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THE DETERMINANTS OF COMPETITIVENESS BASED ON PORTER'S DIAMOND MODEL: THE CASE OF PADDY FARMING IN KELANTAN

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Abstract

This study used the Porter's Diamond Model as the theoretical underpinning to examine the competitiveness of paddy farming in Kelantan. Two (2) different models were used. Model 1 examined only four (4) external factors that were factor conditions, demand conditions, farmers' strategies and supporting industries while Model 2 include both external and internal factor. The internal factors were chances and government's roles. Survey questions from prior studies were adopted and customized to collect data. A total of 302 farmers responded to the survey. Partial least Square (PLS) SmartPLS M2 Version 3.0 was used for data analysis. In Model 1, demand conditions was not a factor for the competitiveness but in Model 2, all external factors were significant. Only government's role (external factor) was not significant. Even these five (5) factors were significant but farmers' strategies found to be negatively related which is not consistent with the theory.

Keywords: Paddy Farming, Competitiveness, Diamond Model

INTRODUCTION

Agriculture is one of the sectors identified in the National Key Economic Areas (NKEAs). Among sectors that have been given high priority are aquaculture, seaweed farming, swiftlet farming, herbal products, fruits and vegetables and premium processed food which have high-growth potential. The farmers will have greater opportunities to increase their income since demand for these high value products showed an increasing demand pattern. Other than these products, the paddy and livestock sub-sectors were also included in NKEA's program to ensure national food security.

Paddy industry has been given priority started with Malaysia's New Economic Policy 1970-1990 (NEP). The main objective in NEP was to alleviate poverty and restructure society. In particular, it was designed to boost up the economic status of Malays who constitute the majority of small farmers. A lot of public investments in infrastructure and support services were made to help rice farmers. For example, various price and income support measures were provided to sustain a reasonable level of profitability or income of farmers.

Table 1 show the planted area and production of wetland paddy in granary areas for all seasons from year 2009 to year 2014. Certain year recorded the increasing in production but some others showed the decreasing pattern due to uncertainty especially because of climate factor. 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 of the measures to increase paddy yield per hectare. It included development of large scale, commercial paddy farms, enhancing private sector involvement and entrepreneur development.

Table 1: Principal Statistics of Paddy and Rice by All Seasons in Granary Area, 2009 – 2014

Year	Planted Area (Hectare)	Average Yield (Kg/Hectare)	Paddy Production (Tonne)	Rice Production (Tonne)
2009	391,625	4,646	1,819,406	1,182,614
2010	387,160	4,540	1,757,575	1,142,423
2011	389,544	4,773	1,859,357	1,208,582
2012	384,544	4,866	1,856,476	1,206,710
2013	369,273	5,002	1,847,208	1,200,686
2014	400,733	5,212	2,088,449	1,357492

Source: Department of Agriculture, Malaysia

There are two seasons to plant paddy namely as main season and off season. 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. Off season is planting period during dry period. Hence it totally depends on irrigation system and basically this season start from March until July every year.

Apart from import and smuggling activities, paddy production also faces both physical and operational constraints. The constraints include land and water resources, the escalating prices of agricultural inputs including implements, low adoption of technology, importing of foreign rice, high post-harvesting losses and uneconomic land holdings and fluctuating yield, with strong indication of a gradual decline over time. (Suntharalingam and Santiago, 2006)

Climate also plays an important role in paddy production. Periodic drought, irregular rainfall, and seasonal monsoon floods are a threat to the rice crop. Malaysia also experiences shortages of irrigation water. The intrusion of coastal seawater into areas below sea level is a continuing problem. Soil-related constraints include suspected nutrient imbalance and deficiency and low cat ion exchange capacity. (Suntharalingam and Santiago, 2006)

With all of these factors, it is important to have a study which can help the government making right decision in determining the best policy to develop the country and indirectly, help those who involved in this industry to be more competitive and could reach for global market.

LITERATURE REVIEW

Definition of Competitiveness

Basically, all literatures define competitiveness in general as the ability of a company, an industry, a region, a nation or a supranational region to generate relatively high factor income and factor employment level and expose to international competition on a sustainable basis. Competitiveness also related with the productivity growth of particular countries in both macro and micro economic level.

