



UNIVERSITI PUTRA MALAYSIA

**CAPACITY UTILISATION IN
THE MALAYSIAN PALM OIL REFINING INDUSTRY**

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**CAPACITY UTILISATION IN
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By

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**Dissertation Submitted in Fulfilment of the Requirements for
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DEDICATION

To my beloved parents Haji Abdul Jalil and Hajjah Mahma,
and to all my brothers and sisters.

ALHAMDULILAH



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CAPACITY UTILISATION IN
MALAYSIAN PALM OIL INDUSTRY

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This thesis examines the economic structure and performance of Malaysian palm oil refining industry with emphasis on both capacity utilisation (CU) of the individual refineries and the overall industry. The specific objectives of the study are: firstly, to explain the general economic development of the palm oil refining industry particularly from the perspective of policies that have been instrumental in shaping the progress of the industry; secondly, to elucidate the general market structure characteristics of the industry; thirdly, to assess the industry's performance pertaining to its CU from the perspective of its demand for the four factor inputs, namely; capital, labour, electricity and fuel; finally, to draw policy implications and recommendations.

The structural dimensions studied are the degree of market concentration and the extent of capacity utilisation in the palm oil refining industry. The industry



concentration is measured by using concentration ratio or indices commonly used by industrial economists, to show simple descriptive statistics of concentration ratio of the larger firms in the industry. The economic capacity output of the refining industry is analysed using the framework of cost and production function following Berndt and Hesse. The economic theory employed in the study is to specify, estimate and interpret the capacity output (CO) and CU measure of the twenty-one refineries within the oil palm refining industry for 1990 and 1991, using pooled time-series and cross-sectional data. CU is defined as the ratio of actual output to capacity output that measures the output gap that exists when actual output differs from capacity output. The framework is empirically implemented by estimating the restricted translog variable cost function with single output. The parameter estimates of the factor demand function are derived using the Ordinary Least Square technique, and elasticities of substitution of the parameter estimates are computed to evaluate the refinery's demand for inputs. The capacity output is estimated through an iterative technique, using the C-language Programming package, as it is not possible to be estimated through analytical or closed-form solution. The effects of change in price of the variable inputs on capacity output and CU is also being assessed.

The result of the four-firm concentration ratio indicates that the market share of the largest few firms from 1988-1992 comes to 40 per cent. It shows strong attributes of a workably competitive market where there is lack of government supervision, unstable market share, flexible pricing, low barriers to entry, very little collusion and very low profit.



The CU estimates point to pervasive and chronic excess capacity in all the refineries examined with the exception of one firm whose CU ratio was more than unity in both years, 1990 and 1991. This indicates the sluggishness of investment in this particular sector of the economy. Demand condition for the four factor inputs has been found to remain inelastic. An examination of the effects of change in price of electricity, fuel, labour and capital on CU shows an insignificant effect on the refiners' decision to refine. These findings imply that investment in capacity and capacity utilisation by all the refineries in the industry may be influenced by factors that are external to the refineries, for instance increased demand and price of RPO in the world market, or a decrease in domestic price of CPO, regardless of the price of the inputs.



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Kajian ini bertujuan untuk meneliti struktur dan prestasi ekonomi industri penapisan minyak sawit, dengan penumpuan khusus kepada penggunaan kapasiti (PK) oleh setiap kilang penapis dan industri keseluruhannya. Objektif khusus bagi kajian ini adalah: pertama, untuk mengesan pembangunan ekonomi industri minyak sawit ini secara menyeluruh, terutama dari perspektif dasar dan strategi kerajaan yang membawa kepada kemajuan industri ini; kedua, untuk menghuraikan ciri dan pola struktur pasaran industri tersebut secara menyeluruh; ketiga, untuk menilai prestasi industri tersebut dari segi penggunaan kapasiti yang diteliti dari perspektif permintaan terhadap faktor-faktor input berikut: iaitu, modal, buruh, tenaga elektrik dan bahanapi; dan akhir sekali, untuk merumuskan implikasi dan saranan polisi.



