

REVEALED COMPARATIVE ADVANTAGE AND COMPETITIVENESS OF BROILER MEAT PRODUCTS IN MALAYSIA AND SELECTED EXPORTING COUNTRIES

Zineb Abdulaker Benalywa*

Universiti Putra Malaysia

Mohd Mansor Ismail

Universiti Putra Malaysia

Mad Nasir Shamsudin

Universiti Putra Malaysia

Zulkornain Yusop

Universiti Putra Malaysia

ABSTRACT

In this paper, the level of competitiveness and comparative advantages of broiler meat products from Malaysia and selected countries have been analysed. The level of competitive advantage was measured using four different indices: RXA, RTA, ln RXA, and RC for a period from 2009 to 2017. For each index, the existence of a correlation between them has been investigated to ascertain which of the four chicken meat products stand out with a definite competitive advantage. This research establishes the presence of the international trade market share with products from the Malaysian broiler industry. The results found that, in Malaysia, only HS020712 (whole chickens and capons, frozen) showed an increase in competitiveness over the period 2012 to 2017.

Keywords: Broiler meat; Competitiveness; Revealed comparative advantage; Malaysia

1. INTRODUCTION

The Malaysian livestock subsector is one of the most important sectors, growing more than 9% since 2012. The livestock subsector accounts for almost 12% of the agricultural industry. High poultry production drives the value, enabling the sector to grow. Chicken is the meat of choice in Malaysia accounting for approximately two-thirds of meat sales. The broiler industry, as an essential part of the non-ruminant sub-sector, has recorded enormous growth, largely propelled by efficient and organized entities in the industry where large companies control a greater share of the market (Benalywa et al., 2018a). The broiler industry was one of the industries that have been emphasised on The Malaysian National Agro-Food Policy 2011-2020. This policy aims to increase the production of food to support local consumption and trade liberalization agreement (Agriculture Liberalization Agreement). The agreement will provide opportunities to exchange

* Corresponding author: Department of Agribusiness and Bioresource Economics, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia. Tel: +60142345931 Email: zineb_a14@yahoo.com ORCID: 0000-0002-5608-9337

agricultural products between Malaysia and member countries. This policy is expected to increase the level of competitiveness of Malaysian food products by increasing the Malaysian market share regarding quantity and quality.

Research on comparative trade advantages for the poultry trade in Malaysia is still relatively rare (except for (Ismail et al., 2013)). The authors' purpose is to examine broiler meat trade developments and advantages between Malaysia and the world to derive broader policy implications for broiler trade, food policy, and sustainable agro-food sector development.

Broiler meat imports are tightly controlled and limited in Malaysia (Royal Malaysian Customs, 2018). China is the leading supplier, followed by Thailand, Denmark, and the Netherlands. Malaysia exports processed broiler products to Singapore and the Middle East, with exports of over 50 million live broilers to Singapore annually. Malaysia demonstrated a highly competitive position for live chicken exports compared to the main exporter countries. In 2014, Malaysia faced many issues in the broiler industry. These issues included an increase in the importation of chicken cuts and products, strengthening market access towards export excellence, and the continuous rise in chicken prices. Therefore, the importation of chicken cuts and products increased by about 5.12% compared to 2013 (DVS, 2016). Such imports are likely to jeopardise the viability and sustainability of the local industry, which is already suffering from the prolonged high cost of production, and consequently, will affect the trade position of the country. On the other hand, the Thai broiler industry showed favorable export growth in 2017 and is expected to continue growing in 2018. This growth can be attributed to strong prices for live broilers and chicken meat exports as well as dominant low feed costs in Thailand. The production capacity is projected at 35-36 million birds per week in 2018, as compared to the estimated 33-34 million birds in 2017 (USDA, 2017). Currently, Malaysia only exported about 7 % of the 1.5 million broiler chickens produced by local farms and breeding centers daily. The export is limited to neighboring countries. Another important issue facing the export market is that the Malaysian broiler producers are relying on the imported feed which contributed more than 72% of the production cost. This problem is one of the main concerns that significantly impacted the industry development (AbdLatif et al., 2015; Benalywa et al., 2018b). Unless cheaper feed sources were found locally, the domestic broiler industry would face difficulties in increasing its market share in the world, indefinitely.

This study aims to evaluate the competitiveness position of Malaysian broiler meat products as a better substitute in measuring the comparative advantage of the industry. The competitiveness analysis of the broiler sector offers a clearer picture of Malaysia's trade position in the global market compared to its potential regional competitors Netherlands, and Thailand as the broiler exporters. This is vital for Malaysia's broiler chicken industry because broiler meat is the most traded poultry product of the nation.

