fraction of the worldwide amount, but the growing awareness of the public for nutrition and health is pushing organic farming to an entirely new level. This has led researchers, scientists, businesses to find out alternatives to promote food security and to start organic farming movement. One popular alternative is to integrate agriculture with organic farming (Ciccarese and Silli, 2016). There is remarkable growth in organic farm size witnessed by Malaysia i-e from 131 hectares to 2367 hectares in the years 2001 and 2006 respectively.

Apart from the tremendous growth, the Malaysian local organic food industry is yet needed to be sustainable since approximately 60% of the organic food in the country is imported. Among imported organic products include processed food such as cereal, grains, beverages, and fresh raw food of vegetables (Dardak et al., 2019). Rice is the main food in the county and the Ministry of Agriculture and Argo-based Industry (MOA) is responsible for the monitoring of the growth of paddy. Malaysia is motivated to attain a self-sustainable level of rice production and to safeguard and ensure the food security. Nevertheless, a study by the World Bank maintained that the Malaysian paddy industry is neither sustainable nor profitable (USDA, 2017). Therefore, a cultivation method called the system of rice intensification (SRI) is also being applied in addition to the introduction of granary areas as an approach to increase the yield of paddy. The cultivation method is normally accompanied by another method called organic management method when being applied in the country. Organic plantation is regulated domestically under the regulatory body of the Malaysia Organic Scheme (MOS). The U.S. Department of Agriculture (USDA) and the International Federation of Organic Agriculture Movements (IFOAM) are the leading international regulatory bodies responsible for monitoring and regulating the organic agriculture. Consistence monitoring and regulation by these organizations would guarantee the quality food to consumers. The objective of this study are 1) To review the definition of organic farming 2) To investigate the international and local standard for organic food and 3) To compare gross margin between organic and inorganic paddy farming. This study will begin with the overview of organic farming, organic farming definition and its international and local regulation, the overview of paddy production in Malaysia, conventional versus organic farming activities and its gross margin, methodology, and-discussion and conclusions.

An Overview of Organic Farming

According to the USDA, the organic industry has witnessed a sharp increase in year 2016 of 37, 032 certified organic operations which was less than 10,000 before the year 2006. Similarly, a survey by the IFOAM and The Research Institute of Organic Agriculture in 2015 showed that 43.1 million hectares of land were allocated for organic agriculture. The distribution of organic land by region is shown in figure 1, where most of the land is from Oceania (40%), Europe (27%), and Latin America (15%). Asia records 8% to the total land area per se while North American and Africa record 7% and 3% respectively. Narrowing down to Malaysia, only 0.01% of its total agriculture land area is allocated for the organic plantation, this figure is incomparable low relative to other neighbouring countries such as Philippines, Vietnam, Thailand, and Indonesia having a value of 0.68%, 0.35%, 0.16%, and 0.16% respectively (Utusan Malaysia, 2015). Adjust rajah + gabungkan perenggan.

The organic plantation as compared to conventional plantation have been verified and proved to contain greater nutrient and antioxidant level by 11 folds. Another report supported this statement by maintaining that organic food is 25% more nutrient-dense comparative to traditional food. It implies that a lesser quantity of food is required to have greater levels of nutrients (Mokhtar, 2013). The organic farming simply pertains to the management of the crops by using natural fertilizers such as compost or manure rather than synthetic fertilizers. To control weed and pests, plant-based pesticides, and enzymes are chosen over insecticides and chemicals (Mokhtar, 2014).

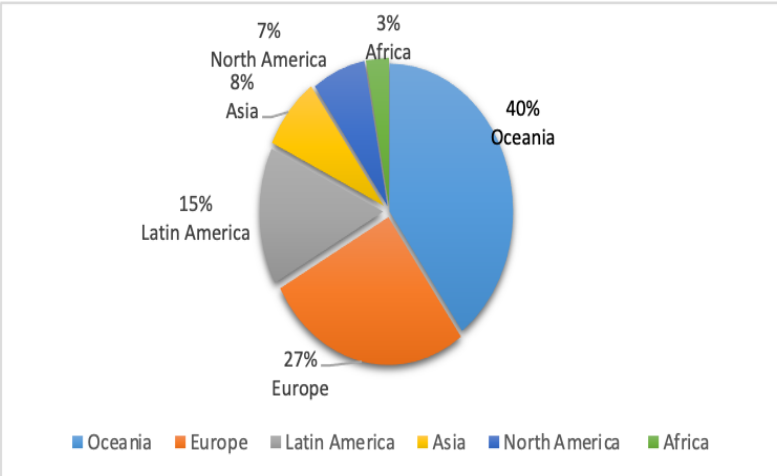

Fig.1: Distribution of organic land by region (own compilation)

