TRADE COMPETITIVENESS OF PALM OIL DOWNSTREAM INDUSTRY IN MALAYSIA

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By

NORASHIDA BINTI OTHMAN

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

May 2019

DEDICATION

My dear husband, Mohd Surizol bin Abu Hasan

…thank you for your understanding, encouragement and support throughout this PhD journey

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

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May 2019

Chair : Professor Zulkornain Yusop, PhD
Faculty : Economics and Management

Palm oil industry is one of the key economic drivers and contributors to Malaysia's national economy. It accounted for RM77.84 billion of export value in 2017, which was equivalent to 6.1% of national GDP. Despite the long history of the industry, the overall development of the palm oil industry in Malaysia has been below expectation. Currently, palm oil related exports are still highly dependent on the upstream segments such as crude palm oil (CPO) with a total contribution to the overall industry at 81.4% while that of downstream contribution is still low at about 18.6%. It is thus important to expand the production and export of high value-added palm oil downstream products such as oleochemicals, biodiesel and palm-based finished products. Therefore, the objectives of this study are: (i) to assess Malaysia's relative competitiveness in palm oil downstream product as compared to 5 main producers of oils and fats (Indonesia, China, European Union-EU, the United States and Argentina); (ii) to analyse the potential market for Malaysian palm oil downstream products in 107 selected countries; (iii) to investigate the effect of environmental policy towards Malaysia's competitiveness of palm oil downstream products. Three methodologies are employed namely relative trade advantage (RTA), shift-share analysis (SSA) and dynamic generalized method of moment (DGMM). The results indicate a higher and more stable relative trade advantage among Malaysia's oleochemicals product while lower for finished products and biodiesel. For the potential market analysis, it is found that highest shift share percentage is in China (23.84%), followed by Republic of Korea (9.78%) and India (8.31%) for Malaysia's oleochemical products. For palm-based finished products, China also ranks first for Malaysia's most potential market with a net shift of 14.77% followed by Egypt (8.88%) and Nigeria (8.61%). The huge market potential is found in Spain for Malaysia's biodiesel product with a net shift of 65.95% followed by Albania and Switzerland with a net shift of 15.91% and 5.57% respectively. The empirical analysis for the third objective based on Porter Diamond framework shows that all the main factors (i.e factor condition; demand condition; firm strategy and rivalry; and related supporting industry) significantly influence the competitiveness of the industry. Interestingly, the results also suggest that environmental regulations in EU have some positive impact on palm oil industry competitiveness, which is technically consistent with Porter Hypothesis which

argues that more stringent environmental regulations can trigger innovation that may offset the costs of complying among the producer. The progress of palm oil downstream is crucial to improve the overall competitiveness of the palm oil industry and national economy. Therefore, this study highlights several policy recommendations which include better supporting facilities such as upgrading of logistic infrastructure, R&D facilities and training center related to palm oil downstream industry especially for biodiesel and palm-based finished products since both of these groups shows a decreasing trend of competitiveness. There is also an urgency to grab the opportunities to exploit the full potential of the oleochemical market since Malaysia is currently the most competitive in oleochemicals products as compared to other major producing countries of vegetable oils and fats. It is also recommended that Malaysia penetrate other emerging markets such as the Republic of Korea to take advantage of the growing market for cosmetics and personal care industries. Finally, it is also proposed that Malaysia's government introduce the energy tax to promote the use of renewable energy leading to the sustainable production of palm oil and overall competitiveness of palm oil downstream industry.

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

DAYA SAING MALAYSIA DALAM PERDAGANGAN INDUSTRI HILIRAN KELAPA SAWIT

Oleh

NORASHIDA BINTI OTHMAN

Mei 2019

Pengerusi: Profesor Zulkornain Yusop, PhD
Fakulti : Ekonomi dan Pengurusan

Industri sawit merupakan salah satu pemacu ekonomi utama bagi Malaysia dan penyumbang terbesar kepada pendapatan negara. Industri ini telah menyumbang sebanyak RM77.84 bilion nilai eksport pada tahun 2017, bersamaan dengan 6.1% daripada KDNK Malaysia. Walaupun telah lama bertapak di Malaysia, perkembangan keseluruhan industri kelapa sawit di negara ini masih dibawah tahap memuaskan. Pada masa ini, eksport berkaitan minyak sawit masih sangat bergantung kepada industri huluan seperti minyak sawit mentah (CPO) dengan jumlah sumbangan kepada industri keseluruhan sebanyak 81.4% berbanding sumbangan industri hiliran sawit yang masih rendah iaitu hanya 18.6%. Malaysia perlu mengembangkan produk hiliran kelapa sawit yang bernilai tinggi seperti oleokimia, biodiesel dan produk siap berasaskan sawit. Oleh itu, objektif kajian ini adalah: (i) untuk menilai secara relatif daya saing Malaysia dalam produk hiliran minyak kelapa sawit berbanding dengan 5 negara pengeluar utama minyak dan lemak sayuran (Indonesia, China, Kesatuan Eropah-EU, Amerika Syarikat dan Argentina); (ii) untuk menganalisis potensi pasaran produk hiliran minyak sawit Malaysia di 107 negara terpilih; (iii) untuk menyiasat kesan dasar alam sekitar di negara-negara Kesatuan Eropah terhadap daya saing produk hiliran minyak sawit Malaysia di negara tersebut. Kaedah kajian yang digunakan termasuklah kaedah relatif kelebihan perdagangan (RTA), analisis *shift-share* dan dinamik panel momen teritlak (GMM). Hasil analisis menunjukkan secara relatifnya, Malaysia mempunyai kelebihan perdagangan yang lebih tinggi dan lebih stabil bagi produk oleokimia sementara produk biodiesel dan produk siap berasaskan sawit menunjukkan kelebihan perdagangan yang lebih rendah. Analisis potensi pasaran bagi industri hiliran sawit Malaysia, didapati peratusan *shift-share* adalah tertinggi di China (23.84%), diikuti oleh Republik Korea (9.78%) dan India (8.31%) untuk produk oleokimia. Bagi produk siap berasaskan kelapa sawit, China juga menunjukkan kedudukan teratas bagi pasaran Malaysia yang paling berpotensi dengan peratusan *shift-share* sebanyak 14.77% diikuti oleh Mesir (8.88%) dan Nigeria (8.61%). Sepanyol merekodkan potensi pasaran yang besar untuk produk biodiesel Malaysia dengan peratusan *shift-share* sebanyak 65.95% diikuti oleh Albania dan Switzerland masing-masing sebanyak 15.91% dan 5.57%. Analisis bagi objektif ketiga berdasarkan model daya saing berlian Porter (1990) menunjukkan bahawa semua

faktor utama (faktor pengeluaran, faktor permintaan, strategi perusahaan, struktur dan persaingan serta industri sokongan yang berkaitan) mempengaruhi daya saing industri secara signifikan. Menariknya, hasil kajian menunjukkan bahawa penguatkuasaan peraturan alam sekitar di Kesatuan Eropah mempunyai kesan positif dan signifikan terhadap daya saing industri hiliran minyak sawit di Malaysia. Hasil dapatan ini juga konsisten dengan hipotesis Porter yang menyatakan bahawa peraturan-peraturan alam sekitar yang lebih ketat boleh mencetuskan inovasi dalam kalangan pegeluar bagi mengimbangi pertambahan kos yang perlu dipatuhi oleh pengeluar. Kesimpulannya, perkembangan industri hiliran minyak sawit adalah penting bagi Malaysia untuk meningkatkan daya saing industri minyak sawit secara keseluruhan dan seterusnya membantu merancakkan pertumbuhan ekonomi negara. Oleh yang demikian, kajian ini menggariskan beberapa saranan bagi mengukuhkan lagi perkembangan industry hiliran sawit di Malaysia. Antaranya termasuklah membentuk dasar yang kuat oleh kerajaan dalam menyokong kemudahan seperti peningkatan infrastruktur logistik, dan pusat latihan yang berkaitan dengan industri hiliran minyak sawit bagi menggalakkan penyelidikan dan pembangunan terutamanya bagi produk biodiesel dan produk siap berasaskan sawit kerana kedua-dua kumpulan ini menunjukkan penurunan daya saing. Selain itu, hasil kajian ini dalam membantu pemain industri untuk merebut peluang yang ditawarkan dalam pasaran oleokimia kerana Malaysia pada masa ini mempunyai daya saing tertinggi dalam industri oleokimia berbanding dengan negara-negara pengeluar minyak sayuran dan lemak utama yang lain. Seterusnya, pihak kerajaan serta pemain industri disarankan untuk meningkatkan promosi serta menjalinkan kerjasama perdagangan bersama pasaran baru seperti Republik Korea untuk menguasai industri kosmetik dan produk penjagaan peribadi yang semakin meningkat. Akhir sekali, kajian ini juga mencadangkan kerajaan Malaysia untuk mempertimbangkan kaedah cukai tenaga kepada pengeluar yang menggunakan sumber yang tidak boleh diperbaharuri dan seterusnya menggalakan pengeluaran melalui tenaga yang boleh diperbaharui bagi membantu meningkatkan permintaan dan pengeluaran produk minyak sawit yang mampan dan akhirnya meningkatkan daya saing industri hiliran minyak kelapa sawit di Malaysia.

