マレーシアにおける 2035 年までのパームオイル需給展望と輸出見通し

A Study on Malaysia's Palm Oil Position in the World Market to 2035

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Malaysia is now the world's second top producer of palm oil. With its large and growing palm oil industry, and strong global demand for palm oil, Malaysia has the potential to play a major role in the world food and biofuel markets. This paper aims to perform quantitative analysis on (1) domestic supply and demand outlook of Malaysia's palm oil, including biodiesel demand; and (2) its ability to supply to the global markets to 2035 in the context of restricted expansion of palm oil plantation area. Domestic palm oil production is projected to rise by about 55% to 25 million tones in 2035. Domestic demand of palm oil for food consumption, industrial non-food uses and biodiesel is anticipated to increase to 1.4 million tones in 2035, up from 0.4 million tones in 2007. This however, only amount to 5% of total crude palm oil production in 2035. With an expected exportable surplus of over 23 million tones in 2035, Malaysia will remain a formidable competitor in the world vegetable oil and biofuel markets.

Keywords : Malaysia, palm oil, export potential

1. Introduction

Palm oil is an important and versatile raw material for both food and non-food industries. In recent years, rising oil prices along with strong intention to reduce greenhouse gas emissions of transport sector has driven up demand for palm oil as an important raw material for transport biofuel, owing largely to its price and productivity competitiveness compared with other vegetable oils. Malaysia is now the world's second top producer of palm oil, supplying about 12.8% of the global consumption of vegetable oils in 2009/10 [(1)]. Between 2006 and 2010, Malaysia exported more than 642 thousand tons of palm biodiesel, directing mainly to Europe and USA [(2)]. In domestic market, palm oil plays an important role in supporting Malaysia's economy (see Table 1). It dominates the local edible oil market, and is the indigenous raw material to oleochemical and food industries in Malaysia. With its large and growing palm oil industry, Malaysia has the potential to play a major role in the world food and biofuel markets. This paper aims to perform quantitative analysis on (1) domestic supply and demand outlook of Malaysia's palm oil, including biodiesel demand; and (2) its ability to supply to the global markets to 2035 in the context of restricted expansion of palm oil plantation area.

2. Methodology

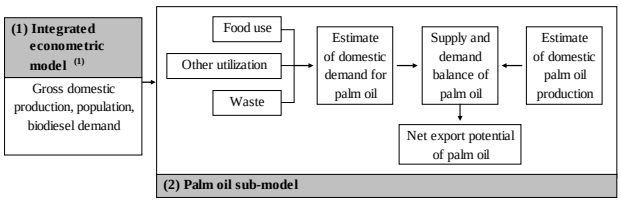
2.1 Overview of model structure

Fig. 1 showed the schematic flow of this study. We developed and linked a palm oil sub-model with our integrated econometric model for this study [(3,4)]. The palm oil sub-model is designed to determine domestic demand and supply, as well as export potential of palm oil. Our integrated econometric model which consists of a macroeconomic sub-model and an energy-environment sub-model provides macroeconomic indicators which influence domestic demand for palm oil such as gross domestic production (GDP) and population.

Table 1 Palm oil industry in Malaysia as of 2009.

Plants/Plantation area	Peninsular Malaysia	Sabah	Sarawak
Plantation area (million hectare)	2.5	1.4	0.8
Palm oil mills			
no of plant	260	130	54
annual capacity (million tonne)	56.9	31.6	11.7
Refinery plant			
no of plant	43	21	8
annual capacity (million tonne)	17.1	10.3	3.1
Oleochemical plant			
no of plant		19	
annual capacity (million tonne)		2.7	
Biodiesel plant [(1)]			
no of plant	13	1	0
annual capacity (thousand tonn	1450	100	0

[(1)] as of 2008



[(1)] Gross domestic production, population, biodiesel demand are adopted from our results in Gan *et. al.*, 2011.

Fig. 1 Overview of this study.

The variables projected in this study are (i) domestic production of palm oil, (ii) domestic demand of palm oil for food, other uses, and waste. For the demand-supply analysis of Malaysia palm oil in this study, we refer to the supply utilization account (SUA) methodology of FAO [(5)]. The SUA is an accounting identity, showing for any year the sources and uses of agricultural commodities in homogenous physical units,

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as showed in equation (1).