Definition of Organic Farming and Its Regulation

In the 1920s, the notion of organic farming was first appeared and remained the focus of debate around the globe since then. The very first definition of the term ‘organic’ was given by IFOAM in 1972. The definition of organic agriculture referred to a production system that helps to sustain the health of people, soils, and ecosystems. IFOAM 1972 also believed that organic agriculture may benefit the mutual atmosphere, encourage impartial relations, and decent quality of life by combining innovation, science, and tradition.

There are only two main regulators in the world for organic agriculture namely IFOAM and USDA. According to USDA, organic farming is the integrated biological, cultural, and mechanical practices that aim to conserve biodiversity, promote ecological balance, and foster cycling of resources (USDA, 2012). The National Organic Program (NOP), developed in 2000, is the regulator of USDA. The body which develops national criterions for organically made agriculture products with exception of nutrition and safety of food is NOP (USDA, 2017). The major difference between USDA and IFOAM is that the USDA does not permit private setters to define and establish their criteria that is beyond the federal in an exception of the occurrence of an explicit environmental condition where essential stringent standards are obligatory (Boström and Klintman, 2011). Whereas IFOAM sets threshold levels above the European minimum requirement and allow others to define their criteria as well. (Gabung perenggan)

Certification processes for organic products and organic farms are not performed by USDA and IFOAM, rather accredited agencies are appointed to carry out certification processes according to the set standards and regulations (see Figure 2.0). The main organization which holds both USDA and IFOAM regulations for international trading is Codex Alimentarius by the World Health Organization (WHO). The countries around the globe have adopted and adapted the regulations from the two leading organic farming regulators. In Malaysia, organic farming is observed by the Ministry of Agriculture and Agro-Based Industry Malaysia under MOS, launched in 2002 (Suhaimee et al., 2016). The number of organic farms in Malaysia is on the rise and since 2003, 170 farms have been listed for organic labels. But only 28 organic farms could achieve this status of using organic labels with the alignment of organic production rules and regulations by the Malaysian government. The Ministry of Health in Malaysia, in August 2009, has revised the food rules and regulations of 1985 to guarantee food products that are labeled with the word "organic, biological, ecological and bio-dynamic" meet the terms with the labeling requirements of the Malaysian Standard MS 1529:2001 which is "The Production, Processing, Labelling and Marketing of Plant-Based Organically Produced Foods". It implies that any organic labeled agricultural product must be MOS certified (KPIAT, 2017).

