FACTORS DETERMINING COMPETITIVENESS OF PADDY INDUSTRY IN KELANTAN, MALAYSIA

AZMAHANI BINTI YAACOB @ OTHMAN

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By

AZMAHANI BINTI YAACOB @ OTHMAN

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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Chair: Prof Zulkornain B Yusop, PhD
Faculty: Economic and Management

Agriculture sector, especially paddy industry has always been given a special priority since rice is the Malaysian staple food. Unfortunately, there were no new areas developed for paddy cultivation. Malaysia has to import 10% to 35% of rice from neighbouring countries to meet the demand. KADA, the granary area in Kelantan was established in 1968. It is the second largest planted area in Malaysia but has been facing low yield of paddy production, surprisingly lower than the country average yield even after 50 years of establishment. Even though the government has allocated billions of Ringgit in order to increase paddy productions and provide various types of support such as R&D, credit facilities, subsidized retail price, guaranteed minimum price, fertilizer subsidies, and irrigation investment, the Kelantan's paddy production is still considered as inefficient in term of cost and quantity of production.

In view of this, there was a need to study the factors that determine the competitiveness of this industry in Kelantan.

Porter's diamond model was used in this study to explain the sources of competitiveness. This model consists of internal and external factors. The internal factors are factor conditions, demand conditions, related and supporting industries and farmers' strategies while the external factors are government's role and chances. Target subjects were farmers in Kelantan granary area from four different district, named as Kota Bharu Utara, Kota Bharu Selatan, Pasir Mas and Pasir Puteh. Out of 400 questionnaires distributed, 344 were completely (86%) filled up. All items in the questionnaires were measured using a 10-point interval scale with anchors on *1 = not important* and *10 = very important*. Partial least Square (PLS) SmartPLS M2 Version 3.0 was used for data analysis.

Out of six variables tested, only four variables were significant and able to explain the competitiveness of paddy industry in Kelantan. The variables were factor conditions, demand conditions, supporting industries and chances. Based on Importance-Performance Matrix Analysis (IPMA), the most important factors are factor conditions and chances but proven to be among the least performing factors. So, the government should concentrate and improve these two factors so that the competitiveness level in Kelantan granary area can be increased.

The government should also consider to come out with a variety of quality seeds which are adaptable to climate changes to reduce the rate of paddy damage in future. Other than that, the government also might encourage collaboration with higher education institution by sharing their research output with farmers and provide them with training or sharing sessions that can improve their management skill in paddy farming. Periodic evaluation on competitiveness in paddy sector is important to help the government and the farmers to determine the reasons behind their relatively low yield.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Doktor Falsafah

FAKTOR-FAKTOR MEMPENGARUHI DAYA SAING INDUSTRI PADI DI KELANTAN, MALAYSIA

Oleh

AZMAHANI BINTI YAACOB @ OTHMAN

November 2019

Pengerusi: Prof Zulkornain B Yusop, PhD
Fakulti: Ekonomi dan Pengurusan

Sektor pertanian, terutama sekali industri padi, sentiasa mendapat perhatian dari pihak kerajan kerana beras merupakan makanan ruji negara. Malangnya, tiada kawasan baru dibuka untuk penanaman padi. Malaysia terpaksa mengimpot 10% ke 35% beras dari negara jiran untuk memenuhi permintaaan. KADA, Jelapang padi di Kelantan telah ditubuhkan semenjak tahun 1968. Ia merupakan kawasan penanaman kedua terbesar tetapi berhadapan dengan masalah hasil padi yang rendah, dan memeranjatkan, hasil padinya lebih rendah dari hasil padi negara walaupun selepas 50 tahun penubuhan. Walaupun kerajaan telah memperuntukkan berbillion ringgit untuk meningkatkan hasil pengeluaran padi dan menyediakan pelbagai jenis program sokongan seperti program pembangunan dan penyelidikan, kemudahan pinjaman, subsidi harga runcit, harga minimum terjamin, subsidi baja, pelaburan untuk sistem perairan dan tali air, namun, pengeluaran padi di Kelantan masih dianggap tidak efisen dari segi kos dan kuantiti pengeluaran.

Oleh yang demikian, satu kajian harus dibuat untuk membincangkan faktor-faktor yang mempengaruhi daya saing industri ini di Kelantan.

Model Diamond Porter telah digunakan dalam kajian ini untuk menerangkan faktor daya saing. Model ini terdiri dari faktor dalaman dan luaran. Faktor dalaman adalah seperti faktor pengeluaran, sumber permintaan, industri sokongan dan strategi petani manakala faktor luaran pula adalah peranan pihak kerajaan dan peluang. Golongan yang dikaji terdiri dari petani di jelapang padi Kelantan dari empat daerah yang berbeza iaitu Kota Bharu Utara, Kota Bharu Selatan, Pasir Mas dan Pasir Puteh. Dari 400 soalan kajiselidik telah diedarkan, 344 (86%) darinya lengkap diisi. Semua soalan dalam kajiselidik ini menggunakan 10-point Skala interval dengan 1 bermaksud tidak penting dan 10 teramat penting. Data yang dikumpul dianalisa menggunakan SmartPLS Versi3.0.

Dari enam pembolehubah yang dikaji, hanya empat pembolehubah sahaja yang signifikan dan mampu menerangkan daya saing industri padi di Kelantan. Pembolehubah tersebut adalah faktor pengeluaran, sumber permintaan, industri sokongan dan peluang. Berdasarkan Analisa Matriks Kepentingan-Prestasi (IPMA), faktor yang terpenting adalah faktor pengeluaran dan peluang tetapi merupakan antara faktor yang paling kurang potensi. Jadi, pihak kerajaan perlu tumpukan perhatian dan membaikpulih kedua-dua faktor ini demi meningkatkan tahap daya saing kawasan jelapang padi di Kelantan.

Pihak kerajaan harus mempertimbangkan untuk mengeluarkan pelbagai jenis benih yang boleh menyesuaikan diri dengan perubahan iklim dan mengurangkan kadar kerosakan padi pada masa akan datang. Pihak kerajaan juga mungkin boleh menggalakkan kerjasama dengan institusi pengajian tinggi dengan berkongsi hasil kajian penyelidikan dengan petani dan menyediakan latihan atau sesi perkongsian dengan petani yang boleh meningkatkan kemahiran pengurusan dalam penanaman padi. Pemeriksaan secara berkala ke atas daya saing dalam industri padi penting bagi membantu kerajaan dan petani mengenalpasti faktor mengapa hasil sumbangan padi semakin berkurang.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follow:

Zulkornain Yusop, PhD
Professor
Faculty of Economic and Management
Universiti Putra Malaysia
(Chairman)

Nik Mustapha Raja Abdullah, PhD
Professor
Faculty of Economic and Management
Universiti Putra Malaysia
(Member)

Mohd Mansor Ismail, PhD
Professor
Faculty of Agriculture
Universiti Putra Malaysia
(Member)

_____
ZALILAH BT MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

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Name and Matric No.: Azmahani Binti Yaacob @ Othman (GS32974)

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Signature: _____
Name of Chairman of
Supervisory Committee: Professor Dr Zulkornain B Yusop

Signature: _____
Name of Member of
Supervisory Committee: Tan Sri Professor Dr Nik Mustapha B Raja Abdullah

Signature: _____
Name of Member of
Supervisory Committee: Professor Dr Mohd Mansor B Ismail

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LIST OF ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
AVE	Average Variance Extracted
BERNAS	Padiberas Nasional Berhad
CA	Cronbach Alpha
CR	Composite Reliability
DoA	Department of Agriculture
FAMA	Federal Agricultural Marketing Authority
FGD	Focus Group Discussion
GDP	Gross Domestic Product
Ha	Hectares
HTMT	Heterotrait-Monotrait Ratio
IADA	Integrated Agriculture Development Area
IMD	Institute for Management Development
IPMA	Importance-Performance Map Analysis
KADA	Kemubu Agriculture Development Authority
KBS	Kota Bharu Selatan
KBU	Kota Bharu Utara
KPDNHEP	Ministry of Domestic, Trade and Consumer Affairs
KRI	Khazanah Research Institute
LPN	Lembaga Padi dan Beras Negara
LPP	Lembaga Pertubuhan Peladang (*Farmers Organization Authority*)
MCAR	Missing completely at random
MEP	Mini Estates Paddy
MITI	Ministry of International Trade and Industry
MNAR	Missing not at random
MP	Malaysia Plan
MT	Metric tonne
n.a	Not available
NAP	National Agricultural Policy
NFAP	National Agro-Food Policy
NKEA	National Key Economic Area
PLS-SEM	Partial Least Square – Structural Equation Modelling
PPK	Districts Farmers Organization
SPSS	Social Package for Social Science
SSL	Self-Sufficiency Level
WEF	World Economic Forum

CHAPTER 1

INTRODUCTION

This chapter introduces the background of the study concerning agriculture as a general discussion and paddy industry in Malaysia as a specific topic. This chapter also discusses in detail the problem statement, objectives, scope, significance and the plan of the study.