Food (direct consumption) + Industrial non-food uses + Feed + Seed + Waste = Total domestic use = Production + (Imports - Exports) + (Opening stocks – Closing stocks) (1)

Domestic production of palm oil as showed in equation (2) is estimated using exogenous assumption on fresh fruit bunch (FFB) yield per hectare as targeted in government's plan [6]. Additionally, we also assume restricted expansion of new palm oil plantation area in response to concern and arguments over sustainability of palm oil production [7, 8]. Hence, plantation area is assumed to remain constant till 2035 and FFB yield per hectare is assumed to reach 26.2 tons in 2035 as showed in Table 2. Future increment in palm oil production is achieved through improvement of FFB yield per hectare.

*CPO=PALMAREA*FFBY* (2)

CPO: Domestic production of palm oil
PALMAREA: Plantation area of palm oil
FFBY: Fresh fruit bunch yield

Domestic demand for palm oil comprises food use, other utilization and waste. Palm oil for food use is obtained by simple multiplication of per capita palm oil consumption with population, where per capita consumption is estimated as a function of per capita GDP and relative prices of palm oil and crude oil. Other utilization consists of industrial non-food uses and domestic biodiesel use. Industrial demand for non-food uses is projected as a function of the GDP whereas domestic B5 blending of palm oil based biodiesel beginning 2011 is obtained from our projections in Gan et al 2011 [3]. Waste (post harvest to retail) is projected as a proportion of total palm oil supply (namely production plus imports) as per the FAOSTAT [9]. Palm oil potential available for export is derived as the balance between domestic supply and demand of palm oil.

2.2 Data and assumptions

Palm oil data from 1961 to 2007 are obtained from FAOSTAT [9]. Palm plantation area and FFB yield data from 1975 to 2009 are obtained from official statistics of Malaysia Palm Oil Board [10]. Macroeconomic indicators such as per capita GDP, population and crude oil prices are obtained from the results of our integrated econometric model in Gan et al, 2011 [3]. Assumption on palm oil prices is adopted from World Agricultural Outlook 2011 of FAPRI-ISU [11]. Estimation of amount of plantation area required to meet domestic demand for palm oil is based on assumed FFB yield and conversion ratio of FFB to palm oil [12]. Major assumptions underlying the projections of this study are summarized in Table 2. Projection period is from 2007 to 2035.

3. Results and discussions

3.1 Outlook of palm oil supply and demand to 2035

Domestic palm oil production is projected to rise by about 55% between 2007 and 2035, increasing from 15.8 million tones in 2007 to 20.5 million tones in 2020, and 24.6 million tones in 2035 as showed in Fig. 2.

Domestic food use is expected to increase from 0.15 million tones in 2007 to 0.524 million tones in 2035, following a steady increase in per capita demand of palm oil for food consumption as showed in Fig. 3. Industrial non-food use of palm oil is projected to reach 0.35 million tones by 2035, up from 0.154 million tones in 2007 on account of steady economic growth and strong demand. Biodiesel industry is projected to represent a significant source of demand following the implementation of B5 blending beginning 2011. By 2035, biodiesel use is anticipated to reach 0.4 million tones and account for 28% of total consumption of palm oil. Together, domestic demand of palm oil for food consumption, industrial non-food uses and biodiesel will increase to 1.39 million tones in 2035, up from 0.38 million tones in 2007. This however, only amount to approximately 5% of total palm oil production in 2035, a small fraction compared with total production.

Table 2 Main assumptions for this study.

Macroeconomic indicators	1990-2007 (Actual)	2007-2020	2020-2035	2007-2035	
I. Indicator (annual growth rate, %)					
Gross Domestic Production	6.3	4.7	4.0	4.3	
Population	2.5	1.5	0.9	1.2	
II. Indicator (level)	2007 (Actual)	2010	2020	2030	2035
Per capita GDP (USD/capita)	4,884	5,439	7,307	9,891	11,488
Crude oil prices (USD/BBL)	68.3	52.3	114.3	159.6	188.6
Palm oil related assumptions	2007 (Actual)	2010	2020	2030	2035
FFB yield (tonnes/hectare)	18.5	19.4	21.9	24.7	26.2
Plantation area (hectare)	4.3	4.7	4.7	4.7	4.7
Palm oil prices (CIF Rotterdam Price) (USD/Metric Tonne)	780.0	945.7	1,033.5	1,308.5	1,472.3
Conversion ratio of FFB to palm oil	5 : 1	5 : 1	5 : 1	5 : 1	5 : 1