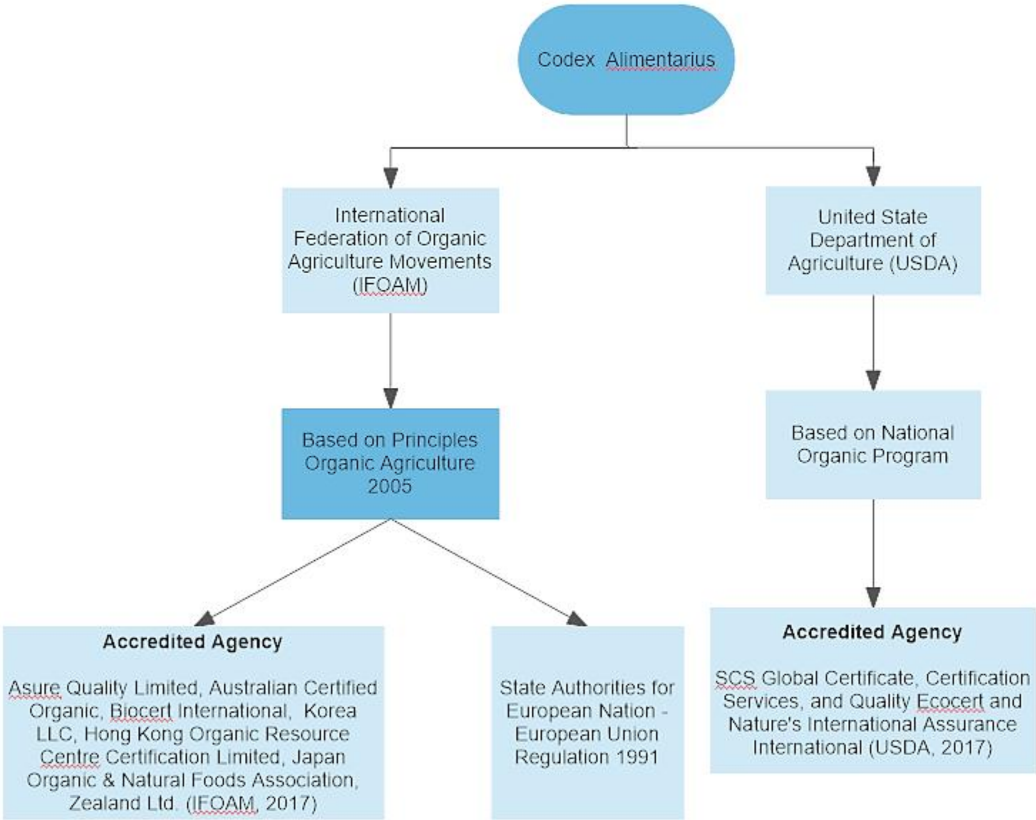

Fig.2: Main Regulator of Organic Farming at the International Level (own compilation)

Nevertheless, current market demand has narrowed down the definition of the term organic to "chemical-free" farming in common. This current description of organic farming is altered and improved, to adjust to all stakeholders which are consumers, producers, and regulations (Seufert et al., 2017). Generally, the common organic labels can be classified into organic, 100% organic, natural, and genetically modified organisms-free (GMO-free). Organic products normally mean that 70% of its ingredients are organic of products such as cookies, cereal, and honey while the 100% organic label means a raw food or a single-ingredient food for example eggs, vegetables, and fruits. The 100% organic products generally come with a legitimate hallmark by authorizing state. Natural organic label refers to the production of food without flavouring, colouring, preservatives, and additives. GMO-free label products are those which are not genetically altered by means of advanced know-how and technologies, these products normally available in their original form. (Mokhtar, 2014).

Table 1: Organic Accreditation in Asia (own compilation)

Country	Certification	Compliances	Year	Logo	Citation
Malaysia	Malaysia Organic Scheme MOS)	Malaysian Standard MS1529:2001	2002		Suhaimee et al. (2016)
Thailand	Organic Agriculture Certification Thailand (ACT)	IFOAM accreditation from the International Organic Accreditation Service (IOAS)	1995		Win (2017)
Indonesia	Organik Indonesia	Indonesia National Standard SNI 6729:2010	2002		Shiotsu et al (2015)
Cambodia	Cambodian Organic Agriculture Association (COrAA)	Standards for Organic Crop Production and Production Standards for Chemical-Free Crop Production	2006		CorAA (2017)
Japan	JAS Seal	Japanese Agricultural Standards adopted from Codex guideline	2000		-
India	India Organic	National Standards for Organic Production	2000		Industry (2014)
China	China Organic Food Certification Center (COFCC)	National Standard of the People's Republic of China: Organic Products GB/T19630-2005	2001		Centre (2011)

Paddy in Malaysia

Since 1961 land area for production of paddy has grown from 51,649 hectares to 766,180 hectares in year 1972. After 1972, land area remained maintained till 1980 and not increased further. However, land area for planation of paddy went down in from 716,873 hectares in 1980 to 698,544 hectares in 2000. Since this downsizing in paddy plantation land area, an average of production of paddy is maintained at 677,000 throughout 2014 giving -0.2% growth rate to paddy harvest land area (Harun and Ariff, 2017). On contrary to decrease in paddy plantation over the years, granary areas irrigation significantly increased to more than 4,000 hectares and acknowledged by state as major areas for paddy production. A remarkable increase in paddy production by granary areas is recorded over the years from 317,041 hectares in 1980 to 400, 733 hectares in 2014 (Malaysia D.o.S, 2015).