1.1 Background of the Study

Rice is the staple food for over half of the world's population. Paddy is currently cultivated in many countries from which more than 715 million tons of rice are produced annually which accounts for 90% of the world's rice harvest. 50% of rice grown come from the largest contributors, China and India. Other major non-Asian rice producing countries such as Madagascar, the United States, Egypt, Brazil, and Nigeria, contribute as much as 5% from the rice produced in the world (Ricepedia, 2019)

The United Nation estimated global population to reach 7.5 billion in the year 2017. 80% of the world's rice consumers are from Asia region. Figure 1.1 below shows the world main paddy producers. The largest producer is China which contributes up to 28% of world paddy produced; followed by 21% from India, 10% from Indonesia, 7% from Bangladesh and 6% from Vietnam. In fact, the world's five largest rice producers are also the world's five largest rice consumers, namely China, India, Indonesia, Bangladesh and Vietnam (Omar, Shaharudin, & Tumin, 2019). China becomes the largest producer and consumer due to favourable growing conditions and the widespread adoption of hybrids. However, the area harvested has continued to decline due to economic reforms that reduced government requirements to grow rice and economic development that increased the opportunity cost of land (Ricepedia, 2019).

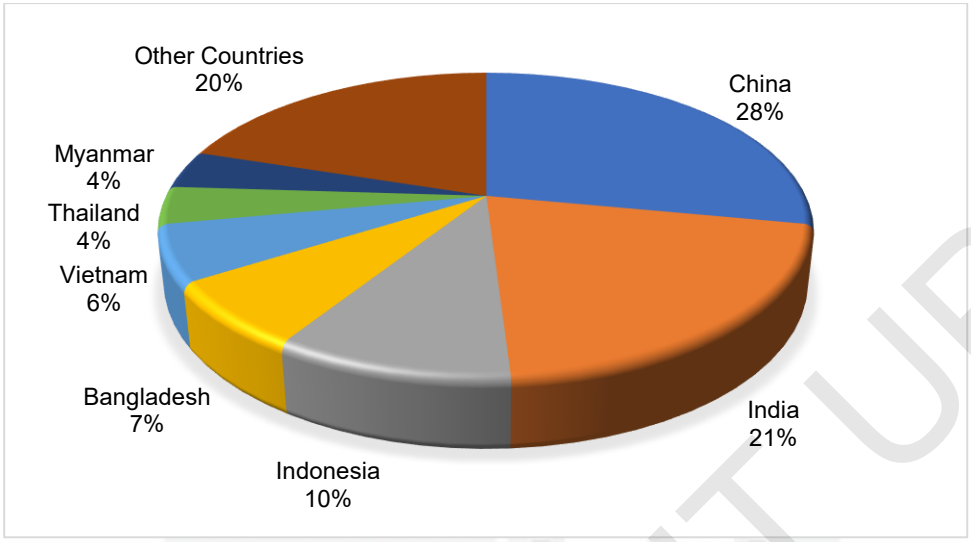

Figure 1.1: World Main Paddy Producers
(Source: Department of Agriculture, 2017)

Table 1.1 below shows the comparison of paddy planted area, production and average, yield per hectare recorded by selected countries in ASEAN for year 2015 to 2017. In 2015, Malaysia average yield (4.04 tonne/ha) was below than ASEAN yield (4.38 tonne/ha). However, in 2017, Malaysia average yield increased to 5.08 tonne/ha higher than ASEAN yield (4.41 tonne/ha). According to a report by AFSIS Secretariat (2018) the increase in production in Malaysia attributed to the increase in yield since the farmers have used more improved variety. Malaysia ranked at the third highest yield after Vietnam and Indonesia. The average yield for Thailand and Myanmar was below the ASEAN yield, even though they are net exporters of rice.

Although the data shows that average yield in Malaysia has increased, the fact is that, Malaysia rice consumption is higher than its production. Figure 1.2 presents the gap between rice consumption, production and imports from the year 1990 to 2017. The higher the gap between production and consumption, shows the higher import bill for rice. The data also shows a slower rate of increase in consumption, but still it is far ahead from local production especially after the year 2007. The production dropped in 2014 and 2015 because of flood in Kelantan and the El-Nino weather anomaly, which was associated with the dry season recorded throughout 2016 (Ghani, 2017). In fact, the OECD-FAO Agriculture Outlook also projected a widening gap between Malaysia's production and consumption of rice (Omar, Shaharudin, & Tumin, 2019).

Table 1.1: Comparison of paddy planted area, production and average yield in ASEAN, 2015 – 2017

Country	2015			2016			2017		
	Planted area ('000 ha)	Production ('000 tonne)	Average yield (tonne/ha)	Land area ('000 ha)	Production ('000 tonne)	Average yield (tonne/ha)	Land area ('000 ha)	Production ('000 tonne)	Average yield (tonne/ha)
ASEAN	**50,066.85**	**213,183.70**	**4.38**	**49,626.72**	**213,183.70**	**4.36**	**50,738.87**	**222,183.83**	**4.41**
Brunei	1.43	3.05	2.34	1.53	2.44	1.75	1.58	2,51	1.75
Cambodia	3,055.51	9,324.42	3.08	3,051.41	9,335.28	3.09	3,097.65	9,814.20	3.19
Indonesia	14,513.79	75,397.84	5.34	15,077.67	79,171.92	5.26	15,087.19	80,656.27	5.35
Lao PDR	984.93	4,102.00	4.25	975.22	4,121.30	4.24	1,017.49	4,339.47	4.26
Malaysia	682.12	2,738.48	4.04	715.3	3,492.08	4.91	730.15	3,692.57	5.08
Myanmar	7,172.14	28,193.08	3.94	7,211.89	27,724.59	3.90	7,518.20	30,637.01	4.08
Philippines	4,741.81	18,911.48	4.02	4,561.23	17,473.17	3.86	4,592.29	17,627.36	3.87
Thailand	11,080.22	31,616.88	2.96	10,259.88	28,088.23	2.87	10,905.33	31,982.59	3.01
Vietnam	7,834.90	45,215.60	5.77	7,772.60	43,774.70	5.63	7,789.00	43,431.85	5.58

(Source: AFSIS Secretariat, 2018)

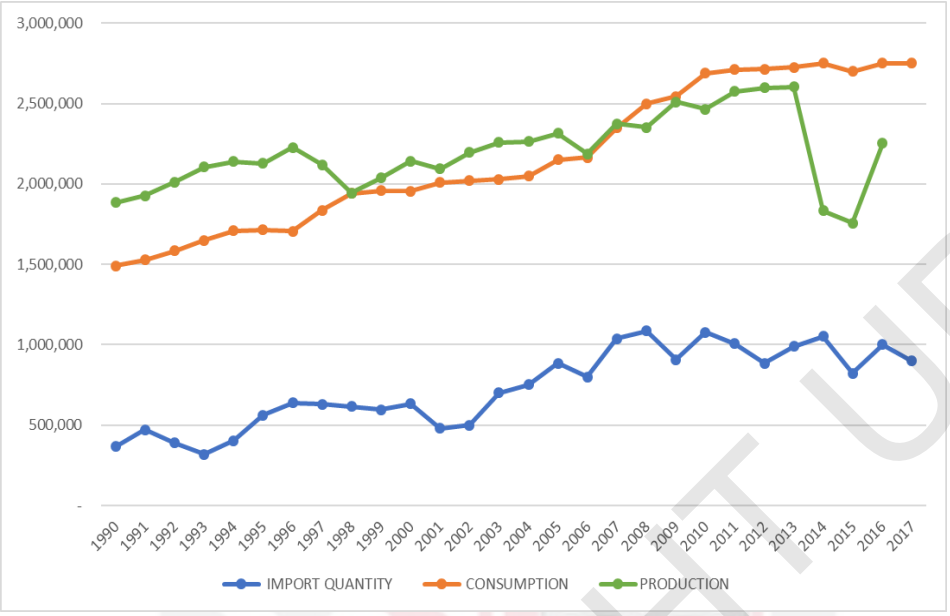

Figure 1.2: Rice Consumption, Production and Import Quantity from Year 1990 to 2017
(Source: IRRI, 2018)

Currently, the import duties for rice imports are 20 percent under the Common Effective Preferential Tariff Agreement (CEPT) of the ASEAN Free Trade Area (AFTA) and 40 percent under the Agreement on Agriculture (AoA) of the World Trade Organization (WTO). Padiberas National Berhad (BERNAS) has been given the sole monopoly right from the government to import rice at duty free rates to Malaysia. It is important to note that domestic food security is a function of both domestic production and imports.

Over-reliance on food imports could further weaken the ringgit. If the currency weakens, the import of food becomes expensive. By continuing to rely on imports to address food shortage, it will cause our currency to continue to fall and as a result, food becomes more expensive. It also makes the country vulnerable for supply shocks and susceptible to food inflation.

Table 1.2 shows some data on import quantity and import value (both in USD and RM) of rice for Malaysians' consumption. Malaysia was the world's 14 biggest rice importer based on value at US$377.4 million (RM1.59 billion) or 2% of global imports in 2016 (Kankyakumari, 2017). The value (RM billion) shows an increasing trend from 2013 to 2015 but decrease to RM1.57 billion in 2016 might be because of the appreciation in RM value since the quantity (in 000 MT) shows an increasing amount as compared to the quantity in year 2015.