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All the praises and thanks are for Allah Azzawajalla the Almighty and the Most Merciful for whose countless bounties and blessings enable me to accomplish this thesis. Thank you Allah for providing me with the opportunity to complete this journey even though tested with various obstacles.

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Declaration by graduate student

I hereby confirm that:

- this thesis is my original work;
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- this thesis has not been submitted previously or concurrently for any other degree at any other institutions;
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This is to confirm that:

- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

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Name of Chairman of Supervisory Committee: Professor Dr. Zulkornain Yusop

Signature: _____
Name of Chairman of Supervisory Committee: Associate Professor Dr. Syamsul Herman Mohamad Afandi

Signature: _____
Name of Chairman of Supervisory Committee: Professor Mohd Mansor Ismail

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AFTA	Asean Free Trade Area
BOT	Balance of Trade
CMS	Constant Market Share
CIF	Cost, Insurance and Freight
COFOG	Classification of the Functions of Government
CPO	Crude Palm Oil
CPKO	Crude Palm Kernel Oil
CAGR	Compound Annual Growth Rate
DOSM	Department of Statistics Malaysia
EPPs	Entry Point Projects
ETP	Economic Transformation Program
EU	European Union
EUR	Euro
FAO	Food and Agriculture Organization of the United Nation
FELDA	Federal Land Development Authority
FFB	Fresh Fruit Bunch
FOB	Free on Board
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HS	Harmonized System
IMP	Industrial Master Plan
INR	Indian Rupee
LNG	Liquefied Natural Gas
MPOB	Malaysian Palm Oil Board
NKEA	National Key Economics Area
OER	Oil Extraction Rate
PDM	Porter Diamond Model
PKR	Pakistani Rupee
POME	Palm Oil Mill Effluent
PORIM	Palm Oil Research Institute of Malaysia
RBD	Refined Bleached Deodorized

RCA	Revealed Comparative Advantage
RMA	Relative Import Penetration Index
ROW	Rest of World
RMB	Renminbi (Chinese) Yuan
RSCA	Revealed Symmetric Comparative Advantage
RXA	Relative Export Advantage Index
RTA	Relative Trade Advantage
SSA	Shift-share Analysis
USA	United States of America
USD	U.S. Dollar
WTO	World Trade Organization
WWF	World Wildlife Fund

CHAPTER 1

INTRODUCTION

The first section of this chapter reviews a brief introduction of the global palm oil industry. The contribution of the palm oil industry to the Malaysian economy is shown in section two. Section three highlights the issues whereas section four and five present problem statement and research question of this study respectively. Section six is earmarked for the objectives of this study. Section seven explains the significance of the study whereas section eight highlights the organization of this study.

1.1 Global Palm Oil Industry

The exponential increase in world population and rising income raised the demand for oils and fats in the global market (Basiron, 2011). In addition to that, palm oil's competitive price compared with other major edible oil and fats in the international market also became a driving factor behind its higher consumption. Therefore, over time, palm oil became a widely used item in millions of products such as food, soap, personal care items, cosmetics, feedstock for biodiesel, and so on. In 2017, 37.86 %, which is equivalent to 72.35 million tonnes, of the global total vegetable oil consumption was dominated by palm oil (including palm kernel oil) followed by soybean oil (28.19 %), rapeseed oil (13.65 %) and sunflower oil (9.70 %) (Review of the Malaysian Oil Palm Industry, 2017). The efficiency of palm oil cultivation lies in its characteristic of optimising land use. On a per-hectare basis, palm oil trees produce ten times more oil than soybeans (Malaysian Oil Palm Statistics, 2017). In 2017, only 6.86 % of total land area (276.85 million hectares) for oilseeds crop in the world was used for palm oil which led to a production of more than 70 million tonnes.

Figure 1.1 shows the changing leading palm oil producers from 1999 to 2017. Malaysia initially produced 51% of total crude palm oil, equivalent to 20.62 million tonnes, whereas Indonesia produced only 30% in 1999. However, Indonesia surpassed Malaysia as the leading producer in 2006 and onwards. In 2017, Indonesia produced 54 % of the global crude palm oil production (67.39 million tonnes), while Malaysia produced only 29.5 %. Faster land expansion and low labour cost allowed Indonesia to overtake Malaysia and become the largest producer of crude palm oil. According to Reuter (2017), production costs in Malaysia are 10 to 15 % higher than in Indonesia. Currently, both Malaysia and Indonesia account for more than 85 % of the world palm oil production.

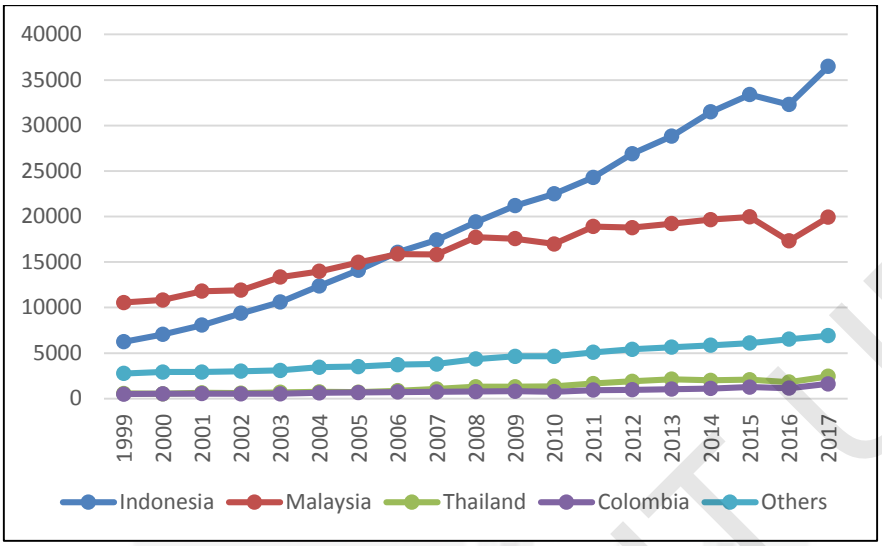

Figure 1.1: World Crude Palm Oil (CPO) Production ('000 Tonnes), 1999-2017
(Source: Malaysia Oil Palm Statistics 2017)

Despite the fact that Indonesia leads in palm oil production, Malaysia is still the largest palm oil exporter in terms of export ratio to the local production (Yoyo et al., 2014). In 2017, approximately 83 % of palm oil produced in Malaysia was exported to global markets as compared to Indonesia which exported 74 % of its total production. This indicates that Malaysia is more reliant on palm oil exports than Indonesia (Malaysian Oil Palm Statistics, 2017). Most of the palm oil produced in Indonesia is for the domestic market because it is home to a larger population as compared to Malaysia (World Bank, 2017).

Palm oil production benefits both exporting and importing countries. The Europe Economics, a consultancy founded in 1988 and specialising in economic regulation, competition policy, and the application of economics to public and business policy issues, reported in 2014 that USD 44 billion of traded palm oil was associated with an indirect contribution to value added in downstream industries of nearly USD 17 billion, an indirect and induced contribution to GDP of nearly USD 39 billion, a contribution to tax revenues in the world of USD 4.3 billion and with creation of 2.9 million jobs globally. Their report also showed a positive impact of palm oil in major importing countries. Based on Table 1.1, palm oil imports to the EU-28 were associated with an indirect contribution of EUR 6.42 billion to GDP, EUR 1.2 billion of tax revenues and creation of 93,620 jobs.