Dimensi struktur yang dikaji adalah berkaitan dengan darjah penumpuan pasaran dan tahap penggunaan kapasiti dalam industri penapisan kelapa sawit. Darjah penumpuan pasaran diukur dengan menggunakan nisbah atau indeks penumpuan pasaran yang sering digunakan oleh ahli-ahli ekonomi industri. Nisbah atau indeks ini menerangkan statistik diskriptif mudah mengenai nisbah penumpuan firma-firma besar dalam industri tersebut. Kapasiti ekonomi bagi output industri penapisan dianalisis berdasarkan kerangka fungsi kos dan pengeluaran mengikut kajian Berndt dan Hesse. Teori ekonomi yang dipadankan dalam kajian adalah untuk menentukan, menganggarkan serta mentakrifkan kapasiti output (KO) dan PK bagi 21 buah kilang penapisan kelapa sawit bagi tahun 1990 dan 1991, dengan menggunakan data siri masa tergembleng dan rentasan lintang. PK didefinisikan sebagai nisbah output sebenar kepada kapasiti output iaitu suatu nisbah yang mengukur perbezaan jarak output sebenar dengan kapasiti output. Kajian empirikal dibuat dengan menganggarkan fungsi translog kos berubah terhad bagi satu jenis output. Parameter untuk fungsi permintaan faktor pengeluaran dianggarkan melalui kaedah Kuasa Dua Terkecil, dan anggaran bagi parameter keanjalan peggantian yang biasa digunakan juga dibuat untuk mengukur permintaan input oleh kilang penapis. Anggaran kapasiti output pula dibuat melalui teknik lelaran dengan menggunakan Pekej Pengaturcaraan Bahasa-C kerana anggaran KO tidak dapat dianggarkan melalui penyelesaian analitis atau penyelesaian tertutup. Kesan perubahan harga input berubah ke atas kapasiti output dan penggunaan kapasiti juga diteliti.

Keputusan nisbah penumpuan bagi empat buah firma menunjukkan syer pasaran sejumlah kecil firma-firma besar dari tahun 1988-1992 adalah dalam purata 40 peratus. Penemuan ini jelas menunjukkan bahawa pasaran bercirikan 'persaingan boleh-berlaku' ujud, di mana terdapat kurang campur tangan kerajaan, syer pasaran yang tidak stabil, letak harga yang boleh-ubah, darjah halangan kemasukan yang rendah, kurang persepakatan dan keuntungan yang rendah.

Anggaran PK menunjukkan bahawa lebih kapasiti kronik berlaku di kilang-kilang penapis yang dikaji, kecuali sebuah kilang yang menunjukkan nisbah PK yang lebih daripada satu dalam kedua-dua tahun, iaitu 1990 dan 1991. Penemuan ini menunjukkan tahap pelaburan yang lembap dalam sektor ekonomi ini. Permintaan terhadap keempat-empat faktor input menampilkan ciri tidak anjal. Perubahan harga tenaga elektrik, bahanapi, buruh dan modal ke atas penggunaan kapasiti memberi kesan yang tidak signifikan di dalam mempengaruhi keputusan pengilang untuk memproses minyak kelapa sawit mereka. Kesemua penemuan ini menyarankan bahawa kemungkinan pelaburan dalam kapasiti dan penggunaan kapasiti oleh semua kilang penapis dipengaruhi oleh faktor-faktor luaran seperti pertambahan dalam permintaan dan harga minyak kelapa sawit yang diproses (MKSP) di pasaran dunia, atau penurunan harga domestik bagi minyak kelapa sawit mentah (MKSM), tanpa mengambilkira harga input-input.

CHAPTER I

INTRODUCTION

The aim of this introductory chapter is to provide the backdrop to the thesis by way of examining the national development planning processes, in particular those which have a direct bearing on the growth performance of the palm oil primary sector and palm oil industrial sector.

Malaysia in Brief

Malaysia, an independent state within the British Commonwealth, is a constitutional monarchy with a parliamentary system modelled on that of the British. The country covers an area of about 336,700 square kilometre consisting of Peninsular Malaysia and the East Malaysian States of Sabah and Sarawak which are situated in the north-western part of Borneo island. Peninsular Malaysia or more commonly known as West Malaysia lies in the south of Thailand, with the island state of Singapore to its immediate south. It is also bounded by the Indian Ocean on the west and the South China Sea on the East.