Paddy Production in Malaysia

In global rice production, Malaysia is very small rice producer with 0.4% of contribution in the total global output (Ibrahim and Mook, 2014). It took four decades for Malaysia to produce two times more and for production to be doubled from 914,550 tons in 1970 to 1,685,236 tons in 2013. However, Average increase is not significant as rice production reduced in several years. The decreased rice production was due to the reasons such as pest, disease outbreaks, and unfavourable weather conditions (Rajamoorthy et al., 2015). Moreover, per hectare average yield of paddy witnessed an upward trend throughout the years, such as the value of an average yield of paddy per hectare was 2,852 kg/ha in 1980 while the paddy production stood at 2,044,604 tonnes and rice production at 1,318,332 tonnes to 4,194 kg/ha in the year 2014 with paddy production of 2,848,852 tonnes and rice production at 1,835,015 tonnes. In terms of rice production per hectare, the year 1980 recorded a value of 1.84 tons/ha compared to the year 2014 of 2.70 tons/ha (Malaysia D.o.S, 2017). Thus, the annual growth rate for paddy production stood at 1.9% while its yield growth rate stood at 2.1% (Harun and Ariff 2017).

Promising rice production is better seen in granary areas in specific, as in the year 1980, the rice production is recorded at 2.65 tons/ha and in the year 2014 3.39 tonnes/ha. Since the Third National Agricultural Policy 1998, eight granary areas were specified to achieve a minimum self-sufficiency level (SSL) for rice at 65%. In the Ninth Malaysia Plan, the SSL for rice is further emphasized to 90% in the year 2010. However, by the year 2014, Malaysia had only managed to achieve an SSL of 71.6% (Malaysia D.o.S, 2015). To date, ten granary areas have been recognized in Malaysia, they are Muda Agricultural Development Authority (MADA), Kemubu Agricultural Development Authority (KADA), Kerian Development Area, Barat Laut Selangor Integrated Agriculture Development Area, Seberang Perak Integrated Agriculture Development Area, Pulau Pinang Integrated Agriculture Development Area, North Terengganu Integrated Agriculture, Development (KETARA), Kemasin Semerak Integrated Agriculture Development Area, Pekan Integrated Agriculture Development Area and Rompin Integrated Agriculture Development Area (Malaysia D.o.S 2015). In addition to granary areas, 74 secondary granaries and 172 minor granaries areas do exist in Malaysia that gives 28,441 and 47,653 hectares respectively. Secondary and minor granary are categorized based scale of irrigation supported (Ibrahim & Mook, 2014). In addition to the Ninth Malaysia Plan, the Northern Corridor Economic Region (NCER) plan is also introduced to safeguard the likelihood of the national target (Othman et al., 2010).

Conventional versus Organic Plantation in Malaysia

In brief organic farming refers to a production system that avoids the use of synthetic fertilizers, pesticides, hormones, and antibiotics. Crop pests are controlled via natural biological system, physical, mechanical methods or the use of bio-pesticides. These measures will ensure the protection of the environment (Othman, 2012). Established on updated information of 2016, myOrganic or MOS Malaysia certified farms are 49 and consist of only a single farm of paddy plantation. This paddy plantation with 9.464 hectares is located in Sik, Kedah owned by Koperasi Agro Belantik Sik Berhad. The very first step for organic farming was taken by KOREF Company on a 260 acres land located in Kahang, Johor. Later on, KOREF Company became the very first farm of Malaysia to receive certification of organic farming status from the Malaysia Department of Agriculture in December 2005 (Othman, 2012; Othman et al., 2016). One of the reasons behind the unpopular organic paddy farming is because organic paddy is not considered as an organic product by the Department of Agriculture in spite of having vast market potential (Othman et al., 2016). Plantation of paddy in Malaysia is divided into two major phases which is the cultivation phase where the method of paddy plantation consists of conventional farming and application of SRI farming (Chapagain et al., 2016). While, for the management of paddy plantation, growers may familiarize to organic farm management or inorganic farm management (Chapagain et al., 2016). The difference between both the management is the practice of organic versus inorganic fertilizer, insecticides, and pesticides. Figure 3 shows a clear flow of the plantation of paddy in Malaysia. Inorganic fertilizers are generally involves chemicals such as urea fertilizer, Kieserite, Muriate of Potash (MOP) and Nitrophoska 15:15:15 that can be available in small pieces, pellets, powder or liquid form. While organic fertilizer is produced manually by farmers by means of microbes or plants that would endure a decaying process. Otherwise, the organic fertilizers can be acquired from providers that are manually produced by composting such as Bokashi, Kuntan and Green Fertilizers (Othman, 2012).