Table 1.2: Quantity of import and value of imported rice (2010 – 2016)

Year	Quantity (000 MT)	Change (%)	Value (USD)	Value (RM billion)
2010	1,076	18.63	500,369	n.a
2011	1,006	-6.51	606,132	n.a
2012	885	-12.03	605,932	1.87
2013	989	11.75	503,580	1.59
2014	1,051	6.27	509,720	1.62
2015	823	-21.69	494,484	2.08
2016	900	9.36	377,417	1.57

n.a: not available

(Source: IRRI, 2018)

The discussion on production of paddy and consumption of rice has a closed relationship with supply chain. A paddy and rice supply chain is a complex relationship between public and private entities where the link starts with the rice producers (farmers), to the rice millers, then to rice collectors and traders who will hand it to the wholesale traders, then to retailers and food processors and lastly to the final consumers. Figure 1.3 below shows the flow of paddy supply chain starting from farming activities and ending with consumption of rice by the consumers. The farmers can be categorized either by small, medium or large-scale land holding. Usually, small scale farmers produce enough rice for their own stock while for those of the medium or large scale, they will sell paddy directly to the local miller. Some of them choose to sell it to paddy collectors if they face some logistic problems like having no transport. In case of insufficient stock, the government will then need to import from neighbouring countries. The process of these linkages has added some values to agricultural products as farmers are required to coordinate their activities for continuous improvement. Costs incurred in each link in this chain are determined by their actions. A good planning and co-ordination are required between chains. They include forecasting, purchase scheduling, production and processing programming, sales promotion, as well as new markets and product launches. All these show the importance of paddy supply to meet consumers' high demand.

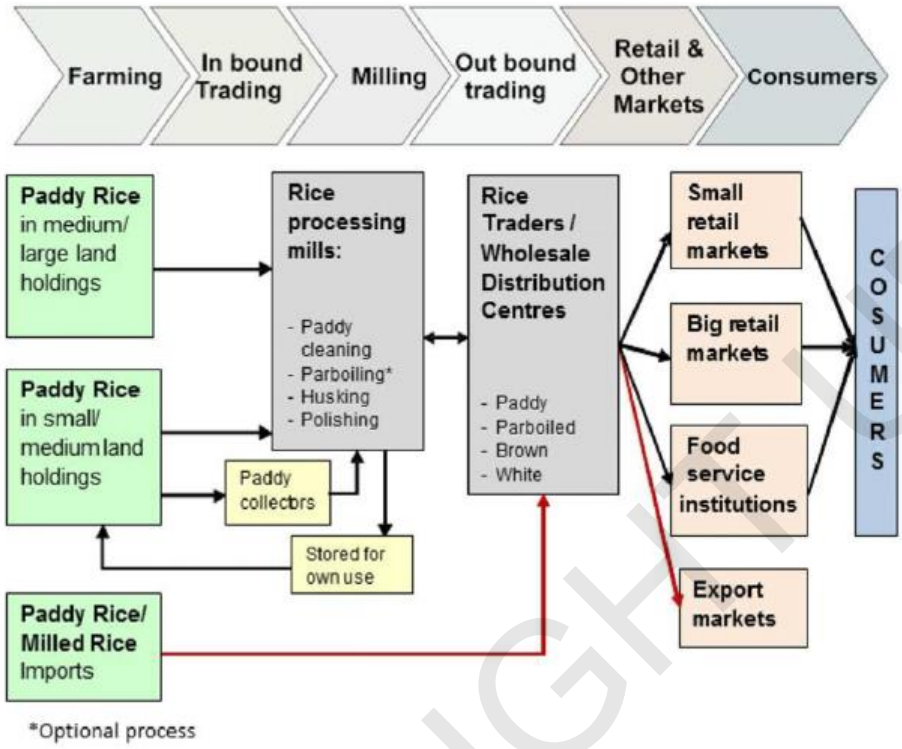

Figure 1.3: Rice Supply Chain in Malaysia
(Source: Adopted from Muthayya, Jonathan, Scott and Glen, 2014)

1.2 Overview of Paddy Industry in Malaysia

The total land area of Malaysia is 330,800 km^2 with a total estimated cultivable area at 14.2 million hectares. It was recorded that in 2009, only 7.6 million hectares of the cultivable area were planted. Out of this planted area, only 1.8 million hectares were planted with annual crops especially paddy while the remaining 5.8 million hectares were planted with permanent crops (Ricepedia, 2019).

Paddy production has always been given special priority since rice is Malaysian staple food. Despite having a small contribution towards the nation's GDP, the paddy industry has garnered much interest from policymakers given its complex relationship with food security, culture and socioeconomic factors. Anyhow, the government did their best and tried to achieve its current national plan, Eleventh Malaysia Plan (2016 – 2020) which emphasized on the high value-added of agriculture activities by accelerating adoption of farming technology and promoting a cluster-based approach through vertical integration of the supply chain for selected crops (MEA, 2018). Unfortunately, since last two decades, more agricultural land, especially rubber and oil palm plantation

have been converted to residential and industrial area or for other commercial purposes. There were also no new areas developed for paddy cultivation purposes (Yahya, 2001). Despite this, there are still substantial areas of idle agricultural land and abandoned holdings. It was estimated that there were about 400,000 hectares of idle agricultural land all over the country and these have been and continues to be a big problem to agriculture sector.

Historically, Malaysia has always had production-driven agricultural targets. Measures were introduced since the 1940s to help increase national rice production and protect farmers' welfare. Indeed, over 30 years, the total production has increased, allowing the self-sufficiency level (SSL) to hover between 60% – 70%. At 60% – 70% of SSL, Malaysia has attained a certain level of production capacity. SSL is accepted as an indicator for food security and the basis for policy design. It is often be a reason of national security in order to provide staple food for the society without depending on other countries.

Table 1.3 is comparing SSL targeted with SSL achieved by Malaysia's Master Plan. The table shows that the highest SSL achieved was during the 3rd MP, however started from the 8th MP, Malaysia could not meet the SSL targeted, so the government tried to reduce the SSL target as Malaysia moved to the next MP. According to Omar, Shaharudin, and Tumin (2019), the total domestic rice production has indeed been increasing at the back of constant land area as a result of increasing farm yield. The increasing national consumption offsets the increase in total production. Due to this, the SSL has fluctuated between 60% to 80% since 2000s. Therefore, as the country has not been able to increase the SSL to a higher level, various policies have been introduced to maintain a relatively stable SSL.

Table 1.3: Self-sufficiency level (SSL) of rice in Malaysia

Master Plan	Period	SSL target (%)	SSL achieved (%)
First Malaysia Plan	1966 – 1970	-	80
Second Malaysia Plan	1971 – 1975	-	87
Third Malaysia Plan	1976 – 1980	90	92
National Agriculture Policy I	1984 – 1991	70	75.9
Fourth Malaysia Plan	1981 – 1985	70	76.5
Fifth Malaysia Plan	1986 – 1990	70	75
Sixth Malaysia Plan	1991 – 1995	70	76.3

National Agriculture Policy II	1992 – 2010	70	65
Seventh Malaysia Plan	1995 – 2000	65	71
National Agriculture Policy III	1998 – 2010	65	65
Eight Malaysia Plan	2001 – 2005	72	71
Ninth Malaysia Plan	2006 – 2010	90	72
National Food Security Policy	2008 – 2010	80 by 2010	72
New Economic Model	2010 – 2020	85 by 2020	n.a
Tenth Malaysia Plan	2010 – 2015	72	72
National Agrofood Policy III	2010 – 2020	70 by 2012	n.a
Eleventh Malaysia Plan	2016 – 2020	69	n.a

n.a: Not available
(Source: Ismail and Norshafadila, 2017; Dardak, 2019)

Omar et al., (2019) also stated food security is not just a measure of production and self-sufficiency, but includes other important factors such as environmental sustainability, food safety and affordability. A lower SSL with a lower number of farmers but with higher yield and quality of paddy can help farmers to increase their level of income. The reduction in paddy production was mainly because of the emergence of the weedy paddy or commonly known as *padi angin*. So, the government, with the help of related agencies, has undertaken some strategies to increase paddy yield per hectare. The strategies included development of large scale, commercial paddy farms, enhancement of private sectors involvement and development of entrepreneurs. (Suntharalingam & Santiago, 2006)

For the past fifty years, the Malaysian government has allocated billions of Ringgit in order to increase paddy production. Government incentive may include credit facilities, R&D, extension support, guaranteed minimum price, subsidized retail price, fertilizer subsidies, and irrigation investment. In spite of continuous government attention as early as the first Malaysian plan (1966-1970) to the recent Eleventh Malaysia Plan (11MP) (2016 – 2020), Malaysia's paddy production still can be considered as inefficient in term of cost and production quantity. Government effort and investment portrays the urgency in improving national paddy production, where in The Ninth Malaysia plan (9MP) (2006 – 2010), the government allocated 70% of RM2.5 billion for National Food Security Policy on rice alone. Later, in the 9MP midterm review, the government injected another RM3 billion for a National Food Security policy. RM928 million was allocated in providing subsidies for paddy farmers in 2008 (Fahmi, Samah, & Abdullah, 2013).

