Overview of Malaysian Palm Oil Industry

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The Malaysian palm oil industry has experienced significant growth since the crop was first introduced into the country from West Africa in the late 1970s. The oil palm species (Elaeis guineensis) was originally planted as an ornamental plant. The first commercial planting, albeit in a small scale was undertaken in 1917. It was only in the 1960s that oil palms were commercially cultivated in large scale, mainly attributed to the success of the government's crops diversification programme to avoid over dependence on natural rubber (the major commodity then). Since then, the palm oil industry has expanded rapidly. Today, oil palm has emerged as the most remunerative agricultural commodity, overtaking the position long enjoyed by natural rubber. Malaysia is today the world's leading producer and exporter of palm oil, accounting for more than half of the world total output and exports.

Palm oil and palm oil-based products (constituted 4.5% of total exports), with a total combined value of 5,3 billion US dollars, retained its position as the country's second largest export revenue earner in the year 2001. Palm oil, amounting to 3.5 billion US$, was the major commodity (66.5%) in this group of products. Compared with the previous year, exports of palm oil declined by 0.8% or 28.1 million US$. The reduction was solely due to softer f.o.b prices in the current year (-16.0% or -63.1 US$ per tonne) as its export volume, at 10.5 million tonnes and higher by 18.0% or 1.6 million tonnes was not able to compensate for the decline.

The oil palm industry can be divided into several main sectors according to their activities:

- plantations: planting of the oil palm and harvesting of the fresh fruit bunches (FFB);
- palm oil mills: processing of the FFB into crude palm oil (CPO) and palm kernels;
- palm kernel mills: extraction of the palm kernel oil;
- palm oil processing: refining and fractionation as well as production of downstream products and bulking installation and storage and shipment of palm oil products to importing countries all over the world.

Oil palm plantation

The total planted area with oil palm in 1960 was only about 55,000 hectares (Table 1). By 1970, some 261,199 hectares of land had been cultivated with oil palm. This figure continued to surge to 1,023,306 hectares by the following decade and at the end of 2001, Malaysia had more than 3.5 million hectares under oil palm. The phenomenal increase in the oil palm cultivation area in the late 1960s was largely due to the Government's Crop Diversification Programme which converted large tracts of rubber estates to oil palms as well as from planting by federal and state land schemes in newly opened up areas. The oil palm cultivation in Malaysia is generally based on the estate management system adopted from the rubber sector. There are three sub-sectors involved, namely private estates, government land schemes (owned by both Federal and State government agencies) and independent smallholders. Most of the private plantation houses are owned by public listed companies, among which are Guthrie, Sime Darby, Golden Hope, United Plantations, IOI etc.

Of the total planted area in 2001, 2,079,341 hectares or 59.4% was accounted for by privately owned estates (Table 2). Federal government agencies such as the Federal Land Development Authority (FELDA), the Federal Land Consolidation and Registration Authority (FELCRA) and the Rubber Industry Smallholders Development Authority (RISDA) collectively owned about 23.6% of the area cultivated with oil palm in 2001.

Table 1 - Total area planted with oil palm (hectares) and production of CPO and CPKO (tonnes)

Year	*Hectarage*	*CPO Production*	*CPKO Production*
1960	54,638	91,793	-
1970	261,199	431,069	-
1980	1,023,306	2,573,173	222,285
1990	1,984,167	6,094,622	827,737
1999	3,313,393	10,553,918	1,338,905
2000	3,376,664	10,842,095	1,384,685
2001	3,499,102	11,803,788	1,531,917

Source: MPOB Palm Oil Statistics 2001

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State government agencies in Sabah (Sabah Land Development Board) and Sarawak (Sarawak Land Development Board and Sarawak Land Consolidation and Rehabilitation Authority) on the other hand, constitute about 7.13% of the cultivated area while the smallholders takes up the remaining 9.8%.