Table 1.1: The Downstream Economic Impacts of Palm Oil in Importing Countries 2013-2014

Countries	Contribution to GDP (Billion)	Contribution to tax revenues	Contribution to employment
EU-28	EUR 6.42	EUR 1.2 Billion	93,620
USA	USD 8.76	USD 860 Million	62000
India	INR 221	INR 23.84 Billion	1,134,000
China	RMB 59.31	RMB 6.16 Billion	929,000
Rest of world (ROW)	EUR 8.92	EUR 1. 56 Billion	411,000

(Source: Europe economics, 2016)

Palm oil sector further contributes to the development of the industries in the downstream palm oil supply chain of the importing countries. A list of the top ten European companies utilising palm oil as reported in the World Wildlife Fund (WWF) Palm Oil Buyers Scorecard, 2016 are shown in Table 1.2 (The rest are listed in Appendix). The firms form the downstream palm oil industry under nine categories: food manufacturers; refineries and processors; retailers; feed manufacturers; electricity generators; biodiesel makers; freight transportation providers; service providers; and other product manufacturers. Unilever stands out as the largest user of palm oil.

Table 1.2: List of European Companies Using Palm Oil

Company name	Country	Palm oil use in 2015 (tonnes)
Unilever	Netherlands	1,513,265
Unigrà	Italy	315,000
Ferrero Trading	Italy	181,000
Reckitt Benckiser	UK	125,843
FrieslandCampina	Netherlands	107,500
United Biscuits	UK	76,196
ABF	UK	70,043
L'Oréal	France	54,986
Vandemoortele	Belgium	44,669
IKEA	Sweden	41,686

(Source: WWF Palm Oil Buyers Scorecard, 2016)

1.2 Palm Oil Contribution to Malaysia's Economy

In 1950s, Malaysia exported low value-added crude palm oil. After gaining independence, the Malaysian government aggressively doubled the efforts to move up the value chain and began to produce refined palm oil. The palm oil industry became the backbone of Malaysia's agricultural economy, fuelling export-led growth in the 1960s (Basiron, 2007). The cultivation of palm oil increased at a fast pace in the early 1960s under the Malaysian government's agricultural diversification programme, which aimed to reduce the country's economic dependence on rubber and tin (Rasiah and Shahrin, 2006). Malaysia also developed the palm oil cluster in Asia that helped other countries

in diversifying their export base (Rasiah and Shahrin, 2006). The industry is currently not only contributing to trade surpluses but also accounts for two-thirds of the total agricultural export value.

In 2017, the palm oil industry export value was equal to RM 53.84 billion which made it the fourth largest industry contributing to Malaysia's total exports. Electrical and electronic products contributed the largest chunk of export earnings (RM 343 billion or 37 %) followed by petroleum products (RM71.98 billion or 8 %) and chemicals and chemical products (RM68.58 billion or 7 %). This is shown in Figure 1.2.

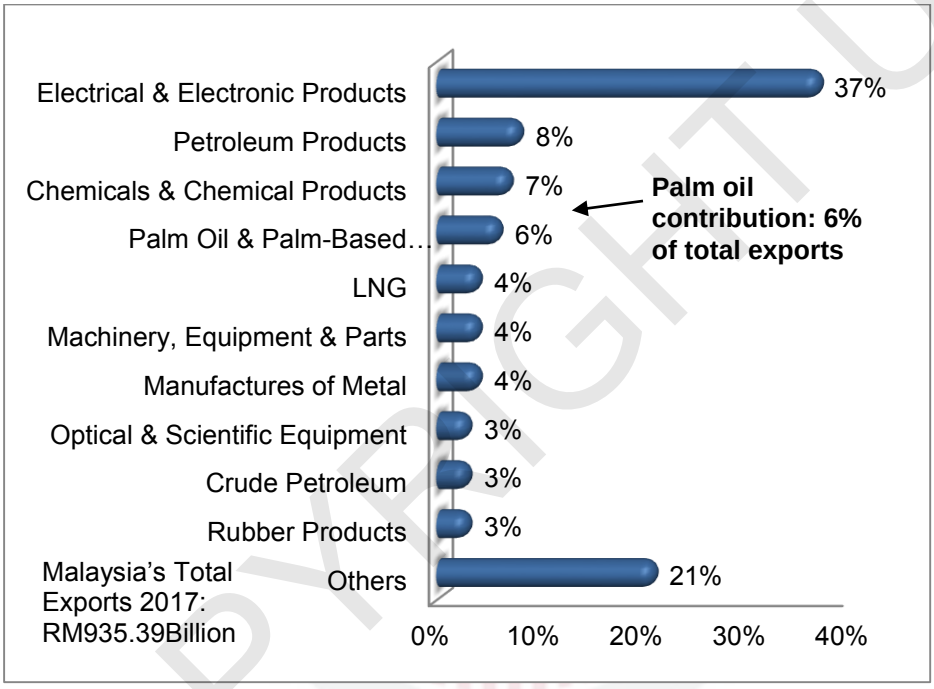

Figure 1.2: Malaysia's Export Contribution by Industry in 2017
(Source: MITI, 2018)

Currently, Malaysian palm oil products are exported to more than 150 countries worldwide. The higher export demand is due to the cheaper price relative to other vegetable oils (Qiu, 2014 and Santeramo, 2017). In 2017, the CPO price was USD 715/tonne compared to soyabean oil whose price was USD 846/tonne, rapeseed oil whose price was USD 870/tonne, and sunflower oil that had a price of USD796/tonne. India with a total population of 1.324 billion people was the major importer for Malaysia palm oil products in 2017 followed by the EU, China, Pakistan and the Philippines (Figure 1.3).

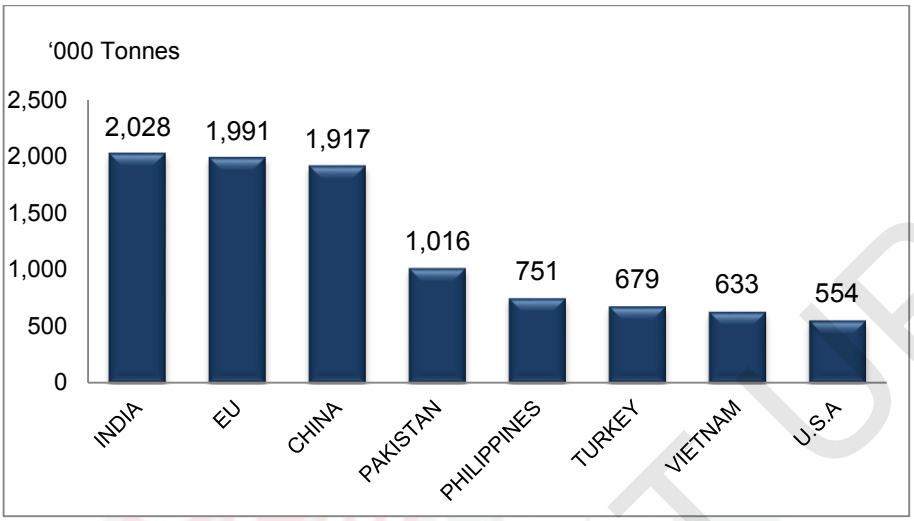

Figure 1.3: Malaysia's Export of Palm Oil to Major Destinations in 2017
(Source: Malaysian Oil Palm Statistics, 2017)

Larger populations in India and China have led to higher export demand in oils and fats, including palm oil from Malaysia. The high demand in EU market had been due to the use of palm oil as the main feedstock for the manufacturing of industrial frying fats, high-value food and oleochemicals products, and expanding biodiesel industry in EU countries (see Figure 1.4).