As for the company, competitive can be defined as the ability to provide goods and services more effective than its competitors (Blunck, 2006). Basically, it is measured through financial performance (Momaya, 1998). The determinants of competitiveness at company level are level of quality, labor costs, capital cost and price level (Arslan & Tathdil, 2012). Company, either traded or non-traded sector, need to sustain their success in market, domestically and internationally. As for industry, Blunck (2006) define it differently. As for him, competitiveness is the ability to maintain its success as compared to foreign competitors without protection or subsidies. He also highlighted in his article that competitiveness of a firm does not necessarily imply the competitiveness of an industry but the success of several firms in an industry in a nation is an evidence of nation specific factors that might be extended and improved.

The understanding of the concept of competitiveness at micro level refers to a firm's ability to compete, to grow and to be generate more profit. At this level, the competitiveness is related to a firm's capacity in producing a profitably manner goods that should correspond to any open market requirements. Comparatively, at a macro level, the concept of competitiveness is more vaguely defined and much more debated. Even improving a nation competitiveness become the central purpose of every economic policy, but because of lack of a clear accepted definition denotes a source of constant controversy and it could be

one of main argument since it is quite dangerous to construct an economic policy from such a vague and interpretable concept. (Hatagen, 2012)

Theory of Competitiveness

The first attempt to explain why countries should engage freely in international trade has its origin in 1776 when Adam Smith introduced the Theory of Absolute Advantage. Absolute advantage is the ability of a country, individual, company or region to produce a good or service at a lower cost per unit than the cost at which any other entity produces that same good or service (www.investopedia.com). For Adam Smith, the capital investments and trade ensures the specialisation and result in rising the productivity and the output. So, competitiveness will lead to trade in differences of productivity.

Then in 1817, David Ricardo put forward the Theory of Comparative Advantage. According to the law of comparative advantage, a country must specialise in those products that it can produce relatively more efficient than other countries (Smit, 2010). In this theory, the production technology differences between industries and nation will lead to employment productivity differences. Thus, comparative advantage also leads to specialisation, but it differs from specialisation which based on absolute advantage.

However, the Ricardian model could not explain the direction of trade. So, economists needed an alternative model to explain this direction of trade. Then, the Neoclassical Economic Theory offered the conditions of a world based on perfect competition. In 1933, the Swedish economics, Bertil Ohlin put forward the Theory of Factor Endowment, which further revealed the source of comparative advantage. Ohlin found out that the difference of the relative price was the basis of the international trade. The reason of the price difference is that the factor endowment of different countries is different, and the factor endowment is the root cause of the international trade (Xing & Yue, 2017). This theory explained the comparative advantage from the production of elements and the price difference between the factors, that is, a country using low-cost production factors of production products are competitive.

Then in 1980s and 1990s, the Competitive Advantage Theory was introduced by Michael Porter when he published many books related to competitiveness (Xing & Yue, 2017). Porter identified four factors which he called the National Diamond that provided the underlying conditions in determining the national competitive advantage of nation. The factors were factor conditions, demand conditions, related and support industries, and company strategy, structure and rivalry. He also proposed another two factors namely as the government policy and chances. These two factors considered as exogenous shocks that became a compliment to this diamond.

Porter's Diamond Model

Four broad attributes of the proximate environment of a firm have the greatest influence on its ability to innovate and upgrade, illustrated in Figure 1 (Model 1). These attributes shape the information firms have available to perceive opportunities, the pool of inputs, skills and knowledge they can draw on, the goals that condition investment, and the pressures on firms to act.

Factor conditions can be defined as land, labour and capital but Porter (1990) distinguished these factors by human resources, physical resources knowledge resources, capital resources and infrastructure which he later subdivided into basic and advanced factors. Porter (1990) focused more on demand differences than similarities to include the concept of international competitiveness. These demand conditions, as explained by Porter, do influence the underlying resource differences between countries and a country's relative location advantages as explained by the new trade theories.

The third determinant of national competitive advantage is firm strategy, structure and rivalry. The main emphasis here is that the strategies and structures of firms which depend heavily on the national environment. Apart from that, Porter also identified rivalry as the most critical driver of competitive advantage of a country's firms. He believed that domestic rivalry forces firms to be cost competitive in order to improve the quality and to be more innovative (Porter, 1990).

According to Porter (1990), the external economies of related and supporting industries such as networks of specialised input providers, institutions and the spill-over effects of local rivalry became the true source of competitive advantage. These industries represent an environment in which learning, innovation and operating productivity can flourish. He believed that these kinds of localised industries were prominent

feature of virtually in any advanced economy but still lacking in developing countries which can limit the productivity and growth.