Table 2 - Distribution of oil palm cultivation by category, 2001

Category	*Hectares*	*%*
Private Estate	2,079,341	59.43
Government Schemes		
FELDA	612,742	17.51
FELCRA	165,528	4.73
RISDA	48,605	1.39
State Schemes	249,454	7.13
Smallholders	343,342	9.81
Total	*3,499,012*	*100.00*

Source: MPOB Palm Oil Statistics 2001

Production

There are two main products produced by the palm oil industry namely crude palm oil (CPO) and crude palm kernel oil (CKPO) before further processing and downstream manufacturing activities. The oil palm is the most productive oil bearing plant species, e.g. palm oil production is 10 times that of soybean. In Malaysia, the oil palm planted is mainly the DxP (tenera) hybrid, which on average yields about 3.5 tonnes of palm oil per hectare, (Malaysian 10-years national average) in addition to 0.5 tonnes of PKO and 0.6 tonnes of palm kernel meal. The total production of CPO has increased significantly from 91,793 tonnes in 1960 to 2.57 million tonnes in 1980. The CPO production increased further to 11.8 million tonnes in 2001 and is expected to reach 14.4 million tonnes in the year 2005 while the total production for crude palm kernel oil has increased to 1.5 million tonnes in 2001 from 222,285 tonnes in 1980.
Prior to 1970, most of the palm kernels produced were exported. However, after 1970, the palm kernel were crushed locally to produce crude palm kernel oil and palm kernel cake and there have been no exports of palm kernels since then. Apart from the expansion in hectarage, the increase in production was also due to the increase in yield of the oil palm. The increase yield can be attributed to the success of research activities conducted in the past and continuously being undertaken in agronomic practices, farm mechanization, biotechnology and breeding to develop high yielding palm progenies. Improved management practices also contribute to high productivity. In Malaysia, the oil palm FFB yield vary greatly from 12-40 tonnes/hectare/year while the average being 18-25 tonnes/hectares/year. There are several factors that influence this variation in the yield which include planting materials, climatic conditions (especially rainfall-with prolonged dry spells resulting in low yields), seasonal variation, soil type and management systems. Proper management systems are of particular significance as they result in optimization of resources, application of proper planting techniques and the utilization of high yielding materials. This approach has proven to be successful in the large plantations and the organized smallholdings in government schemes.

Milling

CPO is extracted from the fresh fruit bunches at the mill. As at the end of 2001, there were 352 palm oil mills with a total capacity of 67.56 million tonnes fresh fruit bunches (FFB)/year were in operation in Malaysia. The mills are located strategically in the midst of the oil plantations. This is to facilitate the speedy and efficient transport and handling of the fresh fruit bunches to the mills upon harvesting. Such a practice will ensure that the crude palm oil extracted will be of the highest quality with low free fatty acids (FFA) content which is known to increase if processing is delayed. The crushing of palm kernel yields two products, i.e. palm kernel oil and palm kernel cake/pellet. There were 61 licensed palm kernel crushers in 2001 with a total crushing capacity of 5.09 million tonnes of palm kernel/ year.
The palm kernel crushers are mostly individual companies with small size capacity plants. Various practices are adopted at the mills and kernel crushing facilities to ensure the production of high quality semi-processed products for further processing. Besides minimizing delivery time of FFBs to mills, other practices include segregation of FFBs, two stage pressing and the application of micro-processors in sterilization.
Measures are also undertaken to ensure compliance with strict environmental regulations pertaining to discharge of mill effluents. Most mills have adopted anaerobic digestion systems to treat effluents while the use of decanters for clarification has helped to reduce the amount of effluent to be treated. In addition, MPOB has also introduced a scheme for evaluating the mills which is called the Mill Certificate of Competency (MCOC) to standardize operations and to encourage production of high quality CPO. Participating mills are evaluated and those that achieve a certain standard are awarded a certificate of competency valid for two year.

Refining

The promotion of agro-based industries in the 1970s by the government provided incentives for the setting-up of the first palm oil refinery in the country. When the refining industry first started in 1972, there were only four refineries in operation. At the end of 2001, there are 47 refineries in operation in the country with a total refining capacity of 15.55 million tonnes of CPO per annum. Malaysia is reputed to have the largest edible oil refining capacity in the world. Most of the palm oil refineries are located close to the ports to facilitate exports. This is especially true in the southern region where most of the refineries are strategically located in Pasir Gudang, Johor where the port is situated. The palm oil refining industry is today among the most important manufacturing sectors in the country. Besides contributing to the Gross Domestic Product and increasing employment opportunities in the country, the refining sector has contributed significantly to the growth of the palm oil industry in Malaysia.
These refineries have the facilities to not only refine the crude palm oil, but also fractionate the oil to produce products such as palm olein and palm stearin. A number of refineries have upgraded their facilities to undertake double fractionation process to produce more specialized products such as double fractionated palm olein and palm mid-fraction while some refineries have further ventured to produce other specialized tailor-made products like specialty fats and oleochemicals. Some of these refineries have also added palm kernel refining in their operations