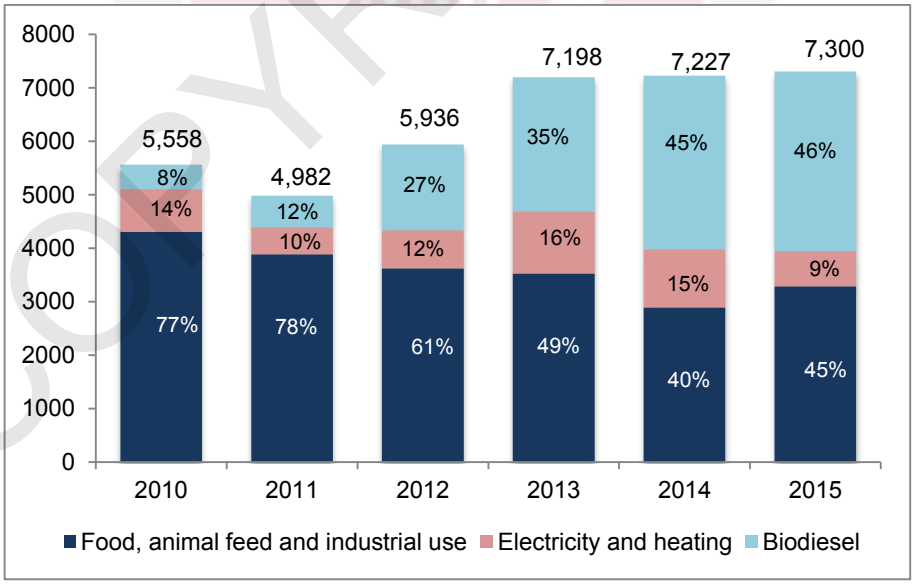

Figure 1.4: Palm Oil by End Use in the EU, 2010-2015
(Source: Europe economics, 2016)

The agricultural exports within Malaysian palm oil industry shifted from general cultivation and low-value crude oil processing during the early 1980s to a more diversified and high value-added downstream products (Rasiah and Shahrin, 2006). It can be seen in Table 1.3 that palm oil is a significant export of Malaysia whose contribution to Malaysian GDP increased from 16.9 % or RM26 billion in 1990 to 53.41 % (RM86.34 billion) in 2017.

Table 1.3: Palm Oil Contribution in the Overall Commodities Export Value

Year	Palm Oil Export Value (RM billion)	Export Value of All Commodities* (RM billion)	Palm Contribution in the overall Commodities export value (%)
1990	4.41	26.08	16.90
1995	10.39	27.78	37.41
2003	20.19	44.90	44.96
2009	36.32	72.33	50.22
2012	53.17	10.02	53.02
2013	42.62	87.57	48.67
2014	42.80	87.35	49.0
2015	40.11	77.75	51.59
2016	41.44	74.32	55.75
2017	46.12	86.34	53.41

(Source: various monthly statistical bulletins from Bank Negara Malaysia website)
*Note: Commodities included natural rubber; saw logs; sawn timber; palm oil; tin; crude oil

It is imperative to mention here that high volume of palm oil exports is not necessarily accompanied by high export revenues because existing market prices keep fluctuating depending on various factors such as the climate, stock levels, total consumption and world price for other oil substitutes (Abdullah and Wahid, 2010; Shamsudin and Arshad, 1993). For example, the El-Nino phenomenon that occurred in 1997 reduced fresh fruit bunches (FFBs) crops and COP output in 1998. This led to a reduction in the world's supply of palm oil and triggered higher export prices for palm oil. Similarly, an export ban imposed by the Indonesian government from January to April 1998 caused downward pressure on worldwide palm oil stocks and increased prices (Rifin, 2014). However, prices fell in 1999 due to increased production (post El-Nino) of CPO in both Malaysia and Indonesia. Moreover, in 2011, higher biodiesel demand, especially from the European Union (EU), increased palm oil prices and the export revenues from Malaysia (Applanaidu et al., 2011).

Figure 1.5 shows that the total export revenue from palm oil exports fluctuated even though total export volume increased continuously over the years (from 8.44 million tonnes in 1995 to 24 million tonnes in 2017). Historically stating, figure 1.3 shows that the highest export revenue was recorded in 2011 although the production in that year was not the highest. Likewise, in 2013, the highest production did not attract highest export revenue. This is because in 2012, the world stock of palm oil was 7.93 million tonnes, out which Malaysian stock accounted for 2.63 million tonnes. Such high stock levels

caused palm oil prices to decline to RM2,052 per tonne in December 2012 compared to RM3,182.50 per tonne in January 2012 (Abdullah, 2014). The price improved slightly after 2013 with a bullish trend seen after 2015 (Figure 1.5).

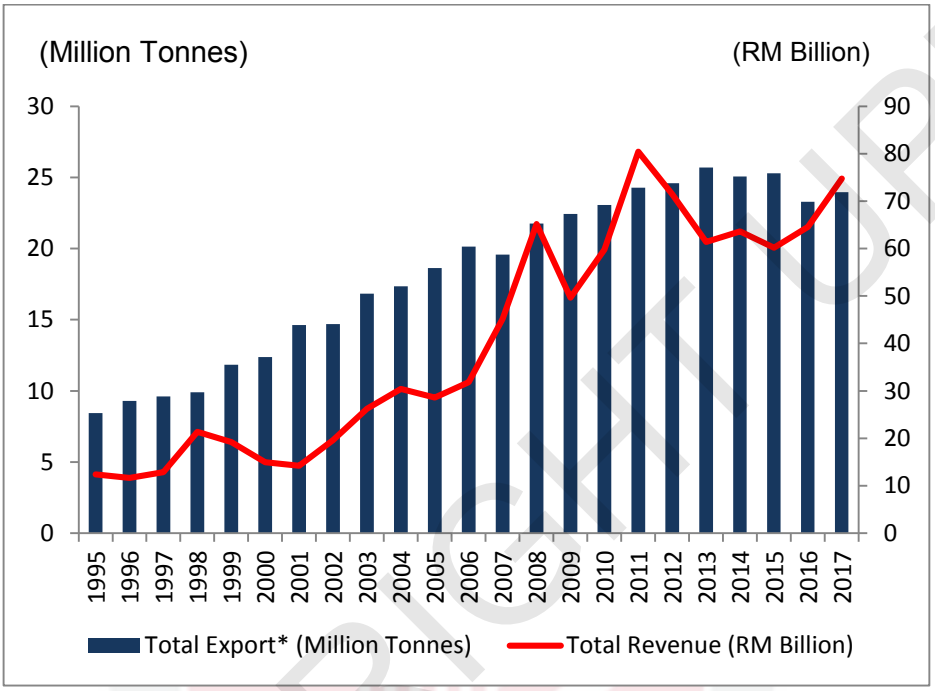

Figure 1.5: Total Palm Oil Exports by Volume (Mn Tonnes) and Total Revenue (RM Bn)
(Source: Malaysian Oil Palm Statistics, 2017)
*Note: including crude palm oil, palm kernel oil, palm kernel cake, oleochemicals, biodiesel, and other palm finished products

1.3 Issues Related to the Palm Oil Sector

Malaysia has been caught in an upper-middle income trap since the last two decades (Suehiro 2019; Cherif and Hasanov, 2015; and Felipe et al. 2012) with a gross national income (GNI) per capita of USD 9,660 in 2017. Felipe et al (2012) show that five out of fourteen upper-middle income countries, including Malaysia, stayed in the same income range for more than fourteen years. Other countries include Saudi Arabia, Syrian Arab Republic, Uruguay and Venezuela. Hence, it is believed in the economic literature that Malaysia has fallen into the middle-income trap. According to the World Bank's definition in 2019, upper middle-income economies are those with a GNI per capita between USD3,896 and USD12,055 and high-income economies having GNI per capita more than USD 12,056.

Production of low value-added items and fluctuations of commodity prices of major exports have been recognized as the major obstacles contributing to the problem of the middle-income trap in Malaysia. Moreover, domestic upstream production faces major challenges including labour shortages and limitations on the availability of cultivable lands due to concerns of deforestation and environmental degradation (Wong et al, 2014; Abdullah, 2012; Gatti et al., 2018). The Malaysian government, therefore, desires to increase efficiency in production and focus on improving value added through downstream activities to ensure the competitiveness and sustainability of the industries.

Under this vision, in 2010, the government launched twelve (12) National Key Economic Areas (NKEA) in the Economic Transformation Program (ETP). Palm oil industry holds a key position in the NKEA and the government aims to increase its total contribution to national income which can help in achieving high-income status by 2020. The twelve National Key Economic Areas (NKEAs) includes Greater Kuala Lumpur/Klang Valley; oil, gas and energy; financial services; wholesale and retail; palm oil and rubber; tourism; electrical and electronics; business services; communications content and infrastructure; education; agriculture; and health care. Figure 1.6 presents a brief summary of NKEAs.