2. LITERATURE REVIEW

This study contributes to the existing literature in many significant ways. Firstly, it provides a better understanding of the advantages of Malaysian broiler trade relative to the world. By increasing the market share of Malaysian broiler, the level of competitiveness of the poultry industry could be improved. Malaysia expects to increase self-sufficiency level to 130% in 2020. This means that the export volume would be increased to 30% which is equivalent the excess supply. Moreover,

the results may be of broader relevance to those players with direct involvement in commercial broiler supply chain and agricultural policy makers. This is because the outcome can be assessed for competitive agro-food trade and food policy implications.

There are many theoretical concepts available to explain international trade in agro-food products. The latest empirical studies highlighted two essential characters in agro-food trade. First, the role of processed and manufactured food products increased at the expense of raw and bulk agricultural commodities. Second, similar to other trade sectors, the agro-food trade is shifting to an intra-industry trade nature, meaning that similar products are exported and imported at the same time. This is due to the utilisation of economies of scale from the specialisation of production, as well as consumer preferences for variety caused by a household's income growth. Although there are many studies on various aspects of agro-food trade, there is scant research focusing on the links between agricultural, food, and multifunctional, sustainable rural development.

The concept of competitiveness was widely discussed in economic research and economic policy papers over the last decade, but there is little agreement on its definition (Krugman, 1994). The variety of definitions arise from the diversity of policy analyst's desires, perspectives, and objectives. Competitiveness can be examined at three different levels: a national or macroeconomic level, an industrial level, and at a firm or micro-economic level. Competitiveness also takes the geographical locations of the investigation into consideration, comparing enterprises or trade within a region of a particular country or between nations.

National competitiveness is related to the concept of comparative advantage. The theory of comparative advantage states that trade flows exist as a result of relative cost differences between trading partners. It suggests that countries are competing in producing goods and services in which they have a relative cost advantage. The only difference between comparative advantage and competitiveness is where the former includes market distortions whereas the later does not. The differences between competitiveness and comparative advantage may seem trivial on the surface, but both concepts are different. A country can experience a loss in competitiveness while sustaining its comparative advantage. Further, a country can be competitive without having a comparative advantage. Nevertheless, despite fundamental conceptual differences, competitiveness and comparative advantage are inextricably linked in the real world conduct of international trade (Dunmore, 1986).

Due to policy distortions in agricultural markets, competitiveness takes a more accurate view of the world (Barkema et al., 1990). Lafay (1992) highlighted two differences between comparative advantage and competitiveness. First, competitiveness comprises a cross-country comparison for a specific product. Comparative advantage is measured between products in one particular country. Second, competitiveness is subject to changes in macroeconomic variables, whereas comparative advantage is structural in nature. Therefore, empirical analyses that focus on comparative advantage versus competitiveness may lead to different results (Ferto & Hubbard, 2002).

3. METHODOLOGY

3.1. *Measuring the Comparative Advantage*

The concept of revealed comparative advantage (Yercan & Isikli) is grounded in trade theory. The original RCA index, formulated by Balassa (1965), can be written as:

$$RCA = \frac{x_{ij}/x_{it}}{x_{nj}/x_{nt}}$$

In the above equation, the variable x represents exports, i represents the country, j represents commodity, t represents a set of commodities, and n represents a set of countries. RCA is based on observed trade patterns. It measures a country's exports of a commodity relative to its total exports and the corresponding export performance of a set of countries.

Vollrath (1991) formulates three alternative measures of RCA. The first is the relative trade advantage (RTA). RTA is calculated as the difference between the relative export advantage (RXA) and relative import advantage (RMA). This is written as:

$$RTA = RXA - RMA$$

The calculation of RXA and RMA is based on the standard RCA, which expresses competitiveness as the share of broiler exports in the country relative to the share of total broiler exports in the world. This is measured as:

$$RCA = (\text{Malaysian broiler exports}/\text{total Malaysian exports}) / (\text{world broiler exports}/\text{total world exports})$$

Similarly, RXA measures export (X) RCA as:

$$RXA = \frac{x_{ij}/x_{it}}{x_{nj}/x_{nt}}$$

RMA import (M) is written as:

$$RMA = \frac{m_{ij}/m_{it}}{m_{nj}/m_{nt}}$$

Finally, RTA is calculated as:

$$RTA = \frac{x_{ij}/x_{it}}{x_{nj}/x_{nt}} - \frac{m_{ij}/m_{it}}{m_{nj}/m_{nt}}$$

Positive RTA values are an indication that the broiler industry or broiler products are competitive compared to international peers. Negative values signify a lack of competitiveness, whereas zero indicates marginal competitiveness. RTA is a relative measure determining the competitive status of the broiler industry. Therefore, it necessitates establishing the success of each section of the supply chain trading its products in relation to the other sections. This approach enables the

identification of the section of the supply chain that is uncompetitive. To this end, trade data are needed for each part of the chain, with the product in each section of the chain representing that section. For instance, the broiler chicken will represent the unprocessed section of the broiler supply chain. To enable comparisons with international competitors, the RTA values of the broiler industry and its subsectors in Thailand, the Netherlands, Indonesia, and the Philippines are also calculated. That will also indicate where the Malaysian broiler industry fits in relative to its peers in the international competitors' community.