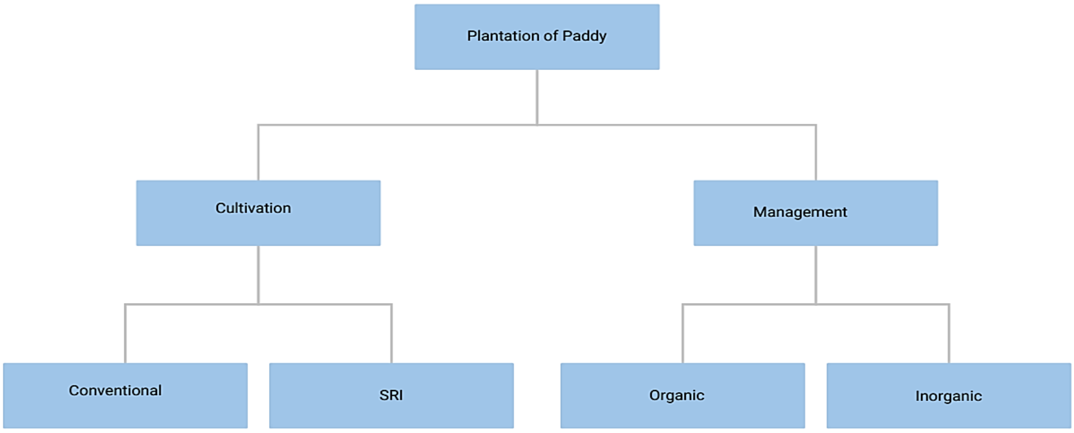

Fig.3: Cultivation and Management of Paddy Farming in Malaysia (Own compilation) - centre

System of Rice Intensification (SRI)

SRI method is chiefly used in cultivation of organic farming of paddy since 2009 in Malaysia. SRI method was developed in Madagascar in 1983 to gain higher possible yield with fully utilized and well managed resources of fertilizers and water (Othman et al., 2016). Still, SRI technique has been questioned over the years owing to its insufficient evidence of yield gain over the conventional technique (Dobermann, 2004; Sheehy et al., 2004). Yet, SRI offers a substitute method of unsustainable paddy farming where the application of the SRI system is a step forward to increase and acquire a higher yield and a well-managed of resources i-e lessening water consumption. This is opposite to the green revolution standard in which yield is increased by refining the genetic potential of crops whereby more chemical inputs are used to trigger better yield output (Chapagain et al., 2016). Furthermore, on developing the valid system of SRI in Malaysia, a Memorandum of Understanding was signed in the year 2011 between the Federal Land Consolidation and Rehabilitation Authority (FELCRA) Training & Consultancy Sdn. Bhd and an NGO in Indonesia, Nusantara Organic SRI Centre which kick-started in Selangor farm (Othman et al., 2016). By the year 2017, SRI was implemented in Sabah, Sarawak, Perak, Kedah, and Kelantan (Pilo, 2017).

Gross Margin of Plantation

Waykar et al. (2006) compared the productivity and net returns for organic and inorganic farms for grape production. The study found that per hectare productivity and net returns were less in organic farms as compared to inorganic farms. Furthermore, the study also found that per hectare total cost for grape cultivation is lower for organic produce while significantly higher for inorganic grapes production. Jadhav et al. (2006) observed that for sugarcane in organic farming delivered a lower yield of 82.47/ha relative to inorganic farming yield which was 93.58/ha. However, the quality of sugarcane produced by organic farming was better but per quintal cost of inorganic farming was lower than organic farming. Moreover, the study also found that organic farming was more profitable relative to inorganic farming. Tripathi et al. (2010) estimated returns and cost in organic and inorganic farming for crops such as pigeon pea, cotton, mung, and wheat. The study found a higher gross income in organic farming.