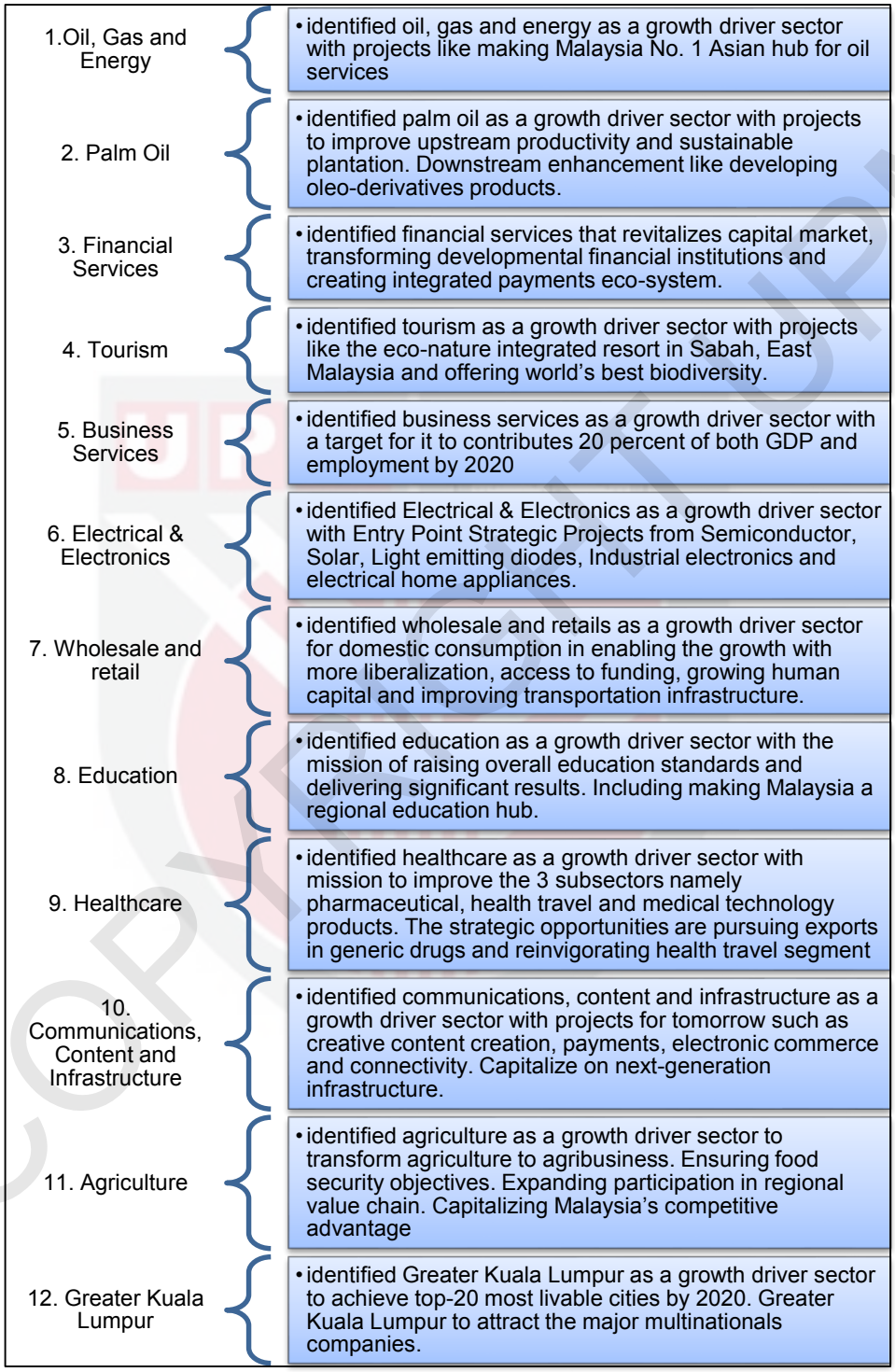

Figure 1.6: National Key Economics Areas

For the palm oil industry in NKEA, Malaysian government aimed a GNI contribution of RM 178.0 billion and creation of 41,600 jobs by 2020 (PEMANDU, 2010). This GNI was targeted to be achieved through the implementation of eight core entry point projects (EPPs), five of which were designed to improve the palm oil upstream industry (accelerating the replanting an new planting of oil palm; improving fresh fruit yield; improving worker productivity; increasing the oil extraction rate; and developing biogas facilities at palm oil mills), while the rest of three EPPs were designed to improve the palm oil downstream industry (focus on high value oleo derivates; commercialising second-generation biofuels and expediting growth in food and health-based downstream segments). The EPPs for downstream industries aimed on developing finished segments that generate high value, including oleo-derivatives and selected food and health-based segments, as well as commercialising second-generation biofuels. Moreover, EPPs for downstream industries' expansion and sustainability were not only designed to concentrate more on refined products, but also to capture the fast-growing global market by increasing the exports. However, by 2017, palm oil export had a significant proportion of the upstream sector with a total contribution to the overall industry at 82.3 %, while downstream sector contribution had only been equivalented to 17.6 % (see Figure 1.7). Figure 1.7 further shows the total export volume of Malaysia's palm oil, categorized by-products, which include palm oil, palm kernel oil, palm kernel cakes, oleochemicals, biodiesel and finished products, amounted to 23.97 million tonnes in 2017 with total revenue of RM 74,748 million. Most of the palm exports are contributed by upstream products consisting of crude palm oil (11.30 %), processed palm oil (57.77 %), palm kernel oil (4.03 %) and palm kernel cake (2.21 %). The East Coast Economic Region (ECER) Malaysia (2010) stated that even though Malaysia is recognised as the major producer of palm-based oleochemicals products that covers approximately 20 % of the global basic oleochemicals production, the downstream activities and the high-end value products are still limited and insignificant in the country.

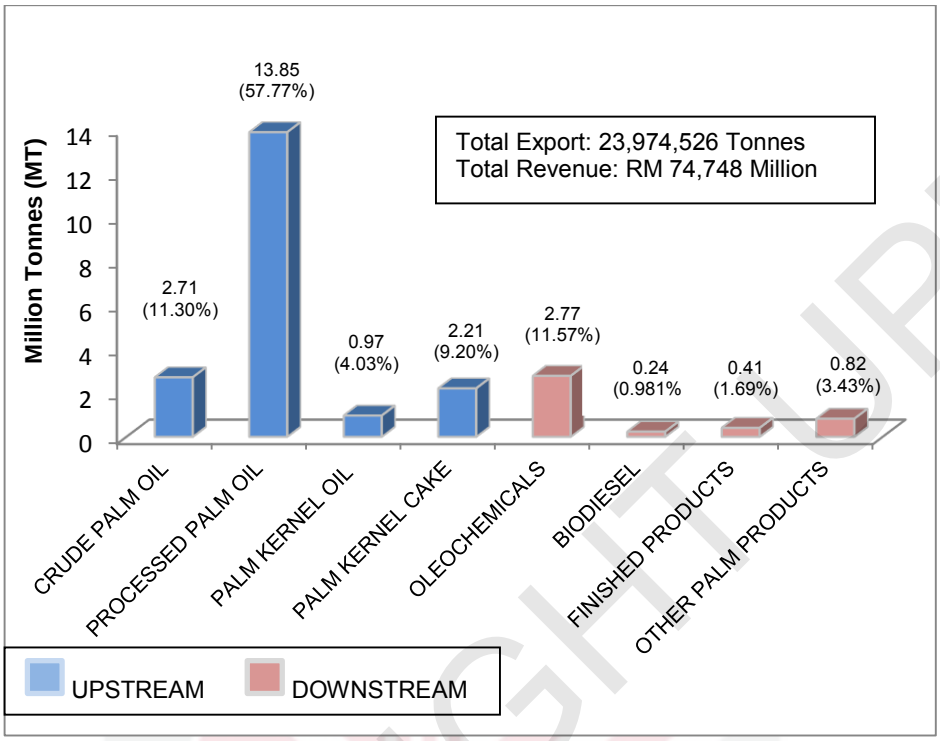

Figure 1.7: Malaysia's Annual Palm Oil Export Volume by Products in 2017
(Source: Malaysian Oil Palm Statistics, 2017)

Exports of oleochemicals products reached 2.77 million tonnes in 2017 of which fatty acids were the major exports (990,132 tonnes or 35.89 % of total oleochemicals exports). These were followed by fatty alcohol (580,703 tonnes or 20.93 %), methyl ester (437,846 tonnes or 15.78 %), glycerine (402,573 tonnes or 14.51 %) and soap noodles (336,318 tonnes or 12.12 %). The major palm oil-based finished products exported in 2017 were shortening amounting to 177,227 tonnes or 43.62 % of the total palm oil-based finished product exports, followed by vegetable/dough fats (70,557 tonnes or 17.36 %), vegetable ghee/Vanaspati (37,183 tonnes or 9.15 %) and cocoa-butter replacer (35,303 tonnes or 8.68 %). Other palm oil products exported comprised of more than 50 items which mainly included palm kernel shell, oil palm fiber, used frying oil, industrial grade palm oil, mix vegetable acid oil, mixed acid oil, residue oil/scavenger oil, palm fatty acid residue, fatty alcohol residue and pitch oil.