According to Zorya and Santos (2015), higher agricultural spending does not guarantee higher productivity. The most important action is to monitor the quality of the budget allocated. However, careful action is needed if the plan to remove subsidies and incentives is going to be implemented. The removal of subsidies and incentive could lead to a sudden drop in production and rice productivity.

Other than providing subsidies, the government also helps the farmers in terms of financing for a minimum price. It has persistently been the biggest outlay and surpassed supports allocated on drainage and irrigation facilities. Soft loans are also available in the form of small and medium industries fund, Fund for Food (3F), and various other schemes, such as the paddy credit scheme (WTO, 2009).

Table 1.4 below shows various policies that have been introduced and implemented since pre-independence and some of them still persist until today. Under input subsidy policy, there have been several other programmes being introduced since 1979 such as the Federal Government Paddy Fertilizer Subsidy Scheme (SBPKB), Paddy Production Incentives Scheme (SIPP), Production Rice Incentives (IPPB), Production Seeds of Legitimate Rice Incentives (IBPS) and Skim Baja dan Rice Subsidy Scheme. IPPB program was stopped in 2015. Besides input subsidy, the government also introduced output subsidy policy. There was only one program under output policy introduced in 1980, that is Rice Subsidy Scheme (SSHP). Guaranteed Minimum Price (GMP) and Stockpiling were among the earliest program introduced among other programmes. Both were introduced in 1949 under market and trade policy.

Table 1.4: Policy measures in paddy industry

Category of Policy	Intervention Programmes	Period	Details	Source
Input subsidy	The Federal Government Paddy Fertilizer Subsidy Scheme *(Skim Baja Padi Kerajaan Persekutuan – SBPKP)*	1979 to present	• Subsidized compound and urea fertilizers are distributed to farmers with maximum paddy area of 10 Ha • The amount and types of fertilizers are based on recommendations made by *Jawatankuasa Dasar Bantuan Kerajaan Kepada Industri Padi dan Beras*	Omar, Shaharudin and Tumin (2019), Kari (2018)
	Paddy Production Incentives Scheme *(Skim Insentif*	2007 to present	• The government introduced SIPP to alleviate the burden of paddy farmers due to the increases in diesel price and ploughing cost	

	Pengeluaran Padi – SIPP)		• Types of incentives include: • Ploughing allowance • Organic fertilizer • Additional NS fertilizer • Growth enhancer • Foliar • Pesticide (herbicide)	
	Production Rice Incentives *(Insentif Peningkatan Pengeluaran Beras Negara* – IPPB)	2008 to 2015	• IPPB was introduced in 2008 in response to the food crisis as well as the hike in petroleum price that caused input price to increase tremendously • Types of incentives include: • Liming • Additional NPK fertilizer • Pesticide	
	Production Seeds of Legitimate Rice Incentives (*Insentif Benih Padi Sah* – IBPS)	2007 to present	• The objective of the incentive is to encourage paddy farmers to use high-quality seeds • Certified paddy seeds are purchased at a ceiling price of RM1.40/kg	
	Skim Baja dan Racun Padi Bukit/ Huma	2015 to present	Incentives for hill/upland paddy production, which includes: • Compound fertilizer • Urea fertilizer • Pesticide	
Output Subsidy	Rice Subsidy Scheme *(Skim Subsidi Harga Padi* – SSHP)	1980 to present	• Farmers earn a pre-determined amount for each tonne of paddy harvested as an incentive to cultivate more paddy • In the 2016 budget announcement, the government increased the incentive to RM300/MT	Omar, Shaharudin and Tumin (2019)
Market & Trade	Guaranteed Minimum Price (GMP)	1949 to present	• Paddy prices are controlled through the GMP scheme • This is the minimum price millers must pay to farmers when purchasing the harvested paddy	Omar, Shaharudin and Tumin (2019)
	Stockpiling	1949 to present	• First introduced in 1949 by the British government, buffer stocks are used in Malaysia to stabilize domestic price	

			fluctuations and as an emergency reserve • BERNAS manages the national stockpile; at any given moment, it must stock enough rice to feed the nation for 45 days	
	Single rice importer	1974 to present	• *Lembaga Padi dan Beras Negara* (LPN) became the single rice importer in 1974 in response to the world rice crisis in 1973 – 1974 • After the corporatization of LPN, BERNAS became the single importer of rice based on the corporatization agreement •	
Others	Granary areas as permanent paddy areas	2010 to present	• In 2010, through *Rancangan Fizikal Negara ke-2*, the government made eight granary areas permanent paddy cultivating areas • In these areas, urbanization and the planting of other crops will be limited and closely monitored	Omar, Shaharudin and Tumin (2019)

Table 1.5 compares the hectarage of overall planted area, average yield and production of paddy by all seasons in Malaysia and granary areas from year 2008 to year 2017. In general, the average yield of paddy in granary areas is higher than that in Malaysia. The planted area in granary area also shows an increasing trend even though the paddy production shows some up and down figures.

Table 1.5: Hectarage of overall planted area, average yield and production of paddy for all season in Malaysia and granary areas (2008 – 2017)

Year	Malaysia			Granary Areas		
	Planted Area (ha)	Average Yield of Paddy (kg/ha)	Paddy Production (metric tonnes)	Planted Area (ha)	Average Yield of Paddy (kg/ha)	Paddy Production (metric tonnes)
2008	656,602	3,584	2,353,032	384,145	4,249	1,632,407
2009	674,928	3,720	2,511,043	391,625	4,646	1,819,406
2010	677,884	3,636	2,464,831	387,160	4,540	1,757,575
2011	687,940	3,748	2,578,519	389,544	4,773	1,859,357
2012	684,545	3,797	2,599,382	381,583	4,866	1,856,476

2013	671,679	3,876	2,603,654	369,273	5,002	1,847,208
2014	679,239	4,194	2,844,983	400,733	5,212	2,088,449
2015	681,559	4,022	2,741,404	406,048	4,864	1,974,994
2016	688,770	3,978	2,739,606	417,007	4,941	2,060,318
2017	688,959	3,728	2,568,102	426,249	4,491	1,914,299

(Source: Department of Agriculture, 2016)

Paddy industry community, comprise of Bumiputera, is usually related to poverty groups. The community is classified in poverty groups based on small-scale paddy area, highly dependence on paddy farming activity as their income and lack of productive assets. The incidences of poverty and income inequality among farmers especially among the Bumiputera for decades have attracted policy makers' attention in formulating policies to avoid them from continuing. The policies vary, ranging from input subsidies, output subsidies, market and trade and others.

Other than small farmers, there are also smallholdings involved in paddy production. Basically, they are family-owned and operated by small agrarian communities. These smallholdings are relatively small and uneconomical which recorded low income earned level and high incidence of poverty. For example, about 70% of the rice farmers owned farms less than two hectares (five acres), contributing to farm income of RM300 to RM350 per acre per month (Suntharalingam & Santiago, 2006).

National Farmers Organization (NAFAS) has come out with new idea to involve urban and rural youths to participate in agriculture activities. In December 2016, Nafas took part in Malaysia Agriculture Horticulture and Agrotourism (MAHA) 2016 by organizing Nafas Agro Youth Camp. The main objective of this program was to enable youths to understand the agriculture industry and instil love for agriculture (Sun Media Corporation Sdn Bhd, 2016). Through this program, it was hoped that it can attract youth to become entrepreneurs in agriculture and have more knowledge on agriculture concepts besides opening their mind that there are actually a lot of career opportunities in this sector. This three-day camp sessions had attracted 4,500 youths, aged between 18 and 35, from all over Malaysia.

The legislative and institutional framework of the agriculture sector has remained largely unchanged. The sector is regulated mainly by the Ministry of Agriculture and Agro-Based Industry who are responsible for the agri-food sector which includes crops, livestock, and fisheries.

This ministry was helped by many other agencies related to paddy industry. Each division and agency has their own visions and strategies to help the agriculture sector and paddy industry is included. Among the agencies involved are:

- Malaysia Agriculture Research and Development Institute (MARDI)
- Farmers' Organization Authority (FOA)
- Federal Agricultural Marketing Authority (FAMA)
- Muda Agriculture Development Authority (MADA)
- Kemubu Agriculture Development Authority (KADA)
- *Lembaga Padi dan Beras Nasional, Malaysia (LPNM)*

Paddy in Peninsular Malaysia was planted in two major strata, stratum A known as irrigated areas and stratum B, the non-irrigated areas. An irrigation area or scheme refers to an irrigation project which is completed, commissioned, operated and declared by the authority as an irrigation area. The main objective of irrigation project is to manage water to and out of paddy land area to help farmers in increasing paddy productivity. Most of these schemes are managed by formal government organizations such as Drainage and Irrigation Department (DID), MADA and KADA.