Vollrath's second measure, which calculates the relative export advantage ($\ln RXA$), and third measure, which calculates revealed competitiveness (RC), are written together as:

$$RC = \ln RXA - \ln RMA$$

(Fertő & Hubbard, 2003) State that the benefit of expressing the latter two indices in logarithmic form is that they become symmetric through the origin. Positive values of Vollrath's three measures (RTA , $\ln RXA$ and RC) reveal a comparative and competitive advantage. In fact, observed trade patterns can be distorted by government policies and interventions and may consequently affect underlying comparative advantage.

Of the indices defined above, RXA and $\ln RXA$ represent only export data, whereas RTA and RC account for import data as well (Bojnec & Fertő, 2009, 2012). Therefore, Vollrath (1991) suggests the use of RXA and $\ln RXA$ over RTA and RC , because the former two are less susceptible to policy-induced distortions. This is because those distortions tend to be more pronounced on the import side. Export subsidies were widely used in agriculture and there would appear less of an argument, in this respect, in favour of RXA and $\ln RXA$.

With relative trade advantage (RTA), competitive advantage is indicated by the trade performance of individual commodities, supply chains, and countries. Each commodity's trade pattern reflects relative market costs as well as differences in non-price competitive factors, such as government policies (Vollrath, 1991). Furthermore, it is necessary to determine the success of each sector in selling its products over time in the local and global market relative to its competitors. The RTA method measures competitiveness under real-world conditions, including uneven economic "playing fields", distorted economies, and different trade regimes. It is therefore considered to be best suited for measuring the competitive status in the intended study (Vollrath, 1991), as adapted by (Esterhuizen, 2006).

The Vollrath's indices have been used by many researchers in recent studies. This rise in interest is due to the use of export and import data in measuring comparative advantage. Additionally, Vollrath (1991) emphasises the presence of two limitations in the Balassa index. The first is that a double-counting problem occurred in the commodity and/or country considered in the index. Secondly, the index is limited by the significance of simultaneous consideration on the import side. This means that the set of products and nations in the denominator should exclude the commodities and countries used in the numerator to avoid the double-counting problem (Khai et al., 2016).

3.2. Data Description

All indices are measured for Malaysian broiler products traded over time from 2009-2017 and using the world broiler exporting nations as competitors. The annual import and export data of broiler meat for Indonesia, Malaysia, Thailand, Philippines, and the Netherlands was extracted from the International Trade Centre (ITC) from the United Nations' Comtrade database. This was used to determine changes in the competitive status of Malaysia's broiler industry and its international peers in October 2017. There are four chicken product subgroups at the six-digit level, namely HS020711 (whole chickens and capons, chilled), HS020712 (whole chickens and capons, frozen), HS020713 (chickens and capons, cuts and edible offal, fresh or chilled), and HS020714 (chickens and capons, cuts and edible offal, frozen).

4. RESULTS AND DISCUSSION

The competitive status of the Malaysian broiler industry was evaluated in this study. The relative trade advantage indices RTA, ln RXA and RC were estimated for four chicken meat subsectors. The study also determined the competitive advantage of the broiler industry and its subsectors in Malaysia's most important trade partners. The comparative advantage of broiler meat in these countries are compared to Malaysia in the following tables.

4.1. Relative Trade Advantage (RTA) Results by Product Groups

The RTA results for Malaysia and selected countries for product subgroup HS020711 (whole chickens and capons, chilled) are presented in Table 1. The indices show negative RTA values throughout the evaluated time period, indicating that the chicken products of Malaysia are not competitive in the international market. The Netherlands and Thailand are competitive for this product.

Table 1: Relative Trade Advantages RTA of HS020711 (whole chickens and capons, chilled)

	Malaysia	Thailand	Netherlands	Indonesia	Philippines
2009	0.000	0.000	2.498	-	0.000
2010	0.000	0.000	1.738	-	0.000
2011	0.003	0.041	0.534	-	-0.025
2012	-0.002	0.008	1.357	-	0.009
2013	-0.001	0.010	1.243	-	-0.042
2014	-0.205	0.016	1.255	-	-0.019
2015	-0.548	0.000	1.071	-	0.000
2016	0.000	0.007	2.186	-	0.000
2017	0.000	0.000	1.856	-	0.000

Source: Authors' calculations based on SITC data at the six-digit level from ITC

The relative trade advantages for HS020712 (whole chickens and capons, frozen) are shown in Table 2. The results indicate that Malaysia experienced comparative disadvantage from 2009 to 2011, but saw an increase in comparative advantages for this product beginning in 2012. This

shows that Malaysia has begun to compete with its international competitors, Thailand and the Netherlands.