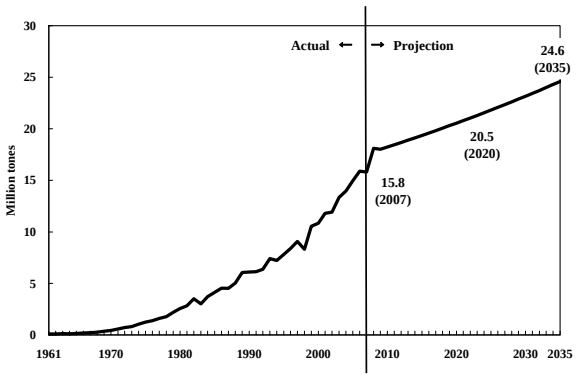

Fig. 2 Domestic palm oil production to 2035.

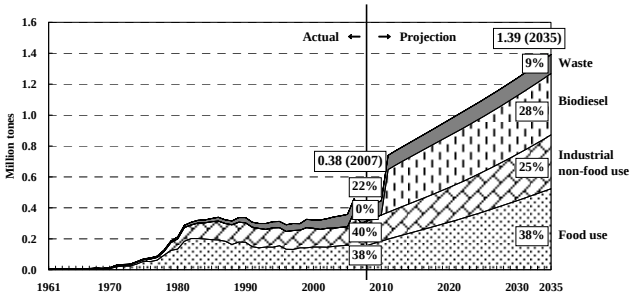

Fig. 3 Domestic demand for palm oil to 2035.

In terms of the amount of plantation area required to meet future palm oil demand, by assuming an annual average yield of 5.24 tones per hectare for palm oil production through 2035, domestic demand for palm oil would need only 5.7% of total plantation area by 2035. In other words, existing production is more than ample in meeting local demand even without further addition of new palm plantation area in Malaysia till

2035.

Coconut oil has been the main edible oil consumed in Malaysia, supplying close to 80% of vegetable oil consumption in 1960. Along with the expansion of commercial planting of palm oil beginning in the 1960s, demand for palm oil has increased with population growth, increased per capita consumption and as the consumers moved away from coconut oil. Today, palm oil is the main edible oil consumed in Malaysia accounted for 40% of vegetable oil consumption in 2007 [9].

Over the projection period, economic growth and population increases are projected to boost up food demand of palm oil. Per capita palm oil consumption is projected to rise to 14 kilogram (kg) by 2035, up from 5.5kg in 2007, supported by vast availability of home grown palm oil and strengthening global competition for soybean, particularly in China, India and European Union which will limit significant increase of soybean oil consumption in the future [5, 13]. Along with this increment, the share of palm oil in vegetable oil for food consumption is anticipated to increase from 40% in 2007 to 65% in 2035 as showed in Fig. 4.

Compared with other studies, FAPRI-ISU (2011) [11] in World Agricultural Outlook 2011 estimated 43kg of per capita palm oil consumption for Malaysia in 2025, a considerably much higher estimation compared with this study (see Table 3). In terms of per capita vegetable oil consumption, this study estimated 22kg in 2035, whereas OECD-FAO (2011) [14] projected 29kg in 2020 as showed in Table 3. Taking into account data differences for base year – 2007 between OECD-FAO and this study, OECD-FAO estimation for 2020 would be approximately 19.3kg, which is rather close to our projection.

3.2 Outlook of palm oil's export potential to 2035

Malaysia has been the leading exporter of palm oil, reflecting the country's large production and refining capacities, its small domestic market for palm oil, and an export tax structure that favors export of palm oil products rather than CPO . Palm oil available for exports is expected to increase to 23.2 million tones in 2035, up from total exports of 15.9 million tones in 2007 as showed in Fig. 5. According to OECD-FAO (2011)[14], world vegetable oil consumption for food and biofuel combined will reach 182 million tones in 2020. A large part of future increases in food consumption of developing countries are expected to come from vegetable oils and its products, with a growing share of four oilcrops namely oil palm, soybean, rape and sunflower in total oilcrops sector [5]. With an expected exportable surplus of over 23 million tones in 2035, Malaysia will remain a formidable competitor in the world vegetable oil and biofuel markets.