so that they are also able to produce refined palm kernel oil and its fractions. When the palm oil refining industry first started in the 1970s, it had employed mainly alkali or chemical refining process as alkali refining was the more established process for edible oils at the time. This mode produced neutralized palm oil (NPO) and its products. After the late 1970s however, physical refining began to be the preferred method as it is more cost effective. Most refineries today are using physical refining to produce products such as RBD palm stearin (RBDPOs), RBD palm olein (RBDPOo), RBD palm kernel stearin (RBDPKOs), RBD palm kernel olein (RBDPKOo), RBD palm mid-fraction (PMF) and palm fatty acid distillates (PFAD).
Various technological improvements have been introduced to improve the efficiency of the refining plants. These include the use of membrane filter in fractionation to increase olein yield and the use of thin film deodorizer to reduce energy consumption (during deodorization). The above and other innovative measures have resulted in final products tailor made to meet customer requirements and quality specifications.
The Refiner's Certificate of Competency (RCOC) scheme was introduced by Palm Oil Research Institute of Malaysia (PORIM) in 1983 with the objective of establishing the capability of refiners in terms of skill and facilities to produce a consistent, high quality products. Although the scheme is voluntary, the RCOC has been accepted by the majority of the refiners in Malaysian. The evaluation is based on defined criteria which includes quality control, factory operations and storage and disposal of products. Participating refineries that have reached certain standard are issued with a certificate of competency valid for two years. The evaluation scheme has been revised from time to time to incorporate various standards such as the ISO 9000 series and Hazard Analysis Critical Control Point (HACCAP).

Oleochemicals

The Malaysian palm oil industry is experiencing another exciting area of development - the oleochemical industry. Prior to 1980, palm and palm kernel oils were mainly used after refining and fractionation, for edible purposes. Since the development of the Malaysian oleochemical industry in the early 1980s, there has been an increase in the used of these oils as raw materials for oleochemical production. By the mid-1980s, tallow and coconut oil were increasingly being replaced by palm and palm kernel oils since the production of the former was stagnating. The shift to the greater usage of palm and palm kernel oils was also accelerated by the establishment of many oleochemical plants in the Association of South East Asian Nations (ASEAN) and the Asia-Pacific region, notably Malaysia. The first oleochemical plant in the country started operation in 1982, and presently there are 17 operating oleochemical plants with a combined capacity of 1,957,509 tonnes. The oleochemical produced include refined fatty acids, glycerine, methyl esters and fatty alcohols. The oleochemicals are used for the production of soaps, detergents, surfactants and skin care products.

Other downstream products

Other downstream products of the Malaysian palm oil industry include margarine and shortening, vegetable ghee/vanaspati, fat blends, dough fat, cocoa butter susbstitutes, palm mid-fraction, soap and red olein. In 2001, a total of 290,341 tonnes of these products were exported and the export revenue was estimated at 150 million US$.

Infrastructure

Port and bulking facilities

The importance of port and bulking facilities in maintaining effective export linkages for the Malaysian palm oil industry cannot be over-emphasized. The four main ports of Pasir Gudang, Port Klang, Butterworth and Kuantan handle nearly all the palm oil products for export. For obvious reasons, many refineries are located within or close to these ports. There were a total of 33 bulking installation in operation in 2001 with a total storage capacity of 959,075 tonnes. Of these, 24 bulking installations with a combined capacity of 860,635 tonnes were located in Peninsular Malaysia (Port Klang, Butterworth, Pasir Gudang and Kuantan Port) while the others were in Sabah and Sarawak. These bulking installations received and handled 8.8 million tonnes of palm products in 2001. The largest bulking installation is Felda Johore Bulkers at the Pasir Gudang port that handles about 50% of total export of palm oil from Malaysia.
The bulking installation are custom built to cater for the palm oil industry and are specially designed and equipped with dedicated pipelines and almost all tanks used for palm oil products are coated with epoxy linings. Products stored in bulking installations are normally inspected and tested by cargo surveying companies upon arrival, during storage and when shipmen is made to ensure the quality of palm oil products being exported through Malaysian ports.