Palm oil companies in Malaysia are operating in a challenging and uncertain environment due to fluctuations in the CPO price and fierce competition from other vegetable oils. Local commodity producers have limited influence on the market price of their products. The competitiveness has also been lower as compared to the major competitor namely Indonesia. Faster growth of Indonesia's land expansion allowed the country to overtake Malaysia's production and become the world's largest producer in 2006 (see Figure 1.1) and the largest exporter in 2011 onwards (Figure 1.8). Labour cost difference is also a major factor behind lower production cost in Indonesia where daily

wages are almost half than those in Malaysia. This issue is worsening due to overreliance on foreign workers in the Malaysian palm oil industry.

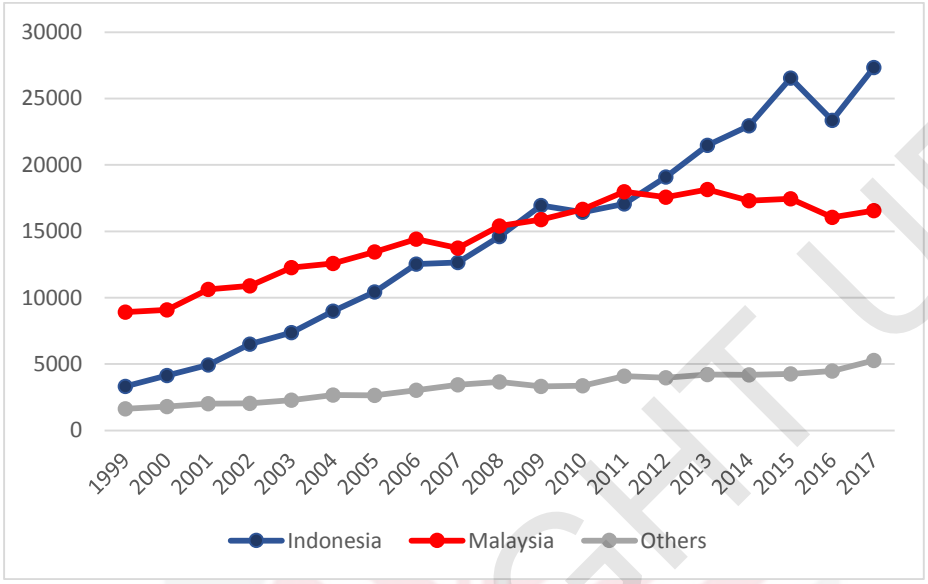

Figure 1.8: World Palm Oil Exporter ('000 Tonnes), 1999-2017
(Source: Malaysia Oil Palm Statistics 2017)

In 2017, the palm oil industry provided employment to 630,000 people, which covered the whole production chain from nurseries, plantations, mills, refineries to the oleo-chemical plants. The plantation sector is the most labour-intensive and employs 450,000 workers or 71.4 % of the total work force in the palm oil industry. Of this, 77.8 % of workers were from foreign economies and majority were from Indonesia (Kamaruddin et al., 2018 and Pye, et al., 2016). Azman, (2014) reported that land labour ratio in the plantation sector is 10.9 hectares per one worker which is not an encouraging figure. The deficit in the labour force ratio creates a negative impact on palm crops, especially among those farms that depend on traditional or hand harvesting to collect FFB from trees. As a result, the FFB is left unharvested causing it to rot in the trees and thus reducing the annual crop yield.

Another issue in the Malaysian palm oil sector is lack of export competitiveness which reduces Malaysia palm oil exports in many markets at the expense of Indonesia. Although it forced Malaysian palm oil stocks to increase, production remained low (Basiron, 2016). Table 1.4 shows Malaysian palm oil has lost market share in some countries for the past seven years due to competition from Indonesian palm oil. The EU is the second largest buyer of Malaysia's palm oil products after India (see Figure 1.4). Approximately 46 % of total palm oil imports into the 28-nation economic bloc are used for biofuels. Palm oil exports to the EU continued declining on a gradual basis, even though it's Renewable Energy Directive proposing a total ban of palm oil usage in the biofuel mix would not be realised until 2030. Palm oil exports to the EU had already decreased by 3.3 % to 2 million tonnes within a span of one year, from 2016 to 2017

(Malaysian Oil Palm Statistics, 2017). Similarly, in 2010, Malaysia's market share in Pakistan was 95 % that dropped to 19 % in 2017 while that of Indonesia increased to 80 % in 2017 from merely 3 % in 2010. The Pakistan-Indonesia preferential trade agreement (PTA) that was activated by the two countries in September 2013 caused a decrease in Malaysia's share in Pakistan's palm oil market. Items related to palm oil imports from Indonesia were granted a 15 % margin of preference rate (or PKR 9180/MT import tariff) over the standard tariff rate (PKR 10800/MT import tariff) by Pakistan (Amir and Hyder, 2015).

Table 1.4: Malaysia versus Indonesia Palm Oil Market Share in Major Importing Countries (Thousand Tonnes)

Countries	2010				2017			
	Malaysia	% Share	Indonesia	% Share	Malaysia	% Share	Indonesia	% Share
China	3,377.65	61.48	2,101.97	38.26	1,862.00	36.66	3,214.94	63.3
EU	593.23	49.27	531.18	44.12	645.04	21.35	2,291.18	75.84
Pakistan	1,380.14	95.32	43.89	3.03	509.72	19.16	2,148.86	80.8
India	280.39	29.5	665.41	70	515.26	17.45	2,437.27	82.54
USA	885.85	93.46	48.48	5.11	458.70	33.08	898.81	64.83
Turkey	263.63	64.34	145.71	35.56	552.32	91.32	50.90	8.41
Egypt	135.50	56.93	97.94	41.15	69.70	8.88	706.60	90.09
Vietnam*	297.88	96.59	10.30	3.34	445.12	74.84	149.55	25.14
Phillipines	1.02	9.83	8.54	82.62	152.85	56.69	115.29	42.76
Japan	519.38	94.24	31.26	5.67	498.00	70.4	208.08	29.41

(Source: Author calculation based on UN-Comtrade database)
*Note: *Data for Vietnam up until 2016 only.*

Figure 1.9 shows that Malaysia's exports are largely refined palm oil, while the difference between crude and refined palm oil exports is much smaller in Indonesia (Figure 1.10). However, in 2011, Indonesia increased its export duty on crude palm oil and lowered export duty for processed products to support production and export of processed palm oil.