Figure 1.4 shows the location of granary areas in Peninsular Malaysia. Initially, the government recognized eight granary areas, the main paddy producing areas under this irrigation scheme. These granary areas are:

- Muda Agriculture Development Authority (MADA)
- Kemubu Agriculture Development Authority (KADA)
- Kerian-Sungai Manik Integrated Agriculture Development Area (IADA KERIAN)
- Barat Laut Selangor Integrated Agriculture Development Area (IADA BLS)
- Pulau Pinang Integrated Agriculture Development Area (IADA Pulau Pinang)
- Seberang Perak Integrated Agriculture Development Area (IADA Seberang Perak)
- Northern Terengganu Integrated Agriculture Development Area (IADA KETARA)
- Kemasin Semerak Integrated Agriculture Development Area (IADA Kemasin Semerak)

Two new, additional granary areas started their operation in 2014. They are

- Rompin Integrated Agriculture Development Area (IADA Rompin)
- Pekan Integrated Agriculture Development Area (IADA Pekan)

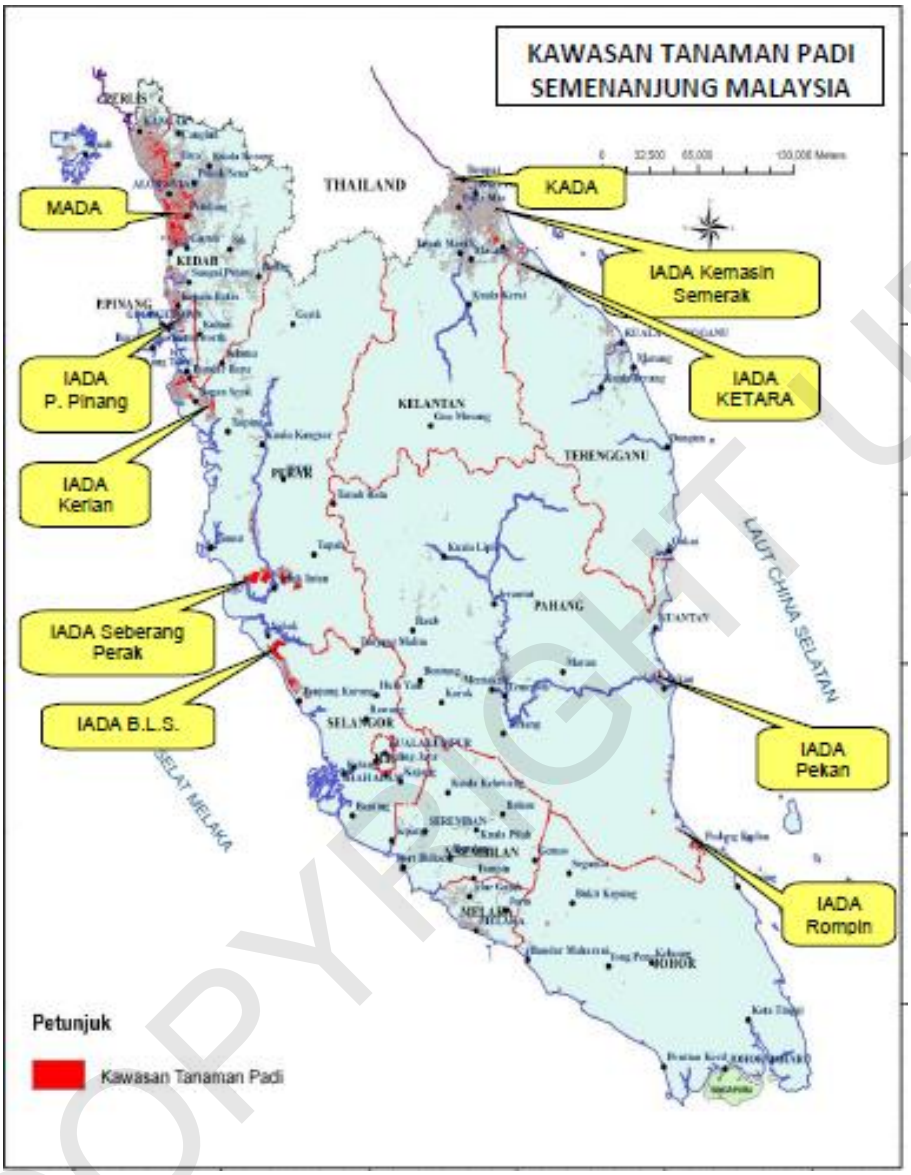

Figure 1.4: Granary Area in Peninsular Malaysia
(Source: Paddy Statistics of Malaysia, 2016)

Table 1.6 below shows general information of year of establishment of each granary and IADA area. MADA was the first granary area set up in Malaysia followed by Kelantan 3 years later and then IADA KERIAN and IADA BLS, both in year 1979.

Table 1.6: Year of establishment of granary area and IADA

Granary area / IADA	Year established
MADA	1965
KADA	1968
IADA KERIAN	1979
IADA Barat Laut Selangor (BLS)	1979
IADA Seberang Perak	1981
IADA KETARA	1992
IADA Kemasin Semerak	1982
IADA Pulau Pinang	1983
IADA Pekan	2014
IADA Rompin	2014

(Source: Unit Statistik, 2017)

Table 1.7 below shows the hectarage of planted area by granary area. Based on 2017 data, MADA is the largest area of granary area, known as 'Rice Bowl' of the nation, followed by KADA and IADA KERIAN. Both Kelantan and Perak have two (2) granary areas which are KADA and IADA Kemasin Semerak in Kelantan as well as IADA KERIAN and IADA Seberang Perak in Perak.

Table 1.7: Hectarage of planted area by granary area, 2012 – 2017

Granary area	2012	2013	2014	2015	2016	2017
MADA	187,413	187,413	190,127	191,853	201,239	201,259
KADA	45,855	38,641	50,268	51,675	53,836	54,067
IADA KERIAN	53,158	41,955	41,944	41,944	41,788	41,898
IADA BLS	37,835	37,833	37,842	38,114	38,114	36,708
IADA Pulau Pinang	20,160	20,160	25,564	25,564	25,564	25,564
IADA Seberang Perak	16,465	27,686	27,594	27,697	27,723	27,735
IADA Ketara	9,799	9,752	9,752	9,752	9,752	9,752
IADA Kemasin Semerak	5,988	5,383	6,512	7,468	7,281	7,129
IADA Pekan	-	-	6,030	6,783	6,541	6,832
IADA Rompin	-	-	5,100	5,218	5,169	5,101

(Source: Unit Statistik, 2017)

Table 1.8 below shows the average yield by granary area. Although MADA is the largest granary area, it was IADA Pulau Pinang which produced the highest yield, followed by IADA Ketara. MADA, on the other hand, recorded the third highest yield in year 2017 followed by IADA BLS then only KADA. These granary areas show different levels of yield because of different environmental conditions, farms practices and locations besides other contributing factors (Kari, 2018). In general, the overall performance in 2017 shows decreasing patterns of yield except for IADA Kerian, IADA Kemasin-Semarak and IADA Rompin. IADA Pulau Pinang shows a consistent increase in yield except in year 2016 and 2017. The data also shows that even though KADA is the second largest granary area in Malaysia, its yield is below the average level of expected yield.

Table 1.8: Average yield (kg/ha) by granary area, 2012 – 2017

Granary area	2012	2013	2014	2015	2016	2017
MADA	4,843	5,026	5,539	4,884	5,284	4,841
KADA	4,196	4,136	4,297	4,442	4,610	4,448
IADA Kerian	4,380	4,495	4,514	4,508	3,949	4,087
IADA BLS	5,989	6,280	6,403	6,305	5,825	4,510
IADA P. Pinang	5,621	5,841	5,872	5,866	5,801	5,737
IADA Seberang Perak	4,948	4,552	4,484	3,956	3,729	3,180
IADA Ketara	5,604	5,549	5,738	5,437	5,623	5,172
IADA Kemasin Semerak	3,905	3,495	3,715	3,781	3,771	3,779
IADA Pekan	-	-	2,671	2,571	2,052	1,357
IADA Rompin	-	-	3,442	4,014	2,793	3,147
TOTAL	4,866	5,002	5,212	4,864	4,941	4,491

(Source: Unit Statistik, 2017)

Non-irrigation refers to an area planted with paddy without any irrigation system but depends on the supply of rain-water (rainfed area). The non-granary areas are scattered all over the country and usually the sizes vary between 50 hectares to 200 hectares and basically are managed by Farmers Organization Authority (FOA).

There are two seasons to plant paddy – the main season and off season. The main season is a period where planting is very suitable based on rainy season

and does not depend on irrigation system. Usually it starts between August and February the following year. The off season is a planting period during dry period. Hence it totally depends on irrigation system and often, this season starts from March until July every year. (Department of Agriculture, 2012). The details on harvesting season based on state and granary area can be referred to Appendix G and H.

1.3 Paddy Industry in Kelantan

Paddy planting in Kelantan is carried out bi-seasonally, Season I (Off Season) and Season II (Main Season). Season I is between March until July while Season II is between August to February. The water supply comes from different sources. For Season I, the water supply is through irrigation channels from river with drought being a real threat. As for season II, the water supply is from rains with flood being a real threat.

Until 27 September 2018, paddy land area in Kelantan was only 26,092 hectares (93%) as compared to 28,072 hectares of total area in 2017. There were 6 different KADA district offices in Kelantan which handle different total area for each district. Table 1.9 below shows the district and centre areas for the year 2017.