Role of government agencies and related organisations

The Ministry of Primary Industries, Malaysia announced the establishment of the Malaysian Palm Oil Board with effect from 1st May, 2000. Legislation for this was passed in the Malaysian Palm Oil Board Act 1998, assented to on 25th June, 1998 and gazetted on the 9th July, 1998. The functions of the Palm Oil Research Institute of Malaysia (PORIM) and the Palm Oil Registration and Licensing Authority (PORLA) are merged into MPOB, and PORIM and PORLA accordingly dissolved. The Malaysian Palm Oil Promotion Council (MPOPC) on the other hand, is a private organisation, incorporated to carry out promotion of Malaysian palm oil to the general consumers locally as well as overseas.
The private sector is also well represented in the organisation of the Malaysian palm oil industry through the various associations or bodies. The oil palm growers are represented by the Malaysian Palm Oil Association (MPOA) and the National Association of Smallholders (NASH), while the millers are represented by the Palm Oil Millers' Association (POMA). The Palm oil Refiners' Association of Malaysia (PORAM) represents the refiners. The manufacturers of edible oils are represented by the Malaysian Edible Oil Manufacturers' Association (MEOMA). The Malaysian Oleochemicals Manufacturers' Group (MOMG) and the Soap and Detergent Industries Group (SADIG) represent the oleochemical and the soap industries respectively. The views of these associations are always sought on matters of importance to the industry and appropriate action is taken based on the views. Another important organisa-

tion to the palm oil industry is the Malaysia Derivatives Exchange Bhd. (MDEX) which is responsible for regulating the trading of the palm oil futures market in Malaysia.

MPOB's objectives and functions

Objectives

MPOB is established with the following objectives:
- to promote and develop the oil palm industry of Malaysia;
- to develop national objectives, policies and priorities for the orderly development and administration of the oil palm industry in Malaysia.

Functions

The functions of MPOB are to:
- implement policies and developmental programmes to ensure the viability of the oil palm industry of Malaysia;
- conduct and promote research and developmental activities relating to the planting, production, harvesting, extraction, processing, storage, transportation, use, consumption and marketing of the oil palm and its products;
- plan, co-ordinate, implement and monitor research and developmental activities on the oil palm and its products;

Table 3 - Exports of Malaysian palm oil products (tonnes)

Products	*1960*	*1970*	*1980*	*1990*	*2000*	*2001*
Crude Palm Oil	97,568	401,930	197,659	93,949	398,352	1,275,732
Processed Palm Oil	-	-	2,073,563	5,633,502	8,683,143	9,343,069
Total	*97,568*	*401,930*	*2,271,222*	*5,727,451*	*9,081,495*	*10,618,801*

Source: MPOB Palm Oil Statistics 2001

- regulate, register, co-ordinate and promote all activities relating to the planting, supply, sale, purchase, distribution, movement, storage, surveying, testing, inspecting, brokering, export and import of oil palm products, and the milling of oil palm fruit;
- develope and commercialise research findings for the benefit of the oil palm industry and to promote the use of the research findings commercially;
- provide technical, advisory and consultancy services to the oil palm industry;
- promote the efficient marketing and handling of oil palm products;
- develope and maintain markets for oil palm products;
- promote, control and monitor measures towards attaining a high quality for oil palm products;
- plan and implement training programmes and human resource development in line with the need of the oil palm industry;
- liaise and co-ordinate with other bodies within or outside Malaysia to further enhance the oil palm industry of Malaysia;
- conduct research and development on oil seeds and other oils and fats other than palm oil where such research and development are for the enhancement of the oil palm industry;
- gather information and maintain records on all relevant matters relating to the oil palm industry;
- be the resource and information center for the oil palm industry;
- publish or sponsor the publication of journals, periodicals, booklets and other publications and to collect, collate and disseminate information relating to the oil palm, oil palm products and other vegetable and animal oils and fats;
- conduct research and development in any other area where the results of the research and development area intended to benefit the oil palm industry;
- do such other things as it deems fit to enable it to perform its function effectively or which are incidental to the performance of its functions.