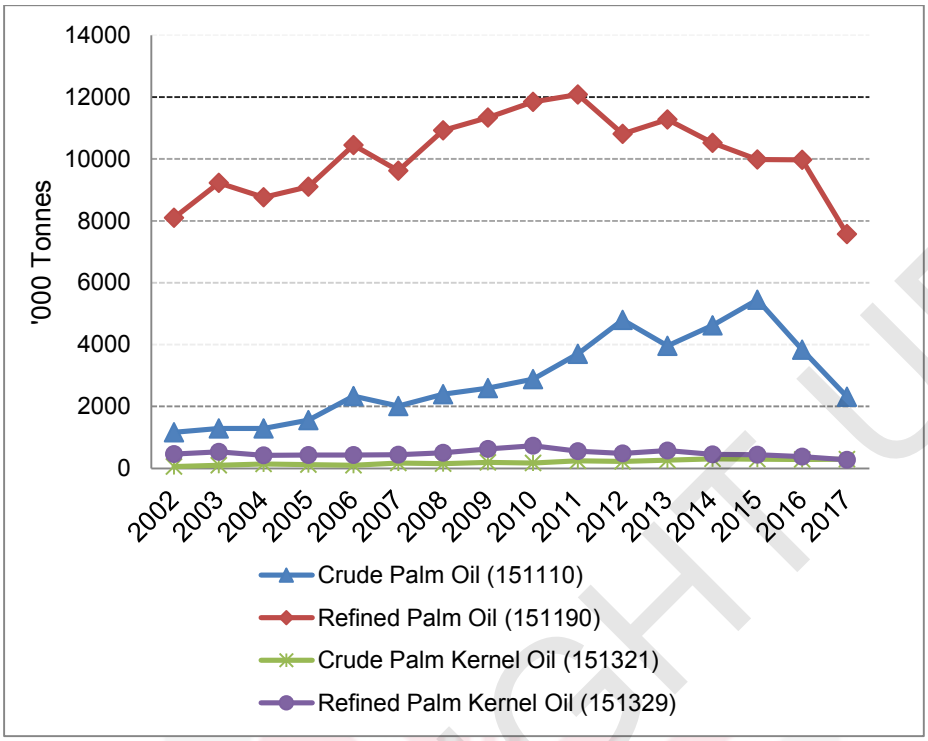

Figure 1.9: Malaysian Export on Selected Products ('000 tonnes)
(Source: UN Comtrade database, 2018)

The Indonesian government's export tax revision in 2011 provoked a response by the Malaysian government. Starting in January 2013, the Malaysian government imposed a new CPO export tax that initiates at 4.5 % when the price of CPO exceeds RM 2,250 per tonne and rises by 0.5 % as the price increases by RM150 per tonne. However, the impact of the new CPO export tax cannot be termed as successful as Indonesia's export tax (Salleh et al., 2016). Compared to Indonesia, the policy implementation increased the export of refined palm oil and widened the gap between refined and crude palm oil. However, in September 2014, Indonesia removed export duty for RBD (Refined Bleached Deodorized) palm oil, RBD palm stearin and biofuel. This encouraged greater competition with Malaysian palm oil companies in the refined products category, but the revenue of this industry may fall as a result of the export tax revision.

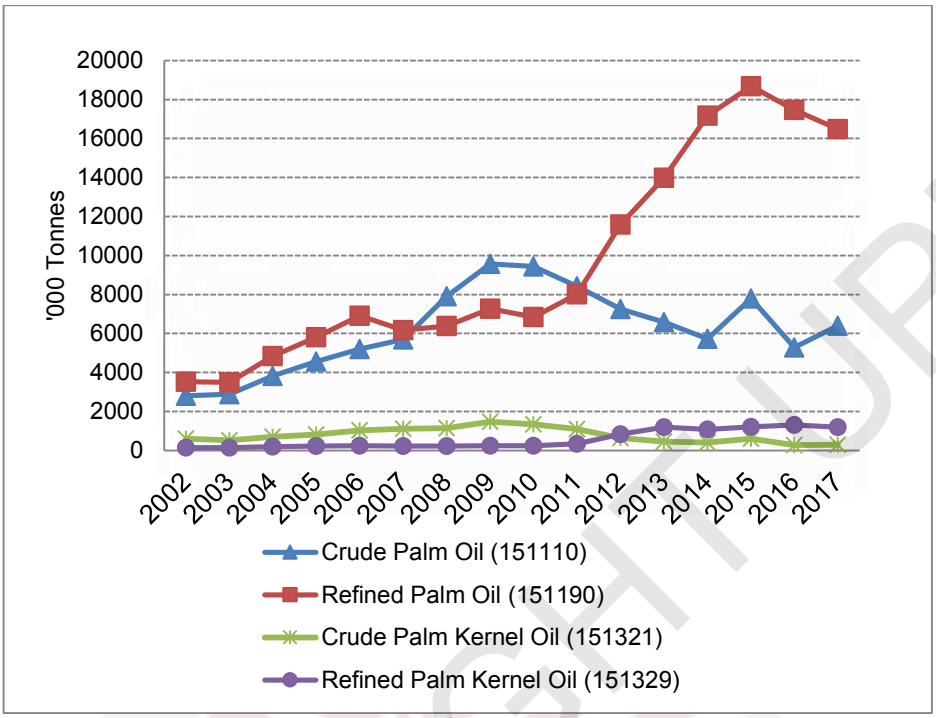

Figure 1.10: Indonesia's Export on Selected Products ('000 tonnes)
(Source: UN Comtrade)

The issues of quality, food safety and sustainability have become the new forms of trade barriers in the global oils and fats trade. Environmental NGOs have been extremely vocal towards the palm oil industry especially among Southeast Asia including Malaysia and Indonesia claiming that the industry has caused an increase in deforestation and unsustainable practices such as poor labour conditions and negative environmental impacts. Other forms of new barriers include the rules on food labeling imposed by United States (US) and EU whereby consumers will be informed about the sources of vegetable oils so that they can boycott the product which contains palm oil. Due to these circumstances, the government had to deploy financial and human resources to vehemently deny these allegations with specific references to *Orang Utan* habitat loss and greenhouse gas emissions in order to improve the image of palm oil in the world market. However, this still remains a major issue for local palm oil producers.

Although EU has offered incentives to promote uses of biodiesel, palm-based biodiesel will only be eligible for the incentives if the default value of greenhouse gas emission savings for palm oil specified in the instructions is below the set threshold. This can only be realized if palm oil biodiesel meets the right conditions such as avoiding methane emissions. Malaysian government sees this underlying sustainability criterion as a trade barrier and a form of "crop apartheid" (Sundram, 2018). The criteria further requires the producers of the palm oil products to submit additional proof of validation that the requirements are being adhered to or else the production patterns need to be changed (for biofuel derived from palm oil, the auditor shall verify that (i) the Palm Oil Mill Effluent

(POME) is treated in a gas-tight digester system equipped with methane capture, and (ii) the methane is either used for energy generation purposes or flared). Despite these circumstances, the potential of palm oil as a source of biodiesel raises question since both EU and US view palm oil biodiesel as environmental threats. Hence, even though over the past 100 years, the oil palm industry has led to the development of Malaysia economy, the success story of this industry dampens as it causes deforestation, higher greenhouse gas (GHG) emissions because of fires and planting on drained peatlands, exploitative human rights practices in the workforce, and is marked by lack of good governance and transparency (Kumaran, 2019).

To overcome such obstacles, therefore, the local palm oil industry relies on third party independent certification systems to demonstrate the implementation of good practices in the production supply chain. In 2004, the Roundtable on Sustainable Palm Oil (RSPO) was established to promote sustainable growth and use of oil palm products throughout the world and currently, these voluntary certification schemes have coverage of approximately 30 % of the oil palm cultivated area. The goal of RSPO was to develop a set of environmental and social criteria with which companies must comply to produce Certified Sustainable Palm Oil (CSPO) (Laurance et al., 2010 and Foong et al., 2018). The negative impact of palm oil cultivation on the environment and communities in palm oil-producing regions can be minimized when these criteria are properly applied (RSPO, 2018).

Table 1.5: MSPO certification status in Malaysia in 2018

Areas certified	Total planted area (ha) / no. of mills	Certified Areas (ha)/ mills capacity (MT/h)	%
Independent smallholder	976,758	12,312.01	1.3
Organised smallholding	1,287,958	105,751.06	8.2
Plantation Areas	3,543,429	971,732.95	27.4
Total	5,811,145	1,089,796.03	19
Palm oil mills	454	102	

Furthermore, the Malaysian Sustainable Palm Oil (MSPO) standard was announced in 2013 to help small and mid-size cultivators who cannot afford RSPO certification to operate sustainably (Foong et al., 2019 and Efeca, 2016). Since then, numerous initiatives have been reported to promote sustainable development, meeting environmental commitments through credible global standards and engagement of stakeholders. In 2017, the Malaysian government move for the implementation of a mandatory national certification system by December 2019 aims to cover the entire oil palm planted area (including smallholders, large plantation owner, millers, etc.). However, the smallholder sector needs drastic improvement as it has achieved a lower percentage of the certified area (Table 1.5).