Table 2: Relative Trade Advantages of HS020712 (whole chickens and capons, frozen)

	Malaysia	Thailand	Netherlands	Indonesia	Philippines
2009	0.007	0.015	0.461	-0.016	-0.013
2010	-0.019	0.056	0.330	0.000	-0.164
2011	-0.007	0.150	0.638	0.000	-0.184
2012	0.007	0.175	0.690	0.000	-0.060
2013	0.019	0.158	0.574	-0.001	0.001
2014	0.003	0.492	0.220	0.000	-0.372
2015	0.031	0.109	0.436	0.000	-0.037
2016	0.018	0.083	0.505	0.000	0.224
2017	0.032	0.052	0.347	0.000	-0.023

Source: Authors' calculations based on SITC data at the Six-digit level from ITC

The RTA results for HS020713 (chickens and capons, cuts and edible offal, fresh or chilled) for Malaysia and its competitors are displayed in Table 3. The Netherlands was highly competitive for this product with positive values between four and seven. In contrast, the table shows that Malaysia was competitive for this product until 2014, after which the RTA drops into the negatives. This indicates that the trade of Malaysia is uncertain and depends on domestic demand.

Table 3: Relative Trade Advantages of HS020713 (chickens and capons, cuts and edible offal, fresh or chilled)

	Malaysia	Thailand	Netherlands	Indonesia	Philippines
2009	0.050	0.000	4.578	-	0.000
2010	0.085	-0.002	5.268	-	-0.001
2011	0.061	-0.004	7.091	-	0.000
2012	0.029	0.162	5.959	-	0.000
2013	0.017	0.007	4.742	-	-0.001
2014	0.023	0.030	5.600	-	0.000
2015	-0.275	0.026	5.118	-	0.000
2016	-0.227	0.075	4.924	-	0.000
2017	-0.434	0.087	3.865	-	0.000

Source: Authors' calculations based on SITC data at the Six-digit level from ITC

The relative trade advantage results for HS020714 (chickens and capons, cuts and edible offal, frozen) are presented in Table 4. The RTA figures show high relative trade advantages for the Netherlands and Thailand, which have a positive value and are often higher than one. On the contrary, Malaysia and Philippines were uncompetitive in this product group, reflecting their weak trade positions. These results suggest that both countries rely on the import of this product.

Table 4: Relative Trade Advantages of HS020714 (chickens and capons, cuts and edible offal, frozen)

	Malaysia	Thailand	Netherlands	Indonesia	Philippines
2009	-0.384	0.397	1.305	-0.050	-0.516
2010	-0.597	0.402	1.615	-0.002	-1.023
2011	-0.797	0.586	1.896	0.000	-0.694
2012	-0.794	1.029	1.975	0.000	-1.623
2013	-0.780	1.150	2.343	0.000	-1.586
2014	-0.749	2.074	1.982	0.000	-2.765
2015	-0.701	2.705	2.302	0.000	-3.163
2016	-0.855	3.155	2.437	0.000	-3.382
2017	-2.584	3.287	1.635	0.000	-3.245

Source: Authors' calculations based on SITC data at the Six-digit level from ITC

4.2. Comparing Revealed Comparative Advantages Indices

In this study, four indices were used for the broiler meat subsectors of each country. The authors have calculated annual indexes based on the six-digit Standard International Trade Classification (SITC) (Rev.4 products in the poultry sector. The table shows the indices for each country, based on the average values over an eight-year period.

A summary of the statistics (mean and coefficient of variation) for the four indices are displayed in Table 5. The results show that only the Netherlands had definite comparative advantages in all four indices for three of the subsectors: HS020711, HS020713, and HS020714. Malaysia and the Netherlands only have a relative trade advantage (RTA) and relative competitiveness (RC) for subsector HS020712. The results of Malaysia are found to be consistent with the conclusion of (Ismail et al., 2013). Thailand, on the other hand, has revealed a comparative advantage for only HS020714. Thailand also has only relative trade advantage (RTA) in the four product groups. The Philippines revealed comparative disadvantages for all indices. Positive values of the RXA index for individual countries are directly related to a low coefficient value of the variation of the index. The authors' note that the Netherlands shows low coefficients of variation, which indicates the stability of the coefficient of comparative advantage.