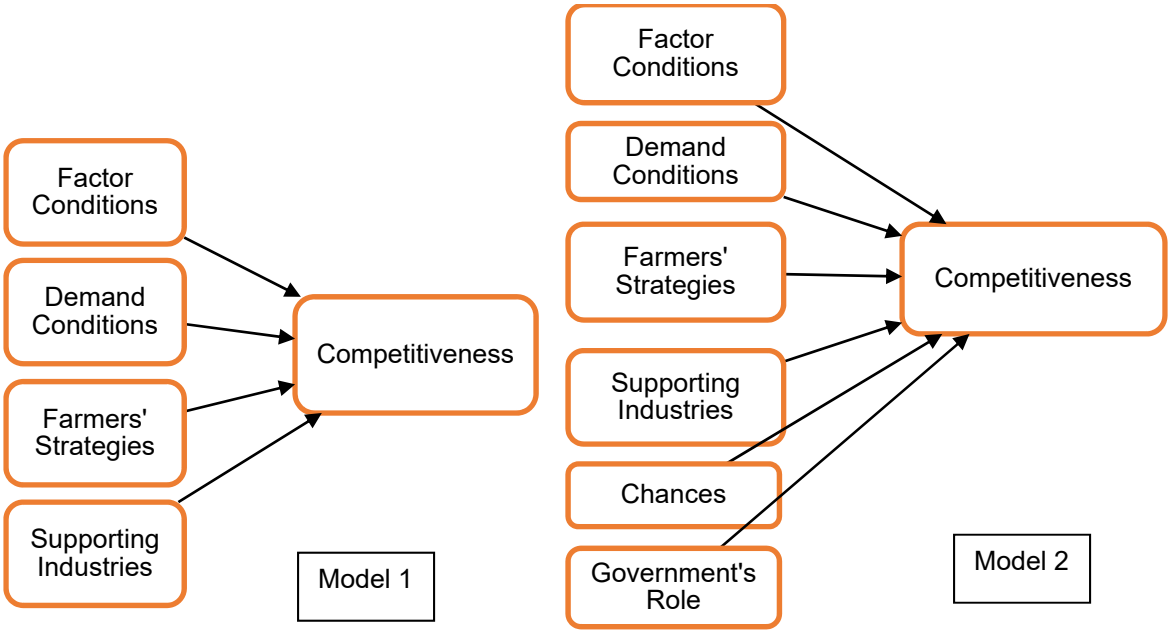
Porter (1990) believes that although the role of government and chance in obtaining a competitive advantage is very important but these two have an indirect influence on competition by influencing the other four factors of competitive advantage. The government acts as a catalyst and challenger, which encourages this industry to move to higher levels of competitive performance. It must encourage enterprises in this industry to raise higher performance, stimulate demand for products, and stimulate local rivalry by limiting direct cooperation and enforcing regulations or deregulations (Wu, Xiao, & Song, 2017).

Porter's research confirms the need to ensure an interdependent, self-supporting and reinforcing operation of the diamond system, but the most important conclusion that can be drawn from Porter's work and empirical evidence is that domestic rivalry and geographic concentration have a disproportionately greater power to transform the diamond into a system. Strong domestic competition also helps to generate upgrading of the main diamond determinants. The geographic concentration of competitors can help in systematize the interdependence of determinants. This systematization operates within the conditions under which firms establish interdependencies, while industry and government converge in the creation of advanced factors according to the needs of the industry's firms to compete and achieve international success (Eduardo, 2009).

CONCEPTUAL FRAMEWORK

These four determinants (Model 1) mutually affect each other and a change in one of them affects all other three determinants. In addition to these four determinants, government's role and chance (Model 2) can indirectly influence the competitiveness (Porter, 1990).

Figure 1: Conceptual Framework for Model 1 and 2



Hypothesis

Therefore, the following research (for Model 1) hypotheses were defined as:

H1: Factor conditions will be positively related to competitiveness
H2: Demand conditions will be positively related to competitiveness
H3: Farmers' strategies will be positively related to competitiveness
H4: Supporting industries will be positively related to competitiveness

Apart from that Porter (1990) also believed that external factors were related. The external factors were government's roles and chances. So additional hypothesis (for Model 2) will be:

H5: Chances will be positively related to competitiveness

H6: Government's roles will be positively related to competitiveness

RESEARCH METHODOLOGY

The measures used to operationalize the constructs included in the investigated models and the questionnaires were mainly adapted from previous studies Bakan and Dogan (2012) and Nurul Asrin et al. (2012) with minor wording changes to tailor them to the competitiveness in paddy farming. All items were measured using a 10-point Likert-type scale with anchors on 1 = not important and 10 = very important.