Table 1.9: Total area and total planted by district

KADA District Office	Centre Area (ha)	Total Planted (Ha)
Kota Bharu (North)	2,833	2,823
Kota Bharu (South)	4,654	4,590
Bachok	5,482	4,471
Pasir Mas	6,255	4,703
Pasir Puteh	4,649	5,795
Tumpat	4,199	3,710
Total	**28,072**	**26,092**

(Source: KADA, 2018)

Table 1.10 below shows yield area, average net paddy yield and paddy production in KADA region for the year of 2002 to 2017 during all seasons, main season and off season. Albeit the increasing trend in yields and despite the government spending a lot in various incentives subsidies and support programs, the yields were still far from the actual target which is 6.5 tonne/ha in year 2020

Table 1.10: Paddy information in KADA for the year 2002 – 2017

Year	All Season		Main Season		Off Season	
	Planted area (ha)	Average yield (kg/ha)	Planted area (ha)	Average yield (kg/ha)	Planted area (ha)	Average yield (kg/ha)
2002	47,150	2,576	20,877	2,740	26,273	2,445
2003	40,786	3,256	17,363	3,191	23,423	3,304
2004	45,134	3,635	21,507	3,637	23,627	3,633
2005	48,852	3,528	22,722	3,549	26,130	3,510
2006	50,851	3,559	25,075	3,600	25,776	3,519
2007	52,414	3,599	25,634	3,593	26,780	3,605
2008	49,929	3,586	24,470	3,558	25,459	3,613
2009	55,921	3.754	28,137	3,738	27,784	3,771
2010	50,615	3,974	26,544	4,204	24,071	3,720
2011	53,024	4,096	25,447	4,098	27,577	4,095
2012	45,855	4,196	27,450	4,543	18,405	3,678
2013	38,641	4,136	26,279	4,267	12,362	3,856
2014	50,268	4,297	25,129	4,406	25,139	4,118
2015	51,675	4,442	25,332	4,597	26,343	4,292
2016	53,836	4,610	26,985	4,722	26,851	4,497
2017	54,067	4,448	27,268	4,791	26,799	4,099

(Source: KADA, 2018)

Paddy is the main commodity under KADA. KADA has tried to ensure that the self-sufficiency level can reach 90%. Hence, KADA has come out with a few strategies in boosting up the productions through some concepts such as

- Ladang Merdeka which refers to a commercial rice planting using the latest technology and controlled by a central management
- Paddy Mini Estates (*Mini Estate Padi – MEP*) or Batch Cultivation which focus on the combined strength of all farmers under the supervision of KADA
- 10 Ton Projects which call for intensive support and assistance to a group of farmers with the goal to reach productions at 10tons/hectare to be exemplified by other farmers.

Table 1.11 compares the average yield in KADA granary area, Ladang Merdeka, Paddy Mini Estate and KADA NKEA project. The three projects under KADA have proven to produce higher yield as compared to the granary area.

Table 1.11: Comparison of average yield (tonne/ha) between granary area, Ladang Merdeka, Paddy Mini Estates and NKEA Project (2015 – 2017)

	2015	2016	2017
Granary Area	4.44	4.61	4.48
Ladang Merdeka	6.42	6.44	6.23
Paddy Mini Estates	4.67	5.16	4.92
KBU	*5.76*	*5.25*	*5.75*
KBS	*4.92*	*5.13*	*5.28*
Bachok	*4.70*	*5.12*	*4.76*
Pasir Puteh	*4.18*	*5.14*	*4.49*
Pasir Mas	*4.69*	*4.98*	*4.91*
Tumpat	*5.05*	*5.32*	*5.19*
KADA NKEA Project	-	-	*7.24*

1.4 Issues in Paddy Industry in Kelantan

Rice is the staple food in Malaysia. There are 0.3 million paddy farmers in the country, of which only 40% are full time farmers. 65% of total paddy farmers have farm sizes below one hectare. There are a total of 426,260 ha paddy planted area, with the average yield of 3.5 ton per hectare (Alam et al., 2010). Singh et al., (1996) mentioned that the actual farm yields of rice in Malaysia vary from 3 to 5 tons per hectare, where potential yield is 7.2 tons. Alam et al., (2010) also highlighted that there is a possibility for rice production in Malaysia to come to an end, due to the continued declines in cultivated area, negligible gains in productivity, continued increases in the cost of production and decreased profitability.

In an article, Masso and Man (2016) responded that rice production in Malaysia is still at insufficient level and often involves traditional farming as well as limited skill and less expert workforce. In paddy literature, there are a lot of discussions on changing techniques to improve productions. These include machine-scheduling for rice production (Deris & Ohta, 1990), irrigation scheme (Johnson, 2000; Alam et al., 2012) and the introduction of rice varieties in the market (Azman et al., 2014; Oladosu, et al., 2014) such as MR 219, MR 220, and MR 253.

Some of the above-mentioned problems also faced by the Malaysians' farmers. Malaysia has more than 100,000 farmers who depend on rice productions for their livelihood and many more are working in rice-related industry. Furthermore, the sustainable production of rice is critical to ensure food security and addressing poverty. Increasing food safety is also a growing concern either locally or globally. NAP I and NAP II were then developed for the overall agricultural sector with the objectives to maximize income through resource utilization and to increase agricultural productivity. Efforts were further increased to improve the efficiency and competitiveness of the paddy industry. Meanwhile, more focus was given to issues and problems in paddy and rice industry in the Third National Agricultural Policy (NAP III). The development of

eight granary areas as the designated national paddy production hubs gave significant impacts in increasing rice productivity. Due to the importance of the development of food sector and enhancement in food security, the NAP was replaced with the National Agro-food Policy (NAFP) effective from 2011 to 2020.

One of the main issues in rice production is high import bill of rice. The fact that Malaysia does not have a comparative advantage in the rice farming industry creates a trading situation in the region in which Malaysian rice production levels tend to be below the self-sufficiency targets. This strongly suggests that Malaysia will continue to be a net importer of rice. BERNAS, which gets the authority to import rice, is responsible in managing the national stockpile and must stock enough rice to feed the nation for 45 days. Currently, Malaysia imports rice mainly from the ASEAN region such as Thailand and Vietnam (AFSIS Secretariat, 2017).

However, BERNAS has been facing a problem of rice smuggling throughout its operations due to the lack of enforcement by the authorities and issues of corruption among BERNAS staff (Suntharalingam & Santiago, 2006). These activities happened because of differences in terms of price. Smuggled rice is cheaper than the legal, set local price as the government wanted to protect the local paddy.

The location of Kelantan in the north-eastern corner of Peninsular Malaysia shares three border crossings with Thai province of Narathiwat: Sungai Golok, Takbai and Buketa. A lot of rice smuggling activities spread through these borderlines (Lord & Tangtrongjita, 2016). Historically, there had been informal trades of rice along the provincial border with Malaysians. The network flourished until stricter border controls were put into place in 2004, following political unrest. Unofficial markets for the distribution of cross-border rice trade continue to exist and expand based on formalized networks of traders (Khemakunasai, 2014).

The smuggling activities, which basically use river, automobile or train routes, are difficult to be curbed due to many reasons. Firstly, it is due to a unique geographical feature of a river which allows people to commute to each other by boats. Secondly, it is due to family and kinship system of the people in the borderland. Controlling these activities would affect the lives of so many villagers. Thirdly, there are insufficient number of officers to put on duty. Lastly, train journey across the border is available daily and the smugglers could operate across different trains, wait to get on the train near the departure time or use different stations (Kusagayavong, 2001)

In May 2019, a total of 23,750 kg of Thai rice worth RM76,000 was seized in an operation in Tumpat. There were also four men detained who were believed to be involved in the rice smuggling activities (Bernama, 2019). In 2018, various

smuggled items worth nearly RM200,000 were siezed in series of operation along border areas (NSTP, 2018) while in June 2016, 21,300kg of rice valued at RM200,000 was sized in Pasir Mas (BorneoPost Online, 2016).

The second issue related to paddy production is the existence of idle agriculture land and land conversion either for housing or industrial purposes. Malaysia actually has a total land area of 32.83 million hectares of which 59.15% are forested land. The rest of the land was used either for agriculture or development purposes. Data from the Ministry of Agriculture and Agro-Based Industry shows that there are about 12,180 hectares of agricultural land left idled in Peninsular Malaysia. This is equivalent to 35% of 34,360 hectares of the whole agriculture lands in the country (Azima & Ismail, 2011). These figures indicate the reduction of production in agriculture sector and low income among farmers in the country. Some of the arable lands were allocated for paddy plantations but the owners are not interested to involve in paddy sector either because of high costs or irrigation problems.

Several factors have been identified as the causes of idle agricultural land for Malay reserve land in Kelantan. The first factor is unfavourable physical attributes which include climate, topography, soil type, water supply and accessibility. Next is lack of the technical know-how. Other than that, the land-owners might also be facing with economic and social constraints such as uneconomic size of holdings, severe shortage of manpower and machinery, costly inputs, uncertain market prospects and unequal competition between non-agricultural and urban-based sectors. But generally, the cause revolves around negative attitudes and behaviour of the farming folks, such as distrusts, disputes and lack of cooperation among land owners (Azima & Ismail, 2011).