Table 5: Revealed comparative advantages of Malaysia and selected counties by product group and index, average values for the period of 2009-2017

	Mean				Coefficient of variation %			
	RXA	RTA	LNRXA	RC	RXA	RTA	LNRXA	RC
	>1	>0	>0	>0				
Malaysia								
HS020711	0.001	-0.094	-7.012	-0.029	171	-209	-22	-1848
HS020712	0.036	0.010	-3.677	0.743	86	0	-26	649
HS020713	0.039	-0.074	-3.298	0.432	55	-472	-17	325
HS020714	0.037	-0.915	-3.389	-3.066	35	-21	-9	-8

	Mean				Coefficient of variation %			
	RXA >1	RTA >0	LNRXA >0	RC >0	RXA	RTA	LNRXA	RC
Thailand								
HS020711	0.010	0.010	-3.094	-0.375	124	133	-65	-282
HS020712	0.155	0.155	-2.055	-1.917	89	95	-67	139
HS020713	0.043	0.042	-4.838	-0.561	140	155	-69	-185
HS020714	1.672	1.643	0.418	4.956	70	75	383	27
Netherlands								
HS020711	2.438	1.535	0.879	1.050	16	42	19	43
HS020712	0.752	0.482	-0.302	1.263	19	32	-64	29
HS020713	9.029	5.320	2.195	0.895	11	15	5	10
HS020714	3.030	1.962	1.101	1.058	12	19	12	15
Philippines								
HS020711	0.001	-0.010	--0.875	-0.125	265	-181	-166	-282
HS020712	0.088	-0.076	-3.484	-1.172	88	-229	-74	-277
HS020713	-0.355	-0.001	-1.4	--0.025	-189	-145	-112	-280
HS020714	0.666	-1.844	-0.537	-1.394	44	-61	-111	-64

Source: Authors' calculations based on SITC data at the Six-digit level from ITC

4.3. Trendline for Malaysia Indices

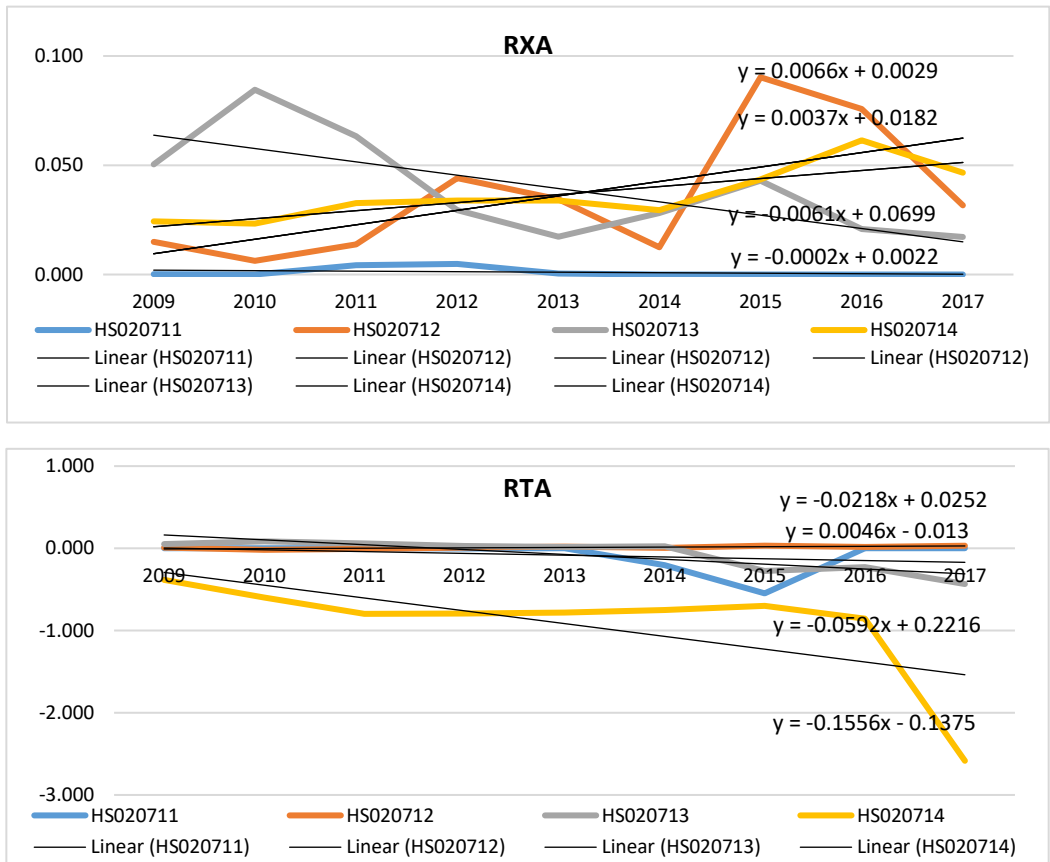
Figure 1 represents the trend line of the Malaysian broiler meat subsectors for the period examined. The export advantage (RXA) indices computed for chicken product groups indicate that Malaysia has comparative disadvantages for all commodities, as the RXA for all groups is less than one. Out of four, only HS020712 (whole chickens and capons, frozen) and HS020713 (Chickens and Capons cuts and Edible offal fresh or chilled) have shown an increasing trend in RXA. The trend line equation for both product groups showing a positive coefficient indicated an increase in revealed export advantage RXA for HS020212 and HS020713 by 0.0006 and 0.0037 respectively. However, it wouldn't be possible to reveal comparative advantage in the near future as the increasing rate is too small.