Target subjects were farmers in Kelantan from different area such as Kota Bharu Utara, Kota Bharu Selatan, Pasir Mas and Pasir Puteh. Out of 344 questionnaires distributed, only 302 were completely filled up. 42 of them did not answer two main sections which were demand conditions and government's role and therefore discarded. Any missing value were treated using EM (expectation-maximization algorithm) while Mahalanobis distance was used to examine the potential of multivariate outliers in this reserach.

To analyze the research model, the Partial Least Squares (PLS) analysis using the SmartPLS 3.0 software was used (Ringle, Wende, & Becker, 2015). Following the recommended two-stage analytical procedures by Anderson and Gerbing (1988) the measurement model (validity and reliability of the measures) was tested followed by an examination of the structural model (testing the hypothesized relationship) (see Ramayah, Osman, Azizah, Malliga, & Jasmine, 2013 and Ramayah, Lo, Rouibah, & Oh, 2014). To test the significance of the path coefficients and the loadings, a bootstrapping method (5,000 resamples) was used (Hair, Hult, Ringle, & Sarstedt, 2017).

DATA ANALYSIS

Demographic Characteristics

All respondents were Malays and majority of them were males (84.6%) aged more than 60 years old (58.6%) with experience more than 20 years. Most of them (71.4%) planted paddy on less than 5 acres of land which is categorized by KADA as inefficient since the area planted is small.

Measurement Model

Convergent validity is the extent to which a measure correlates positively with alternatives measures of the same constructs (Hair et al., 2017). To evaluate convergent validity, researchers need to consider the outer loadings of indicators and the average variance extracted (AVE). As presented in Table 2, the cronbach alpha (CA) and composite reliabilities (CR) were all higher than 0.7, and the AVE were also higher than 0.5 as suggested in the literature (Hair et al., 2017).

Table 2: Measurement Model

Construct	Model 1			Model 2		
	CA	CR	AVE	CA	CR	AVE
Competitiveness	0.841	0.895	0.691	0.849	0.925	0.764
Factor Conditions	0.925	0.931	0.579	0.923	0.937	0.653
Demand Conditions	0.803	0.858	0.549	0.862	0.901	0.696
Strategies	0.956	0.962	0.703	0.950	0.948	0.696
Supporting Industries	0.899	0.918	0.535	0.902	0.953	0.910
Chances	-	-	-	0.899	0.928	0.764

Government's Role	-	-	-	0.981	0.983	0.864

The discriminant validity of the measures (the degree to which items differentiate among constructs or measure distinct concepts) (Ramayah et al., 2013) was examined by comparing the correlations between constructs and the square root of the average variance extracted for that construct. As can be seen from Table 3 and 4, all the square root of the AVE was higher than the correlations values in the row and the column indicating adequate discriminant validity (Fornell & Lacker, 1981).

Table 3: Fornell & Larcker Criterion (Model 1)

	Competitiveness	Demand Conditions	Factor Conditions	Strategies	Supporting Industries
Competitiveness	**0.831**				
Demand Conditions	0.630	**0.741**			
Factor Conditions	0.486	0.457	**0.761**		
Strategies	0.736	0.811	0.483	**0.838**	
Supporting Industries	0.677	0.578	0.446	0.771	**0.731**

Table 4: Fornell & Larcker Criterion (Model 2)

	Chances	Competitiveness	Demand Conditions	Govt's roles	Factor Conditions	Strategies	Supporting Industries
Chances	**0.874**						
Competitiveness	0.509	**0.791**					
Demand Conditions	0.085	0.317	**0.834**				
Government's roles	0.457	-0.156	-0.014	**0.929**			
Factor Conditions	0.821	0.692	0.303	0.291	**0.808**		
Strategies	0.450	-0.230	-0.057	0.843	0.261	**0.834**	
Supporting Industries	0.398	0.375	0.143	0.297	0.459	0.190	**0.954**

Structural Model

Structural model shows the causal relationships among constructs in the model (path coefficients and the R^2 value). Together, the R^2 and the path coefficients (beta and significance) indicate how well the data support and hypothesized model (Hair et al., 2017).

Table 5 shows the results of the structural Model 1 from the PLS output. Demand conditions was positively related to competitiveness but not significantly related to competitiveness ($\beta = 0.108$, $p > 0.05$). All other variables (supply conditions, farmers' strategies and supporting industries) were positively and significantly related to competitiveness. The R^2 value was 0.591 indicating that all the variables explained 59.1% of the variance in the competitiveness in paddy farming. The results supported H1, H3, and H4 whereas H2 was not supported.