The relative uniformity of the Malaysian climate throughout the year, with abundant amount of rainfall and sunlight is generally conducive to a wide range of agricultural activities. This explains why agriculture has predominated the Malaysian

economy for so long and has been the backbone of the economy since the colonial time. During the early post-independent period agriculture generated more than 30 per cent of the gross domestic product (GDP), 50 per cent of employment, about 60 per cent of the foreign exchange earnings (Third Malaysia plan, 1975). Even though its contribution to gross domestic product (GDP) and foreign exchange earnings had somewhat declined since the late 1980s, the sector has continued to be accorded a high priority in view of its role to sustain the rapid development of local agrobased processing industries.

Malaysia has already possessed a highly productive agriculture sector that has a strong foothold in the world market. The Agricultural Policy emphasis has been largely in the production of primary export commodities like rubber, palm oil and more recently cocoa. Recent modification on the policy focused explicitly on agricultural manufacturing and processing. This is due to the realisation that economic development can be further strengthened through the existing primary commodities by simultaneously developing new exports such as food and other economic value crops and related down-stream activities.

Whereas agriculture has performed well and made useful contribution to the country's future, its development thrust, it is believed will have to be based on manufacturing. Under the Industrial Master Plan (1985) the manufacturing sector will be developed in a balanced manner taking into consideration the size of the market, processing capacities, demand and supply situation and the possibilities with respect to upstream and downstream manufacturing activities. This strategy, among other things, would imply a strong interaction between agriculture and other sectors

of the economy through the increased activity of agrobased industrial development. Thus, as the Malaysian economy edges into a high degree of industrialisation it should be expected that the resource-based industry should move into higher levels of downstream activity. For instance, the country may endeavour to supply rubber products instead of natural rubber, cocoa products instead of raw and roasted cocoa beans, high value-added palm oil products rather than crude oil, a variety of chemicals from crude oil and natural gas, tin products from tin concentrates and processed wood products from sawn timber. Indeed this must be viewed as vital for promoting a rapid growth in the country. Despite the fact that Malaysia's raw material export like petroleum, timber and palm oil has consistently been able to withstand competition in the world commodity markets, it appears inevitable that domestic manufacturing outlet be developed in view of uncertainties often associated with international commodity markets.

Agriculture in National Development

At the time of British intervention in 1874, agricultural activity in Malaysia tended to occur in intermittent spurts. This was largely because agricultural development was not actively encouraged by the colonial administration of the Straits Settlement, but rather was left to the initiative of the local populace. The cultivation of rice, the main food crop was largely confined to the ethnic Malays, who mostly practised subsistence agriculture. The Chinese on the other hand, tended to focus on more extensive shifting cultivation of crops of commercial value such as gambier, tapioca and pepper (Thoburn, 1977). To some extent, there was European investor in agriculture, particularly in coffee and sugar, but the decline in the world

market demand for the products, subsequently resulted in their disinvestment in both of these plantation ventures. The European capitalists, in turn, showed interest in new crop - rubber. This interest, to a large extent was brought about by the discovery of the vulcanisation process and the growing demand for rubber in the automobile manufacturing industry of the West.

Even though oil palm (*Elaeis guineensis*) was introduced into the country in as early as 1870, its economic importance was hardly appreciated. Indeed, it was a coincidence that both oil palm and rubber seeds were introduced at about the same time. The late development and the slow growth of the palm oil industry, however, was a reflection of the thriving profitability of the rubber industry during the earlier part of the century as compared to the former. In 1903 several importation of oil palm seeds were made to test the suitability of its cultivation in Malaysia, but in spite of this, commercial planting of the palm took place only in 1917. By this time, rubber cultivators had already reaped substantial monetary benefits from their investment in rubber plantation. The colonial government policy which was explicitly geared towards the fostering of European plantation agriculture based primarily on rubber planting contributed to the phenomenon (Snodgrass, 1980). Also, the colonial agricultural policy was clearly discriminatory towards the local producers, thereby discouraging any substantial local investment in oil palm.

During the colonial period, including over the post-World War II period of 1947-1957, the national income structure of Malaysia glaringly rested on a highly

Rubber was introduced into the country (then Malaya) in 1877. Refer to 'Technological Development - Malaysian Industry in Transition', by Fong Chan Onn, Oxford University Press, NY 1986.

specialised agriculture production based on the export crop of rubber, tin mining and entreport trade. For instance, in 1953 export shipments of rubber and tin constituted almost 85 per cent of total exports. Rubber accounted for 30 per cent of national product and 60 per cent of export earnings. On the other hand the gross value of tin was slightly more than 20 per cent of total export value, and between 12 to 15 per cent of government revenue. As oil palm was still under the exploratory stage by this time, export of palm oil and palm kernel oil constituted barely 1 per cent of total agricultural exports (International Bureau of Research and Development, 1955).