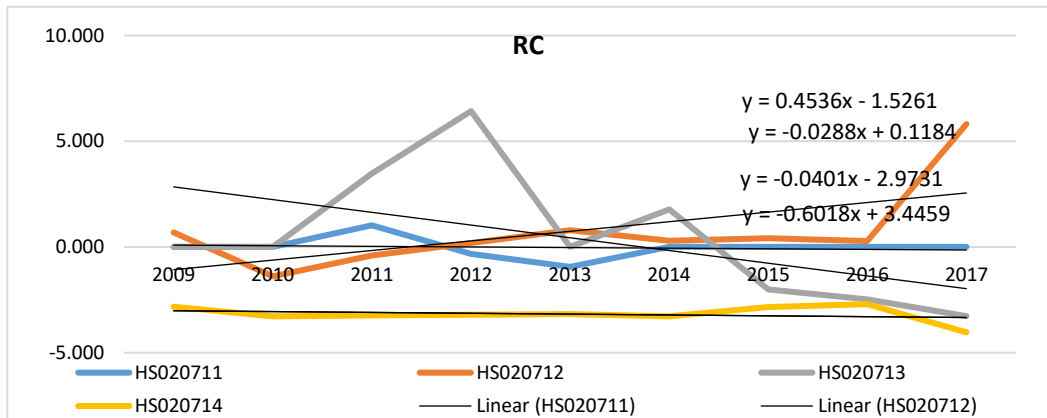
As presented earlier, Malaysian broiler meat sector has positive RTA values for two of the subgroups: HS020712 (whole chickens and capons, frozen) and HS020713 (Chickens and Capons cuts and Edible offal fresh or chilled). However, HS020713 shows a declining trend due to a loss in competitiveness for this commodity that was clear from the negative slope of the trend line equation by 0.0218 . Conversely, HS020712 shows a slight increase in its RTA values the increase by 0.0046 . Although both product groups indicate a decline in RTA, they have the potential to achieve relative trade advantage soon. This is because the trade of the broiler meat in Malaysia depends on the domestic demand, especially during times when the local demand increases, affecting exports. The results for the relative competitiveness (RC) are like that of RTA, as RTA and RC account for both export and import. HS020712 (whole chickens and capons, frozen) showing a positive slope with a significantly increasing rate by 0.4536 revealed that this product has a strong competitiveness. On the other hand, both HS020711 (whole chickens and capons, chilled) and HS020714 (chickens and capons, cuts and edible offal, frozen) show a negative

fluctuating trend line. This indicates that both have a relative trade disadvantage and will never be competitive in the near future. Malaysia relies on import for both of those subgroups possibly because the marginal cost of import is lower than the marginal cost of production.

In summary, the results show that only HS020712 (whole chickens and capons, frozen) showing an increasing trend in all indices, which indicates that, Malaysia has the potential to be more competitive in this product group unlike the other three groups which showed a weak competitiveness position

Figure 1: Competitiveness Trend of Malaysian Chicken Subsectors





Source: Authors' calculations based on SITC data at the six-digit level from IT

4.4. Consistency of the RCA Indices

Statistical analysis of correlations of the attained index has been performed following the examples of (Ballance et al., 1987; Ignjatijević et al., 2014). Using both Pearson's and Spearman's correlation index, the authors analyzed the correlation of coefficients. This index is a statistical test that examines the extent to which the indices are related to the identification of comparative advantages. The interpretation of the results following (Lorde et al., 2010) is that the two indices revealed consistent results, where an observed coefficient above 70% is considered adequate.