4. Conclusion

We developed and linked a palm oil sub-model to our integrated econometric model to analyze domestic supply and demand outlook of Malaysia's palm oil, as well as its ability to supply to global markets to 2035. Our projections indicate that domestic production of palm oil will increase to 25 million tones in 2035 through yield improvements. Domestic demand for palm oil will account for only 5% of total production in 2035, with a surplus of over 23 million tones available to feed further increases in food consumption of developing countries and global demand for biofuels.

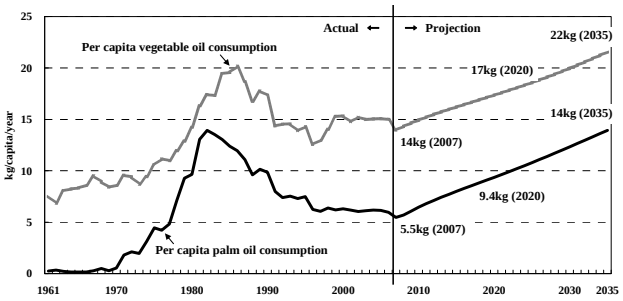

Fig. 4 Per capita consumption of palm oil in Malaysia to 2035.

Table 3 Comparison with other studies.

Study	2007	2015	2020	2025	2030	2035
I. Per capita vegetable oil consumption (kg/year)						
This study	14	16	17	19	20	22
FAO, 2003						
East Asia [1]	-	13	-	-	16	-
Industrial countries	-	22	-	-	23	-
OECD-FAO, 2011						
Developing countries	14	17	18	-	-	-
Malaysia	21	26	29	-	-	-
II. Per capita palm oil consumption (kg/year)						
This study	5.5	8.0	9.4	11	12	14
FAPRI, 2011 [2]	30	38	41	43	-	-

[1] includes Cambodia, China, Indonesia, Korea Dem. Rep., Korea Rep., Lao PDR, Malaysia, Mongolia, Myanmar, Philippines, Thailand, Vietnam, other East Asia countries.

[2] relatively higher projections compared with this study. This might be an estimation of per capita palm oil consumption including both food and non-food uses.

Source : Compiled from FAO, 2003; OECD-FAO, 2011, FAPRI, 2011.

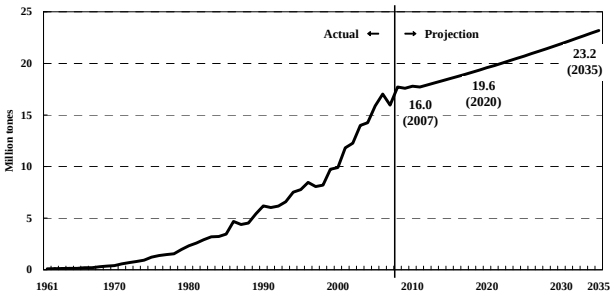

Fig. 5 Outlook of palm oil available for exports to 2035.

As the world's largest edible oil consumed and one of the important feedstock for transport biofuels, future increases in global demand will continue to push up demand for palm oil. Nonetheless, along with the rapidly increasing interest on palm oil use for transport fuels in recent years, serious concern about the sustainability of palm oil production has also increased and has stirred up new debates. Environment and conservation NGOs are concern over the potential destruction of valuable ecosystems that palm oil plantation would create, and studies debate over the environmental benefits of palm oil as a replacement to conventional fossil fuels [7,15-21]. The upcoming sustainability provisions for biofuels in the EU as stipulated in the Community's Renewable Energy Directive [22], the US regulations regarding the use of palm methyl ester under the 2011 Renewable Fuel Standard [23-25] are expected to further limit market access of palm oil.

It is therefore essential for palm oil producers to address

these concerns and barriers to maintain and strengthen its role in the growing global food and biofuel markets. Further increases in palm oil production can be achieved through yield and process improvements as an alternative to new plantation expansion. Existing plantations which are less economical can be rededicated to prepare areas for palm oil plantation, as has happened in the last decade in Malaysia. Many rubber, cocoa and coconut plantations were converted into palm plantations (Lam et al, 2009). Sustainable and responsible palm oil production as promoted through the Roundtable on Sustainable Palm Oil initiative (RSPO) and compliance with international fuel quality standards facilitate access to global market. Additionally, assessment and discussion on the use of palm oil as food and transport fuels need to be driven by objective information on the benefits and drawbacks of its production and use to avoid creating unnecessary market uncertainty.

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