Table 5: Hypotheses Testing (Model 1)

Hypothesis Testing		Path Coef	Std Error	T value	Decision
H1	**Factor Conditions → Competitive**	0.136	0.035	3.889	Supported
H2	**Demand Conditions → Competitive**	0.108	0.084	1.287	Not supported
H3	**Farmers' Strategies → Competitive**	0.381	0.103	3.696	Supported
H4	**Supporting Industries → Competitive**	0.260	0.081	3.204	Supported
	R^2 = 0.591				

Table 6 shows the results of the structural Model 2 from the PLS output. Government's role was negatively related to competitiveness and was not significantly related to competitiveness (β = -0.139, $p > 0.05$) while farmers' strategies was negatively related to competitiveness but significantly related to competitiveness (β = -0.379, $p < 0.05$). All other variables (supply conditions, demand conditions, supporting industries and chances,) were positively and significantly related to competitiveness. The R^2 value was 0.687 indicating that all the variables explained 68.7% of the variance in the competitiveness in paddy farming. The results supported H1, H2, H4 and H5 whereas H3 and H6 were not supported.

Table 6: Hypotheses Testing (Model 2)

Hypothesis Testing		Path Coef	Std Error	T value	Decision
H1	**Factor Conditions → Competitive**	0.564	0.076	7.429	Supported
H2	**Demand Conditions → Competitive**	0.085	0.035	2.462	Supported
H3	**Farmers' Strategies → Competitive**	-0.379	0.108	3.519	Not Supported
H4	**Supporting Industries → Competitive**	0.129	0.049	2.652	Supported
H5	**Chances → Competitive**	0.221	0.080	2.762	Supported
H6	**Government's Role → Competitive**	-0.139	0.099	1.400	Not Supported
	R^2 = 0.687				

Supply conditions, demand conditions and supporting industries were found to be significant determinants of competitiveness. Several studies have shown that there are positive relationships between these three factors and competitiveness (Eduardo, 2009; Keith & Lance, 1997; Moon, Rugman, & Verbeke, 1998; Rodrigues & Khan, 2015). Chances also found to be a significant factor. A research did by Eduardo (2009) in Argentine can confirms that chances is one of important factor in determining competitiveness. Thus, all these four factors are very important in determining competitiveness in paddy farming.

Farmers' strategies was found not to influence the competitiveness since the most important strategies were not come from the farmers but BERNAS since it owns the exclusive import right and has a profound impact on an array of economic, political, and societal stabilities (John & Alias, 2011). Its import strategy has serious implication for national food security. Besides that, the size of land were relatively small and uneconomical which lead to low income earned level and high incidence of poverty. According to Suntharalingam and Santiago (2006) basically, they were family owned and operated by small agrarian communities. For example, about 70% of the rice farmers in the country owned farms less than two hectares (five acres), contributing to farm income of about RM300 to RM350 per acre per month.

Government's roles also found not to influence the competitiveness. It might be related to the attitude of farmers which are too depends on government's subsidies in reducing the cost of production (Nurul Asrin et al., 2012). Farmers need for the protectionism policy to survive since trade barriers able to protect the domestic producers (Deviga, Michael, & Gordon, 2011). Their research found that by implementing an income support policy after eliminating production based subsidies could increase government revenue and at the same time could reduce the burden of taxpayers and hence improve farmers' livelihood.

CONCLUSION

This paddy industry faces challenges domestically and internationally. Domestically, the conversion from paddy land to industrial activities can limit the area expansion hence could lead to reduction in production. Other than that, limited allocation of R&D, reduction of soil fertility due to heavy use of chemicals and high incidence of paddy losses are hindering productivity improvement. Internationally, Malaysia should shift its policy from heavy subsidises and extensive protection to a more liberal policy. It bears a major proportion of the cost of production by spending a substantial amount of money on subsidies. This may seem to be helpful to farmers in guaranteeing a sizeable profit margin, consistent income and assurance of farm gate price. But since the production of rice is not competitive due to high production costs and low yield, the sustainability of such a structure is doubtful. However, consumer prices (wholesale and retail prices) are also maintained low through price control measures, therefore there are no complaints on pricing from the consumers (Nor Lelawati, Afizan, & Helmy Fadlisham, 2010). The government action to practice protectionism is unquestionably a good step taken to protect the rice industry which consists of the local farmers, manufacturers, wholesalers and consumers. However, due to the protectionism practice, the government had incurred a high sum of money which is expensive for the economy. This is because even there is a large sum of money devoted in the industry it is still inadequate to produce a par level of rice production to cater the local consumption line.

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