Table 6 demonstrates the results of the consistency test for the RCA indices for broiler meat products. The consistency test evaluating the indices as cardinal measures of comparative advantage is based on the correlation coefficient between paired indices within an eight-year period. The results of HS020711 (whole chickens and capons, chilled) illustrate that the indices are not consistent with Pearson's measure of revealed comparative advantage. On the other hand, the results of Malaysia's indices for HS020712 (whole chickens and capons, frozen) are highly consistent between RXA and ln RXA, RTA and RXA, and RTA and RC. This is because the coefficient is more than 80% for this product group. There is consistency only between RXA and ln RXA for the other two groups, because these indices share similar criteria and imports are not taken into account (Khai et al., 2016). Using the Spearman's test gave similar results for Malaysia in these four subsectors as the Pearson's test. The authors conclude that, using both Spearman's and Pearson's test, Malaysia's indices have revealed a strong correlation among RXA and ln RXA. Both Pearson's and Spearman's coefficient tests explain how the coefficients are connected to demonstrate comparative advantage. The authors note that the Pearson's index is less consistent as a cardinal measure in most sectors, which aligns with the research results of the referenced sources (Ballance et al., 1987; Fertö & Hubbard, 2003; Ignjatijević et al., 2014; Khai et al., 2016).

In summary, the results propose that there is little consistency between the indices when ranking comparative advantage. However, the indices are relatively consistent in providing a binary measure of comparative advantage or disadvantage. These results are like those reported by Lorde et al. (2010), who calculated five different permutations of the RCA index. It was found that in

general, RCA measures were less consistent in ranking comparative advantage than in providing the binary-type measure. Accordingly, the authors conclude that RCA measures are suitable proxies in determining whether Malaysia has a comparative advantage in a particular product group. However, the RCA index is less effective in indicating the extent of any comparative advantage.

Table 6: Consistency of Revealed Comparative Advantage

	Pearson				Spearman			
	RXA	RTA	LNRXA	RC	RXA	RTA	LNRXA	RC
HS020711								
RXA	1				1			
RTA	0.32	1			0.43	1		
LNRXA	-0.15	-0.61	1		-0.43	-0.62	1	
RC	0.34	-0.02	0.15	1	-0.07	0.52	0.21	1
HS020712								
RXA	1				1			
RTA	0.83	1			0.86	1		
LNRXA	0.95	0.90	1		0.79	0.86	1	
RC	0.40	0.81	0.59	1	0.40	0.79	0.40	1
HS020713								
RXA	1				1			
RTA	0.39	1			0.74	1		
LNRXA	0.98	0.34	1		1	0.74	1	
RC	0.04	0.62	0.09	1	0.24	0.57	0.24	1
HS020714								
RXA	1				1			
RTA	-0.61	1			-0.55	1		
LNRXA	0.99	-0.68	1		1	-0.50	1	
RC	0.65	0.19	0.59	1	0.46	0.15	0.34	1

Source: Authors' calculations based on SITC data at the Six-digit level from ITC

5. CONCLUSION AND POLICY IMPLICATIONS

In this study, the authors attempted to evaluate the trade performance of the broiler industry in Malaysia, Thailand, the Netherlands, Indonesia, and the Philippines. Using Vollrath's approach, four indices of four chicken subsectors for Malaysia and the selected countries were calculated for the years 2009 to 2017. The authors' findings suggest considerable differences across product groups as well as across countries. The results show that Malaysia enjoyed a relative trade advantage for two products: HS020712 (whole chickens and capons, frozen) and HS020713 (Chickens and Capons cuts and Edible offal fresh or chilled). The first product group lost its competitiveness in recent years due to the instability and uncertainty of trade in Malaysia. This is unlike Thailand and the Netherlands, which were more competitive on three of the product groups. In contrast, the RCA indices indicated that only the Netherlands revealed comparative advantages in three of the product groups. Malaysia showed relative trade advantages (RTA) and relative

competitiveness (RC) for only HS020712 (whole chickens and capons, frozen). These results were found to be consistent because both indices take export and import into account. At the same time, the results reflect Malaysia's weak export position in the chicken industry. This is consistent with an earlier study by (Ismail et al., 2013), who stated that, although Malaysia has a relative trade advantage, it did not export as much as what was produced. Despite this, the competitiveness of HS020712 (whole chickens and capons, frozen) is improving. The relatively low coefficients of variation for these product groups indicate that the indices were consistent over the evaluated eight-year period. Furthermore, the results of consistency among the indices revealed that the indices are inconsistent when ranking comparative advantage decision but are relatively consistent in providing a binary measure of comparative advantage or disadvantage.

In essence, the variation in comparative advantages across countries shows that some countries are significantly less competitive in certain broiler product exports than others. These countries are competing for market share within the Asian region only for selected products. Therefore, the results of this study showed that the broiler industry in these countries has both competitive and uncompetitive products.