On the cost and efficiency of organic and inorganic farming, Sujatha et al. (2006) observed that the cost of human labor was higher in organic farming while the cost of manures, pesticides, and fertilizers remained higher in inorganic farming for cultivation of cotton and rice. Moreover, the study also found that the total cost of cultivation was higher in inorganic farming which made organic farming to have more net returns than inorganic farming. Similarly, Sushil et. al. (2006) also concluded that organic farming has a lower cost of production per quintal of produce as compared to inorganic farming. Kshirsagar (2008) revealed that the average cost for organically produced sugarcane crop was 14.24 percent lower than inorganically produced. The lower cost in organic production was due to the non-use of fertilizers and less cost of seed, plant protection, and irrigation. Moreover, it also concluded that the gross value of production and profits were higher in organically produced sugarcane as compared to inorganically produced. Bai et al. (2009) revealed that the total cost of cultivation, for the organic robusta coffee was higher than the conventional cultivation, this was due to high input costs used in organic cultivation.

A comparative study on the integrated organic system and conventional system in western Uzbekistan, Franz et al. (2009) concluded that organic farming systems earned higher profits than the conventional system. Furthermore, the study suggested that revenues could be further raised with appropriate policies to improve the existing value chain. Mundinamani (2010) concluded that the cost of production in organic farming for crops such as chickpea, soybean, jowar, areca nut, and paddy was lower than conventional farming. In contrast, it also observed that there was more probability in the conventional farming for crops such as cotton and onions. Furthermore, on the benefits of organic farming, the study revealed that organic farming created employment for 81.67 percent and raised the income of farmers by 70 percent. Ramesh et al. (2010) observed that organic farming provides more profits by 22% to farmers, despite of lower productivity by 9.2% compared to conventional farming. However, premium prices are found to play a significant role in terms of profitability, as organic farming was not economically feasible where such premium prices were not available and the cultivation cost was higher. Singh and Grover (2011) found a higher cost of cultivation of wheat in organic than inorganic farming, the cultivation cost was found Rs.20,185 per acre while the cultivation cost in inorganic farming for production of wheat stood at Rs.16,700 per acre. Additionally, the higher market price could compensated the lower yield in organic wheat.

METHODOLOGY

This study conducted field evaluation and gross margin analysis to 30 paddy farms in Kedah and Kelantan. Out of 30 farms, only 3 organic farms were managed to be field evaluated and interviewed. Gross Margin Analysis formula is used as follows: -

Gross Margin Analysis = Total Farm Income - Total Variable Cost (Preparation Cost, Fertilizers Cost, Insecticides Cost and Pesticides Cost). In our calculation for gross margin, all farms are converted into acre for standardizing. Cost to calculate gross margin is depicted in Table 2

Table 2: Paddy plantation Cost

1	Total revenue	Production of paddy in tonne is multiplied by RM1091 as regulated price is RM1200/Tonne Metric
2	Preparation cost	Cost per acre multiplied by total acre for each paddy field
3	Fertilizer cost	Price of fertilizers used + (Average cost of sprinkling (RM60) x total land acre
4	Insecticide’s cost	Price of insecticide used + (Average cost of spraying (RM65) x total land acre)

Gross Margin of Conventional-Inorganic and Sri-Organic Plantation in Malaysia

Each year a huge amount of paddy about 3.6 million tons is harvested with ultimate paddy grain price of RM 2 billion. However, in terms of food security, Malaysia has yet to achieve a satisfying level with the SSL achieved in year 2014 was only 71.4% (Malaysia D.o.S, 2015). More than 100 000 farmers are involved in this massive quantity of harvest countrywide. Consequently, a comprehensive study on the paddy gross margin is vital to safeguard the sustainability of paddy farming. Potential and expected gross margin of organic and inorganic paddy farmers can be predicted. This is in line with the Malaysia National Agro-Food Policy which is set to replace the Third National Agriculture Policy (NAP3) that targets intensification food production in the country (Siwar et al., 2014). Farmers are the pivotal key players in organic paddy farming. They generally decide equipment, fertilizers, and weeding and practice their usage manually in each stage of paddy production. As a result, organic farming exerts higher production cost relative to conventional farming. Even though in conventional paddy farming, the farmers’ participation in all stages is incontestably important, much of their responsibilities can be relieved by ready-bought pesticides and herbicides. Contrasting organic farming with SRI management, 38% to 54% of additional labor is mandatory (Rakotomalala, 1997). The chain activities in paddy farming includes phases of pre-production, production, and post-production with farmers involving at each stage.