Figure 1.5 below shows the land conversion activities that have directly impacted the rice production. KADA lost 353.37 hectares per year, hence it resulted in the loss of rice production with a total of 2,827 tonnes a year (Wan Ibrisam Fikry & Norshafadila, 2017). The government, with the help of a few agencies, need to improve the strategies to avoid food supply crisis in future.

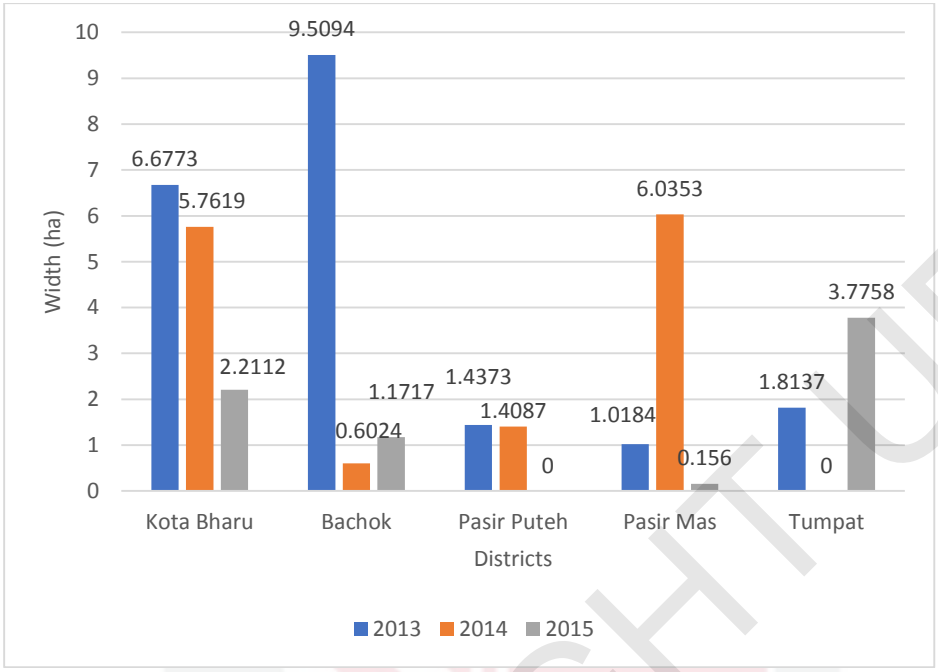

Figure 1.5: The Width of Paddy Land Use Conversion by Kelantan Land Office from 2013 until 2015
(Source: Wan Ibrisam Fikry and Norshafadila, 2017)

Paddy industry is dominated by small and medium scale farmers. So, it cannot reach the economies of scale and compete with others. The level of efficiency can be measured by the amount of average yield (kg/ha) recorded by year or by season. If the land area is lesser than four hectares per farmer, the productivity of paddy cannot reach the level required (Yahya, 2001). As a result, Malaysia will continuously import rice from others.

Low in productivity also leads to another problem which is lower income. It was reported that the productivity of paddy farming was very poor which resulted in low farmers' income with an average of RM1,400 per month and this income received already includes price supports of RM248 per metric ton by the government (Wan & Chang, 2012).

Typically, the average yields in the granary areas are higher than in the non-granary areas (6,011 kg/ha as compared to 3,545 kg/ha in 2017). The yield also varies between granary areas, with IADA Pulau Pinang and IADA Ketara being the top performers with yields above 5,000 kg/ha (refer to Table 1.8). These differences can be attributed to many combinatorial factors, including soil condition, weather, farm management, irrigation, pests and diseases and use of technology. In fact, in agriculture, acquiring optimal yield requires good farm management practices that have been modified to best suit the unique local conditions (Omar, Shaharudin, & Tumin, 2019).

In 2017, KADA ranked at the second largest planted area, but its average yield was recorded to be among the lowest. The highest yields recorded were IADA Pulau Pinang followed by IADA KETARA and MADA. The lower yield shows that the granary is not competitive enough. This lower yield might be because of climatic issues, planting techniques, size of land per farmers and elder group of farmers (Kari, 2018).

In farming theory, attaining economies of scale is seen as a way to improve farm management and reduce the cost of production. Economies of scale can be achieved when there is a reduction of the average cost per unit (in paddy industry case, cost per hectare). As the size of the farm increases, costs can be spread over a larger area and farming can be made more efficient (Omar, Shaharudin, & Tumin, 2019). The costs of paddy cultivating are different by location, time, and other specific factors (Moya, et al., 2016). Some costs are location-specific while some are highly influenced by the changes in paddy cultivating systems. Costs are determined not only by prices of inputs and labors but also determined by the management practices and strategies of the farmers, irrigation costs, land rental, and interest on capital.

According to Fatimah (2016), Malaysia is a net importer of all inputs for its agriculture product, particularly the paddy industry. It depends on imports for seeds, breeds, fertilisers, pesticides, weedicides, feeds for livestock, machinery and labour.

Table 1.12 shows total cost per hectare incurred in paddy production, specifically in Kelantan, as per recorded by KADA. These costs include cost that the farmers have to pay and cost bonded by the government (subsidies). For the case of MADA, the amount of incentive provided to farmers for those involved in NKEA Program, for the year 2011 to 2016, was only RM2,000 per hectare for 5 seasons or RM1,000 per hectare for 10 seasons of cultivation (MADA, 2017). The amount allocated is lesser than whatever received by Kelantan's farmers.

Table 1.12: Total cost of paddy production per hectare

Cost Incurred by Farmer		**Subsidies Provided by Government**	
Type of Cost	**Amount**	**Type of Cost**	**Amount**
Input (seed, additional fertiliser, pesticide)	RM428.30	IBPS (*Insentif Benih Padi Sah*)	RM165.00
Labor Cost	RM232.10	IPP (Paddy Production Incentive)	
Machinery cost	RM1,000.79		
Others	RM20.24	• Cost of plough	RM100.00
		• Farming Input (organic fertilizer, foliar, growth enhancer)	RM140.00
		• NPK (additional fertiliser)	RM405.00
		• Pesticide	RM200.00
			RM970.00

		• Kapur SBPKP (Federal Government Paddy Fertiliser Scheme)	RM560.00
Total	**RM1,681.43**	**Total**	**RM2,540.00**

(Source: KADA, 2014)

Climate plays an important role in paddy production. Periodic drought, irregular rainfall, and seasonal monsoon floods could lead to shortages of irrigation water and become a threat to the rice crop. Besides that, the intrusion of coastal seawater into areas below sea level is also a continuing problem. Ineffective terracing of upland slopes and inefficient gravity-fed irrigation systems lead to water deficits (Suntharalingam & Santiago, 2006).

Cause of damage is different year by year and it is unavoidable and unexpected especially flood and drought. Flood and droughts not only caused losses amounting millions of ringgits but also led to destruction of natural resources and environment and decreased the yield harvested, hence indirectly becomes a risk to the national food security.

Table 1.13 represents the causes of damage by state in Malaysia. The causes are different between years, depending on climate change. In overall, any damages lead to reduction in production, hence, reducing yield and income of farmers. In the case of Kelantan, the causes of damage mainly from flood and drought. Floods and droughts cause a serious damage to paddy planting hence, reducing the production of paddy. Kelantan, a the third largest area in paddy production, can more or less position floods and droughts as a risk in national food security, if the incidences cannot be minimized. A reduction in income could also lead to debts for the next plowing season.

Table 1.13: Cause of damage (hectares) by state in Malaysia for the year 2014 and 2015

State	2014				
	Flood	**Drought**	**Pests[1]**	**Disease[2]**	**Other**
Johor	-	-	2	2	-
Kedah	-	-	-	-	-
Kelantan	55	523	13	-	4
Melaka	8	65	1	10	59
N. Sembilan	1	84	2	3	-
Pahang	-	-	39	32	-
Perak	-	-	-	98	-
Terengganu	37	33	-	36	-

State	2015				
	Flood	Drought	Pests[1]	Disease[2]	Other
Johor	-	-	-	-	-
Kedah	25	-	-	26	-
Kelantan	230	1	-	-	-
Melaka	-	-	-	-	-
N. Sembilan	-	-	-	-	-
Pahang	1,284	785	338	3	-
Perak	-	-	132	90	808
Terengganu	-	-	-	-	-

Pests[1]: animal & insects
Disease[2]: Weeds, lodge, diseases
No damages recorded for Perlis, Pulau Pinang and Selangor for the year 2014 and 2015
(Source: Paddy Statistics of Malaysia, 2014; 2015)

1.5 Problem Statement

While having no clear comparative advantage in paddy production, Malaysia has continued to support domestic paddy production primarily due to long-held policy objectives to increase local farmers' livelihoods and to address food security concerns. A wide range of policy programs, especially at the level of production, have been implemented to constantly support the rice industry. This includes subsidy provisions of both inputs and outputs, farm infrastructures (including irrigation and water systems) and maintenance, and credit facilities. As a result, paddy has become a highly subsidized and protected food crop in Malaysia. In fact, paddy is also given a priority in the series of national development policies and government's funds for many years. However, the competitiveness of the paddy industry and the efficiency of policy programs have been debated since the domestic production indicates a stagnant performance over many years.