In conclusion, countries that display significant comparative advantages in specific product groups such as Malaysian's product group HS020712 (whole chickens and capons, frozen) should continue to produce and promote these products. Additionally, as countries face increased competition for the world market share, Malaysia will need to proactively reinforce new technology and enhance the cost competitiveness possibly through the lowering of feed cost in the broiler industry. Further investigation is necessary to identify the causes responsible for the increased and decreased of revealed comparative advantages in selected products.

ACKNOWLEDGMENT

The authors acknowledge the LRGS research grant (No: 5526015) from the Ministry of Education (MOE), Malaysia for data collections.

REFERENCES

- AbdLatif, I., Abu Hassan, M., Abidin, Z. Z., Rezai, G., Sharifuddin, J., & Mohamed, Z. (2015). The assessment of comparative advantage of the non-ruminant subsector through Policy Analysis Matrix (PAM) in peninsular Malaysia. *Pertanika Journal Of Social Science And Humanities*, 23, 63-76.
- Balassa, B. (1965). Trade liberalisation and "revealed" comparative advantage. *The Manchester School*, 33(2), 99-123.
- Ballance, R. H., Forstner, H., & Murray, T. (1987). Consistency tests of alternative measures of comparative advantage. *The Review of Economics and Statistics*, 157-161.
- Barkema, A., Drabenstott, M., & Tweeten, L. (1990). The competitiveness of US agriculture in the 1990s. *Agricultural Policies in A New Decade*, 253-384.
- Benalywa, Z. A., Ismail, M. M., Shamsudin, M. N., & Yusop, Z. (2018a). Assessing the comparative advantage of broiler production in Peninsular Malaysia using policy analysis matrix. *Tropical Animal Health and Production*, 1-7.

- Benalywa, Z. A., Ismail, M. M., Shamsudin, M. N., & Yusop, Z. (2018b). An assessment of the impact of government policies on broiler production in Peninsular Malaysia. *International Journal of Poultry Science*, 17(10), 459-466. doi: 10.3923/ijps.2018.459.466
- Bojnec, Š., & Fertő, I. (2009). Agro-food trade competitiveness of Central European and Balkan countries. *Food Policy*, 34(5), 417-425.
- Bojnec, Š., & Fertő, I. (2012). Complementarities of trade advantage and trade competitiveness measures. *Applied economics*, 44(4), 399-408.
- Dunmore, J. C. (1986). Competitiveness and comparative advantage of US agriculture. *Increasing Understanding of Public Problems and Policies*, 21-34.
- DVS. (2016). Department of Veterinary Services, Statistik Retrieved 23/12/2016, 2016, from <http://www.dvs.gov.my/>
- Esterhuizen, D. (2006). *An evaluation of the competitiveness of the South African agribusiness sector*.
- Ferto, I., & Hubbard, L. J. (2002). Revealed Comparative Advantage and Competitiveness in Hungarian Agri-Food Sectors Technology Foresight in Hungary: IEHAS Discussion Papers.
- Fertő, I., & Hubbard, L. J. (2003). Revealed comparative advantage and competitiveness in Hungarian agri-food sectors. *The World Economy*, 26(2), 247-259.
- Ignjatijević, S., Matijašević, J., & Milojević, I. (2014). Revealed comparative advantages and competitiveness of the processed food sector for the Danube countries. *Custos e Agronegocio On Line*, 10(3), 256-281.
- Ismail, M. M., Fatimah, M. A., Zulkornain, Y., & Kusairi, M. N. (2013). Competitiveness of Food and Feed Industry in Malaysia.
- Khai, N., Ismail, M., & Sidique, S. (2016). Consistency tests of comparative advantage measures: An empirical evidence from the Malaysian and selected Asian shrimp products. *International Food Research Journal*, 23(6).
- Krugman, P. (1994). Competitiveness: A dangerous obsession. *Foreign Affairs*, 28-44.
- Lafay, G. (1992). The measurement of revealed comparative advantages. Dalam Dagenais, MG & Muet, PA (eds.) *International trade modeling*: London: Chapman & Hall.
- Lorde, T., Francis, B., Iyare, S., Lacorbiniere, J., & Alleyne, A. (2010). Investigating the competitiveness of agri-food industries in the OECS subregion. *Generating innovative solutions to recurring problems in the global business environment: A multi-, inter-, and trans-disciplinary approach to formulating and maintaining competitive organisational edge*, 450-460.
- Royal Malaysian Customs, D. (2018). *Trade Facilitation* Retrieved from http://www.customs.gov.my/en/tp/pages/tp_ie.aspx.
- USDA. (2017). Global Agricultural Information Network.
- Vollrath, T. L. (1991). A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. *Review of World Economics*, 127(2), 265-280.