In organic plantation, no genetically altered seeds are acceptable. Irrigation of SRI-organic farming also requires less amount of water to be used, and allow only organic fertilizer with manual weeding together with pest control using the insect’s food chain (Othman, 2012). This study found that the gross margin of organic paddy is lower than conventional paddy farming by (13.5 %), suggesting the adaption of inorganic farming practice for paddy production. The findings are consistent with the study by Charyulu and Biswas (2010) which established that the unit cost of production in organic farming is higher for paddy and wheat production as compared to chemical farming, this higher cost may negatively impact the profitability of organic farming. While the findings of the study contradict with Sudheer (2013) that found that organic farmers are earning a gross income of 5%, 10% and 7% more compared to the chemical farmers of paddy and with lower input costs the profits earned by the organic farmers are higher by 37%, 33% and 59% for the selected crops (Sudheer, 2013), and Acs et al. (2006) found that organic farming is more profitable than chemical farming. Adhikari (2009) also concluded that carrot production in organic system was insignificantly lower than inorganic system, moreover, revenue per hectare for carrot production remained lower in organic system relative to inorganic system whilst, in contrast, gross margin was found higher in organic production system as compared to inorganic production system. Urfi et al. (2013) found that per hectare cost of organic farming was lower than that of conventional farming for crops such as grape, wheat, sunflower, maize, the lower cost of organic farming was due to lower costs of plant protection and fertilization. Furthermore, it also concluded that organic farming was more profitable.

A yield from conventional plantation of paddy is not sustainable due to its deep reliance on chemical fertilizers. As this will be a direct chain effect comprising many crucial players. For example, in Indonesia, as the subsidies for fertilizer were reduced or eliminated as in the Philippines and Nepal, the fate of a small-scale farmers were on a bleak as they could no longer afford the cost for these inputs (Chapagain et al., 2011). While in Malaysia, only minimal fertilizer was used following the subsidy given. No extra fertilizer was used even though that fertilizer contained higher potential for producing higher yield and not having affordability power for extra costs (Ibrahim and Mook, 2014).

DISCUSSIONS AND CONCLUSIONS

Organic farming in Malaysia is still lagged. The local policy needs to be revised and improvised as myOrganic accreditation scheme is still not recognized by the international bodies. Some local producers obtained the recognition from international organic certification (Suhaimee et al., 2016).

The meticulous standard laid out by the certification scheme may elaborate on the challenges fronting organic farmers concerning the certification. Similar any policies about obedience of the rules and regulations, the pertinent authorities must monitor compliance. The challenge as correctly noted by Sutinen and Kuperan (1999) is “there is little or no recognition of how policies and the policy process may affect the extent of compliance with regulations”. Quite commonly when there is no compliance, the blame is on the enforcement which is either inadequate or inefficient (Sutinen and Kuperan, 1999). Furthermore, the gross margin of organic farmers is found low as compared to conventional techniques which may lead to another challenge to encourage more organic production in Malaysia. Based on our discussion in the previous sections, our case study found that organic paddy farming is physically demanding, and cost is higher which leads to the lower gross margins. As organic paddy farming is still at infancy and most of the farmers are small scale production, further study is needed to explore the possibilities to reduce cost in organic farming and increase its gross margin. Further study is also needed to promote organic paddy farming which is more sustainable in large scale or commercial-scale production.

Funding

This work was supported by the Universiti Sains Malaysia Short Term Grant (PSOSIAL.6315027)

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

ACKNOWLEDGEMENTS

We would like to thank the USM Short Term Grant 304.PSOSIAL.6315027 for supporting this research.

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