With the same amount of subsidies and incentives received by farmers in each state, Kelantan still has problems in paddy yield. The data showed that the average yield of paddy in Kelantan was below the average nation yield (refer to Table 1.7). Kelantan was the second state to come out with granary areas in Malaysia after Kedah. KADA has been set up since 1968 and has now become the second largest paddy planted area after Kedah but the yield recorded was among the lowest.

Paddy land acquisition for development purposes is another major problem in land conversion that also contributed to the reduction of paddy land area. KADA has lost 353.37 hectares per year, resulting in the loss of rice production with a total of 2,827 tonnes a year. Paddy land in Kelantan is not under Malay Reservation Land, so the state government does not have the authority to gazette the lands title. This has restricted some of government agencies to

interfere in land ownership issues and to persuade the owner to work together with the government agencies to involve in paddy production in order to increase efficiency in productions and paddy yields. Another issue related to the lands in Kelantan is the state had to sacrifice paddy plantation areas of 40 acres in 2013 in order to complete the first phase of Lagenda Tunjung components, namely Giant Hypermarket and 40-storey Prima Lagenda Apartment in Bandar Baru Tunjung but ended up with abandoned project in 2018. Pursuing self-sufficiency with a constrained supply of land requires significant gains in productivity or otherwise it will lead to higher market prices, and consequently, reduced consumer welfare.

Higher costs of production can reduce farmers' income. The government has implemented many policies to increase paddy productions and yields that can contribute to the increase in the total of national rice supply. Unfortunately, barriers to achieving this combination are the demographics of paddy farming which comprise of aging farmers who worked on small land sizes (inefficient land size) that contributed to higher costs of production. Other than the issue of aging farmers in Kelantan, paddy farming activities are dominated by small and medium scale of farmers, who are too dependent on government subsidies and support program. The higher cost of inputs such as fertilizers and seeds lead to lower income received by these farmers which eventually, causes them to have financial constraints to start paddy planting in the next season.

Besides that, changes in climates also could also lead to reduction in paddy productions. Climatic changes could contribute to many factors of paddy damage such as floods, droughts, pest attacks and various types of paddy diseases. Since these paddy damages happened frequently and sometimes are beyond the farmers' control, they have caused losses of millions ringgit in government's spending on subsidies and a huge decrease in the yield of paddy harvested.

Approximately 42 farmers suffered about RM200,000 when 60 ha of paddy in Kampung Gong Kulim, Kemasin Semerak IADA were destroyed by *Scotinophoracoarctata* (kutu beruang). Paddy crops attacked by the lice had dried up due to the heat; resulting in 70% of pre-mature rice crops being destroyed. Even though pesticides were used intensively, the plants still became scorched as the lice nested in the stubble and this, were not directly 'in-contact' with insecticides. The losses borne by farmers are in the form of field rental, pesticides, oil and water pumps and wages for plowing. The attack has reduced the average yield and increase the cost of production since farmers have to start all over again. The damage have also demanded for an immediate allocation of about RM51 million from the government in terms of technical supports in the construction of drainage systems and replacing cost of the affected areas.

Farmers' attitude could also lead to the losses and reduce the yield of paddy. 76 farmers under KADA lost RM300,000 when 65.8 hectares of paddy planted areas were destroyed because of flood. The farmers were from the districts of Bachok, Pasir Mas and Tumpat. The cultivation schedule should have started in August and ended in October before the raining season, but the farmers had delayed the cultivation activities; pushing the harvest season to arrive at the monsoon time and hence, did not manage to save the crops. The state government had to provide the compensation while at the same time, hoped the farmers will follow the schedule given to avoid future losses.

Rice smuggling activities are another contributing factor to the decline in farmers' income. This is due to the fact that Kelantan is located near to the border of Thailand. Smuggling rice is cheaper than local price even local paddy has been protected by local government. The cheap foreign imported and smuggled grains are not only favored by low-income urban consumers but also desired by the rural residents, including rice and wheat farmers. The guaranteed price set by the government is different from the actual price received by farmers because of farmers are unable to meet the requirement of good clean paddy with 13 percent moisture delivered to the mill door. This is due to the lack of drying and storage facilities which resulted in deductions for dirt and moisture. The differences in prices of output (low price charges) and inputs (high cost) discourage farmers to produce paddy and hence lowering the paddy yields. This encouraged rice smuggling activities along the border, from Thailand to Malaysia. The latest seize was reported on 26th May 2019 with a total of 23,750kg of Thai rice worth RM76,000 near Tumpat, Kelantan in conjuction with Ops Wawasan Sempadan Malaysia (Kelantan)-Thailand operation.

In most cases, paddy cultivation alone is insufficient to support a household even though it is supported with subsidies and incentives. These differences in yield can be attributed to many interrelated factors, which include soil condition, weather, farm management, irrigation, pests and diseases and use of technology. In fact, in agriculture, acquiring optimal yield requires good farm management practices, modified and customized to best suit the unique local conditions.

1.6 Research Questions

This study is directed towards answering several research questions (RQs) concerning the competitiveness of paddy industry:

RQ1a: What are the processes involved in paddy supply chain?

RQ1b: Who are the main actors and what are the activities involved in every process of paddy supply chain?

RQ2: What are the possible factors which determine the competitiveness of paddy industry in Kelantan?

RQ3: Which factors that are more important but less perform in explaining the competitiveness of paddy industry in Kelantan?

1.7 Objectives of the Study

Some particular countries have particular comparative advantages in certain industries and diagnosing the sources of these advantages is crucial for a country. The research aims to understand why a nation succeeds in certain industries but not in others.

This study aims to determine the factors that determine the competitiveness of paddy industry in Kelantan.

Specifically, this study tries to achieve the following objectives (RO):

RO_1: To identify and understand the structure of paddy supply chain in Kelantan.

RO_2: To determine the factors that lead to competitiveness in paddy industry in Kelantan based on Porter's Diamond Model.

RO_3: To assess the competitiveness of Kelantan paddy industry based on relatively high importance and low performance using Importance-Performance Map Analysis (IPMA)

1.8 Scope of the Study

This study will look at the level of competitiveness of Malaysia's paddy industry which focused on KADA granary areas. The competitiveness here means the level of competitiveness from paddy production up to trade and until the processing of paddy. Among those who involved in this study are farmers in granary areas, KADA, Department of Agriculture (DoA), Farmers Organization Authority (LPP), District Farmers Organization (PPK) in Kelantan and BERNAS.

Kelantan was selected as a study area since Kelantan is the third largest area in paddy farming in Malaysia, yet the average yield is among the lowest. Moreover, there was a study by Terano and Mohamed (2011) on household income structure among paddy farmers in Malaysia which found out that income inequality in Kelantan was the highest (at 0.49 as measured by the Gini Coefficient). Out of five granary areas studied (Kelantan, Kedah, Terengganu, Penang and Selangor), Kelantan's farmers have suffered from having the least amount of opportunities in generating on-farm and off-farm income which has led to a widening of income inequality among them. Another reason is it might be because of the East Coast region especially Kelantan, has being lagged behind since most development programmes were concentrated on the West Coast regions. Despite the same policy and programs being implemented by the government throughout the nation, Kelantan is still left behind in terms of yield of paddy.

1.9 Significance of the Study

1.9.1 To the fellow researchers and academicians

Most research and studies on paddy sector in Malaysia were based on specific topics such as climate issues, farmers' attitude, paddy demand or supply and the challenges of paddy industry. The studies used either regression analysis, Policy Analysis Matrix (PAM) r Cost-Benefits Analysis. So, it is hoped that the outcome of this study will serve as a cross reference for other research of a similar area and contribute to the literature and empirical findings in supporting the competitiveness theory using a different approach and attractive point of view.

1.9.2 To the farmers, agencies and middlemen

It is hoped that this research can help farmers, related agencies and middlemen to identify the weaknesses in paddy industry so as to improve the production techniques and yields to make highly competitive within the global market.

1.9.3 To the government

Findings from this research may help the government to identify the best policies and implement the most practical actions to increase the level of competitiveness in paddy industry and indirectly help the farmers step out of the poverty line.

1.10 Organization of the Thesis

This section elaborates in detail the organization of the whole thesis and contents of every chapter.

Chapter 1 is the introduction part of the study. It explains the background of the study and the importance of the government policy in agriculture. This chapter also discusses the issues of paddy farming in Malaysia in general and later on, narrows down to Kelantan, followed by problem statement and the objectives of the study. The chapter also elaborates the scope of study and ends with the discussion on the significance of the study.

Chapter 2 deals with the literature review which begins with the discussion on the development of the theory, Porter's Diamond Model. The chapter ends with some findings served as a comparison to the study; taken from previous research on agriculture and specifically paddy sector in Malaysia.

Chapter 3 explains the method of the study. The discussion is mostly on data collection method and the test related achieving each objective.

Chapter 4 discusses on the findings while the last chapter, chapter 5 focuses on the conclusions and policy recommendation based on the objectives and significance of the study.

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