Export market for Malaysian palm oil

Malaysia's ability to produce and export large quantities of consistently high quality palm oil which meets stringent standards as advocated by buyers has made palm oil a major oil in the world edible oil market. Palm oil is presently marketed to more than 100 countries worldwide. Prior to 1975 however, palm oil from Malaysia were exported in the crude form. Malaysia's export of CPO increased from 97,568 tonnes in 1960 to 901,566 tonnes in 1974 (Table 3). The EU, USA and Japan were originally the traditional markets for Malaysian palm oil. After 1975, when the refining sector had been established in the country as a result of government's incentives to encourage the processing of palm oil locally under the Industrial Master Plan (1985-1995), the demand for processed palm oil have also steadily increased. Consequently, the market share of these traditional importers was reduced to only 25% in the 1980s from 75% in the early 1970s. In 2001, processed palm oil accounted for 87.7% or 9.3 million tonnes of total export (of 10.6 million tonnes) while CPO exports accounted for only 12.0% or 1,275,732 tonnes. The markets for palm oil have now included other countries such as India, Pakistan, Bangladesh, West Asia, China, Africa and East Europe. In 2001, India was the biggest importer of Malaysian palm oil (2.03 million tonnes or 19.1% of total exports), followed by EU 1.60 million tonnes (15.1%), China PR 1.30 million tonnes (12.1%), Pakistan with imports of 1.13 million tonnes (10.7% of total exports) and Egypt with 0.45 million tonnes (4.3%). Together these five countries accounted for 6.51 million tonnes or 61.30% of Malaysia's total export.

The export of Malaysian palm kernel oil (PKO) in 1970 was very small at 2,268 tonnes. Most of the palm kernels produced were exported direct until 1979, where the kernels were all crushed to produce palm kernel oil and palm kernel cake. In 2001, Malaysia exported 668,605 tonnes of PKO and 1,807,429 tonnes of palm kernel cake. Major importers of PKO in 2001 were the USA with import of 122,721 tonnes (18.6% of total exports), the EU with 101,966 tonnes, Japan 52,333 tonnes, Singapore 39,554 tonnes and China PR 38,630 tonnes. The EU remained as the leading importer of palm kernel cake with 1,534,492 tonnes in 2001. In 2001, Malaysia's export of palm-based oleochemicals amounted to 1,197,964 tonnes with export revenue of 0.89 billion US$. The major oleochemicals products exported were stearic acid 246,419 tonnes (20.6% of total export value) and methylester (15.9% of total export value). The export of other palm oil finished products totaled 290,341 tonnes valued at 150 million US$.

Malaysian palm oil and world oils and fats

Palm oil is one of the 17 major oils and fats produced and traded in the world. The world production of oils and fats in 2001 was at 117.57 million tonnes. However, the main oils produced were soybean oil (27.77 million tonnes), palm oil (23.35 million tonnes), rapeseed oil (13.73 million tonnes) and sunflower oil (8.22 million tonnes). Malaysia produced about 50% or 11.81 million tonnes of the world production of palm oil in 2001.
Compared to the other oils and fats, palm oil is the most traded oil accounting for 46% of the total exports and import of the 17 oils and fats in 2001. Malaysia's dominance in the world palm oil trade has never been challenged. Malaysia remained the biggest producer and exporter of palm oil. In 2001, Malaysia exported about 10.618 million tonnes or 61% of the world exports of palm oil. Palm oil is the world's second most consumed oil, after soybean oil. With an annual disappearance of 23.62 million tonnes, palm oil accounted for 20% of the total 17 oils and fats disappearance of 118.09 million tonnes in 2001.

Future of the Malaysian palm oil industry

Malaysia will continue to promote, strengthen and expand its palm oil industry in order for the Malaysian palm oil to remain competitive with other sources of oils and fats. The Malaysian government is fully committed in its efforts through the introduction of various policies such as the National Agricultural Policy and the Industrial Master Plan to facilitate and encourage the development of the industry. In line with the national aspiration towards Vision 2020, the Malaysian palm oil industry will undoubtedly continue to play an important role as the backbone of the agricultural sector. As the country prepares itself towards becoming a fully developed nation by the year 2020, the growth of the palm oil industry is critical to ensure that the demand for quality raw materials for resource based industries especially in the oleochemical manufacture is met. It is envisaged that the Malaysian palm oil industry will make a significant contribution towards the industrialization of the Malaysian economy.
The Malaysian palm oil is expected to grow despite strong competition from other oils and fats and also from other palm oil producers. The growing world population and increasing affluence of the majority of the population, especially in the developing countries will create a big demand for oils and fats. Palm oil is expected to play a major role to satisfy this need.

Conclusion

Malaysia's achievement in the development of the palm oil industry within a comparatively short period of time has been well recognized. As the world's leading producer and supplier of palm oil, Malaysia is fully aware of its responsibility of ensuring a regular supply of high quality palm oil and its products to the world market. There is no doubt that Malaysia will continue to serve its clients in supplying the world with such kind of products.