1.4 Problem Statement

Palm oil is one of the NKEAs which were designed to increase total contributions to national income and help Malaysia reach high-income status by 2020. However, in 2017, palm oil exports comprised of the upstream segments with a total contribution to the overall industry of 82.3 %, while high value-added downstream contribution was only 17.7 %. Malaysian palm oil production may soon reach its peak due to limited land availability. It is also expected that Malaysia's role as a leading crude palm oil exporter will decrease in the future due to such land constraints, dependence on foreign workers, comparatively higher input costs and increasing rivalry from palm oil substitutes and palm oil producing countries such as Indonesia (Alam, Er and Begum, 2015). Furthermore, Malaysia could be adversely affected and experience a slowdown in the economy if there is a fall in commodity prices since palm oil-based exports are a major component of its GDP. Hence, both dependence on low-value-added products and fluctuations in commodity prices would make it difficult for Malaysia to escape from the upper middle-income trap.

According to McCarthy, Gillespie and Zen (2012), lack of research and development in the downstream palm oil-based production has caused major producing countries to continue to produce lower value-added palm oil products. Therefore, the Malaysian government needs to invest in downstream activities within the palm oil industry. Moreover, the risk of fluctuations in crude palm oil (CPO) global prices can also be reduced if the industry relies more on downstream activities. It could absorb excess supply of palm oil upstream products in the market and stabilize the prices. There is great potential in the downstream segment, which offers more lucrative per unit revenue i.e. about 41 % higher than that of the upstream sector (MPOB, 2015 and PEMANDU, 2013).

Current trends of exports indicate that Malaysian palm oil has been losing its market share in traditional markets such as China, the EU, Pakistan, the US, Turkey, Egypt and Myanmar due to competition from Indonesian palm oil (Table 1.4). One of the reasons behind this weak export performance is the lack of competitiveness. In view of its current domestic production, it is expected that Malaysia's palm oil export in the future will be further declined. In order to curb this problem, it is crucial to enhance and promote palm oil downstream competitiveness so that Malaysia can increase, recover and sustain its strong global position against other key players (Yusoff et al, 2013).

Palm oil cannot be isolated from the environment and sustainability issue. The consumption of edible palm oil has been decreasing in recent years due to increase in environmental issues. Unfortunately, palm oil has also been portrayed negatively by some groups who claim that production of palm oil would cause higher global GHG emissions than those from the conventional fossil fuels due to the conversion of forests and peatlands (Ramdani and Hino, 2013; Butler, 2014). They further claim that the palm oil industry has reduced the habitat of *Orangutans*.

In Europe, palm oil is the most imported vegetable oil, which is used for both the food industry as well as non-food sectors, including the biofuel industry. Palm oil is not only the lowest in terms of price, but also could replace various ingredients in all of these industries (Qiu, 2014 and Santeramo, 2017). The EU has aimed to increase its use of renewable energy from biofuels with one of the potential feedstock being palm oil. However, despite such pros, European countries appear to have the most stringent requirement on certified palm oil. The growing environmental and sustainability concerns of oil palm farming may therefore adversely affect the import demand of palm oil and hence the Malaysian economy.

To curb such issues, the Malaysian Sustainable Palm Oil (MSPO) standard was announced in 2013 to help small and medium-sized cultivators who cannot afford RSPO certification to promote sustainable development and meet environmental commitments through credible global standards and engagement of stakeholders (Efeca, 2016 and Foong et al., 2019). However, the smallholder sector has achieved a lower certified area recorded at approximately 1% of the total independent smallholder nationwide (Table 1) by 2018. Hence, improvement is needed in this sector as well.

With respect to the above arguments, it is time for the Malaysian palm oil industry to start focussing on downstream palm oil industries to reduce dependence on low value-added items and less stable upstream palm oil products. An important aspect is to assess the competitiveness of downstream palm oil industry so that areas of strength and weaknesses can be diligently identified.

There is a limited study on palm oil competitiveness that focuses on the downstream segment in Malaysia. Few of them include the studies done by Asfaranjan and Moayed (2012), and Arip, et al (2013). Even though Arip et al. (2013) assess the comparative advantage of palm oil-related products, their study is limited to 20 palm oil-related products and only focuses on the production at the micro-level. Moreover, the comparative studies done to estimate palm oil competitiveness have been limited to Malaysia and Indonesia only except for Hassanpour & Ismail (2010) who include ASEAN and China. However, their analysis is missing for the latest time period. There are also limitations in previous research that stress on the impact of environmental policy towards the trade competitiveness of the palm oil industry. Therefore, it can be stated that there is a large gap in the literature with respect to the issues of Malaysia competitiveness in the palm oil downstream industry. McCarthy, Gillespie and Zen (2012) argued that insufficient empirical analyses in the palm oil industry have consistently resulted in the manufacturing of lower value-added palm oil products in the major countries which includes Malaysia as well.

This study aims to fill this gap by taking into account overall palm oil downstream products at HS 6-digit code classification. It assesses the competitiveness of palm oil downstream industries in Malaysia from both economic perspective and management perspective by taking into account the competitiveness achieved from gaining comparative advantage and Porter Diamond framework. It analyses the trade competitiveness of palm oil products in downstream sectors between Malaysia and other major producers of vegetable oil which includes Indonesia, USA, Argentina, China and

the EU. This study also intends to investigate the environmental regulatory role in enhancing the export competitiveness of Malaysian palm oil downstream industry. Methods such as RTA, SSA and panel data analysis are employed in addition to the theoretical framework of PDM for this purpose. Lastly, besides incorporating the entire downstream products such as oleochemicals, biodiesel and palm-based finished products, this study also uses more recent data in assessing the competitiveness of palm oil industries in Malaysia.

1.5 Research Questions

Competitiveness is a dynamic concept and keeps changing over time. Various domestic and external factors play important roles in determining a nation's competitiveness in various products. Hence, this study aims to answer the following questions related to Malaysia's palm oil competitiveness in the downstream sector:

1) What is the level of competitiveness for Malaysia's palm oil downstream exports in the global market relative to other major producers?
2) Where is the potential market for palm oil downstream products?
3) What is the impact of environmental policy on Malaysia's palm oil downstream trade competitiveness?

1.6 Objectives of the Study

The main objective of this study is to assess the competitiveness of downstream palm oil industry in Malaysia. The specific objectives of the study are as follows:

i. To assess Malaysia's relative competitiveness in palm oil downstream products as compared to other major exporting countries.
ii. To determine the potential market for Malaysian palm oil downstream products based on the selected markets.
iii. To investigate the effects of environmental policy on Malaysia's competitiveness of palm oil downstream products.

1.7 Significance of the Study

Malaysian palm oil industry significantly contributes to employment and productivity and encourages and nurtures the development of Malay citizens as leaders in industry and commerce. In the Tenth Malaysia Plan, the government emphasized the development of the production of palm oil downstream production and diversification to fully utilize national resources to promote export-oriented and import substitution industries. Despite that, the Malaysian economy is still heavily dependent on palm oil upstream production and export. Fluctuation in the world prices of CPO too significantly affect the country's GDP, export performance and government revenues. The international competitors such

as Indonesia are taking over most of the global market share leading to lower local production. As the government has always been conscious of the urgent need to diversify the palm oil downstream industries, improving competitiveness and economic diversification in the palm oil downstream industries is crucial.

Most of the empirical studies focus on the upstream sector while downstream activities remain largely untapped. In terms of the rationale of exploring research in palm oil downstream products, it can be stated that the low value-added products in the upstream sector such as soap or detergents are widely consumed but attract low profit whereas high value-added downstream products such as pharmaceuticals are relatively less consumed but have a high profit. This further enhances the significance of this study. This study is also beneficial because it seeks to identify the most profitable country for Malaysian palm oil downstream export. By identifying the most profitable country for export, Malaysia can focus on that country to increase the profit and market share.

1.8 Organisation of the Thesis

In order to meet the stated objectives, the study is divided into six chapters; chapter one provides introduction; chapter two highlights the background of palm oil industry in Malaysia; chapter three presents the concepts and literature review of studies related to the competitiveness of palm oil downstream sector and also elaborates the methodology adopted in related studies to this study; chapter four describes the theoretical framework and methodology used to achieve the stated objectives; chapter five presents the research findings and discussion and finally chapter six provides the conclusions and recommendations.

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