Prior to independence in 1957 there was a deliberate curtailment of industrial development by the British administration. This could be explained by the prevailing policy of encouraging the export of primary agricultural goods in exchange for manufactures from Britain. Accordingly manufacturing industries tended to develop only in those particular areas which could not be met by British sources, such as those directly related to tin mining and rubber and oil palm plantation, either through forward or backward linkages; or the non-tradable utility and communications services. The growth of transportation, banking and telecommunication services and other tertiary activities was stimulated to a large extent by the expansion of the agricultural sector. Despite of the rubber and tin price booms for much of the period industrial growth in the country remained insignificant. Malaysia during the colonial era was a typically dependent colonial economy characterised by a “classical export” system that was based on export of agricultural raw materials in exchange for manufacturing imports.

Evidently, the Malaysian agriculture policy which evolved during the early post-independent period, still continued to emphasise primary commodity production, particularly export commodities such as rubber and palm oil. The growth of the manufacturing sector only gained momentum from the early 1960s when the official policy, disillusioned by the steady worsening of the terms of trade, began to turn its orientation towards the development of the manufacturing sector. Malaysia's highly specialised economic activities up till then created a considerable element of instability in the economy making development planning difficult. In the early 1960s² Malaysia experienced sharp vagaries of external market forces which impacted the prices of rubber and tin significantly. Between 1960 and 1965 the unit value of export rubber fell by more than 35 per cent (Hoffmann and Tan, 1980), much of which was due to competition from newly invented synthetic rubber in the world rubber consumption³. From 1960 onwards total world consumption of natural rubber dropped steeply by more than 50 per cent, and by 1979 total world usage of natural rubber was only 30 per cent of total consumption (Yusof Basiron, 1986). The strong negative influence of the competing synthetic on the price of natural rubber caused the latter to fluctuate by 12 per cent and this eventually led to a 1 per cent change in national product (Kasper, 1974; Chang, 1977).

From a different view point tin could not maintain its pre-war status as the second most important foreign exchange earner after rubber, due to the decline in demand for it as an intermediate input by the industrial countries. Besides, the

² The Federation of Malaya and Singapore gained independence from Great Britain in the year 1957. the Federation of Malaysia was formed in September 1963 with Sabah and Sarawak joining the Federation, but Singapore left Malaysia in 1965 to become an independent nation in the British Commonwealth and the member of the United Nation.

³ In the Rubber Literature, 'total rubber consumption' indicates the consumption of natural rubber plus synthetic rubber (Yusof Basiron, 1986).

quality of tin ore from the Malaysian reworked fields had also declined, while mining of the richer reserves was severely impeded by the lack of prospecting activities. As a result there was an urgent desire to look for diversification possibilities in the agricultural sector, and oil palm emerged as one potentially attractive alternative to warrant significant consideration. The crop at this stage was almost established with scattered plantings in estate sector. This, in a way had fostered the confidence of the private and public sectors alike. The sharp and prolonged decline in the price of rubber since 1965 further intensified the need to switch from rubber to oil palm. The total area planted with oil palm in Peninsula Malaysia in 1965 was about 81,000 hectares. By 1988 oil palm had occupied 1,745,581 hectares of total cultivated agricultural land, and had a total production of 5,000,000 tonnes of palm oil (Mid-Term Review of Fifth Malaysia Plan, 1989).

The development of the downstream palm oil industry in Malaysia, on the other hand, was due to several factors. Firstly, the favourable agro-climatic condition in Malaysia, which is similar to that of West Africa and the tropical region of the American continent, the palm's natural habitat, is ideally suited for oil palm cultivation. The fairly long daily sunshine hours together with high rainfall meet the requirement of the crop. This has resulted in palms having comparatively high yields compared with those grown in its homeland. Secondly, the plantation system of cultivation under which rubber has been successfully produced, can be readily adapted to oil palm cultivation. This became very evident during the period of high competition between natural and synthetic rubber, when the dampened price of natural rubber caused numerous large plantations to convert their rubber land into oil palm plantation within a short period. Thirdly, there was a concerted joint effort