Industrial Organization and Sectoral Linkages: A Study of the Malaysian Palm Oil Industry

Niels Fold

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The paper analyses the industrial organization of the Malaysian palm oil industry, a case of agricultural based downstream industrialization linked to the world market. The objective is to identify salient policy lessons concerning the use of regulating mechanisms in order to link the agricultural and industrial sectors in developing countries. Data collection and analysis are structured by a model of a national vegetable oil complexe, i.e. the social agents involved in cultivation and processing of oil crops, and their mutual relations. The study reveals that there is a case for selective use of different institutions that do not fit into the state or market dichotomy within the discourse on development strategies.

Keywords: *development geography, industrialization strategy, industrial organization, palm oil, Malaysia.*

Niels Fold, Assistant professor, Institute of Geography, University of Copenhagen, Øster Voldgade 10, DK-1350 Copenhagen K.

During the last 25 years the Malaysian production of palm oil has increased at an incredible pace (PORLA, 1990). Between the late 1960s and the late 1980s planted area increased nearly ten times and now covers about 2 million hectares, 85 % in Peninsular Malaysia and the rest primarily in Sabah (see figure 1). In the same period the production of palm oil increased about twenty times to 6 million tonnes indicating the tremendous progress in oil palm breeding and agricultural practices. Parallel to the increase in production the processing capacity has been expanded to handle the harvested fruit bunches; a total of 261 palm oil mills were in operation in 1990. Since the mid-1970s refining and fractionating capacity, i.e. the capacity to process crude palm oil resulting from the mill operation, also increased reaching a total of about 10 million tonnes of crude palm oil a year. In the 1980s the palm oil industry was further diversified as a number of oleochemical plants were established.

The same development trends of expansion and diversification are found in exports of palm oil. About 90-95 % of the production is exported and besides the considerable expansion, exports have been characterized by an increasing diversification of products and markets: from a situation in the 1960s when exports of crude palm oil to industrialized countries completely dominated the picture to a situation in the late 1980s characterized by exports of various bulk products and speciality fats to a considerable number of industrialized and developing countries.

On a global scale, Malaysia has been the most important producer and exporter of palm oil for nearly two decades. In 1990 Malaysian palm oil constituted about 60 % of the world production and about 70 % of the world exports of palm oil. Indonesia, the second most important producer and exporter, had about 20 % of the world production and about 15 % of the world exports the same year. Compared with other major vegetable oils, palm oil has recently become second only to soyabean oil in terms of the total world production but it has been the most important vegetable oil in world trade for a decade, primarily because of the development of the Malaysian industry.

As it appears, the Malaysian palm oil industry is a successful story of agricultural based, downstream industrialization linked to the world market. This is a rather superficial account of what has actually happened leaving aside a lot of the social, economic, and political particularities. However, the Malaysian palm oil industry obviously deserves attention as it provides a relatively unique possibility to study and learn more about the factors behind this apparently dynamic, agriculturally based industrialization.

This paper starts out with a brief discussion of the traditional sectoral approach to the study of agriculture-industry linkages and subsequently outlines an alternative approach based on the concept of a vertical production line. Next, the methods for data collection and analysis are described. The main part of the paper consists of a succeeding analysis of the industrial organization of the Malaysian palm oil industry, i.e. the type of social agents involved, the intra-industry markets for goods and services (including the supply systems), the role of the trade organizations, and the power of regulating state institutions. This analysis is started off by a short introduction to the ethnic dimension of the Malaysian development strategy. The conclusion points to some general policy lessons concerning the role of the state versus that of the market within the discourse on development strategies.

Theoretical Background and Analytical Concepts

The theoretical arguments for an agriculturally based industrialization strategy are founded on a number of tradi-

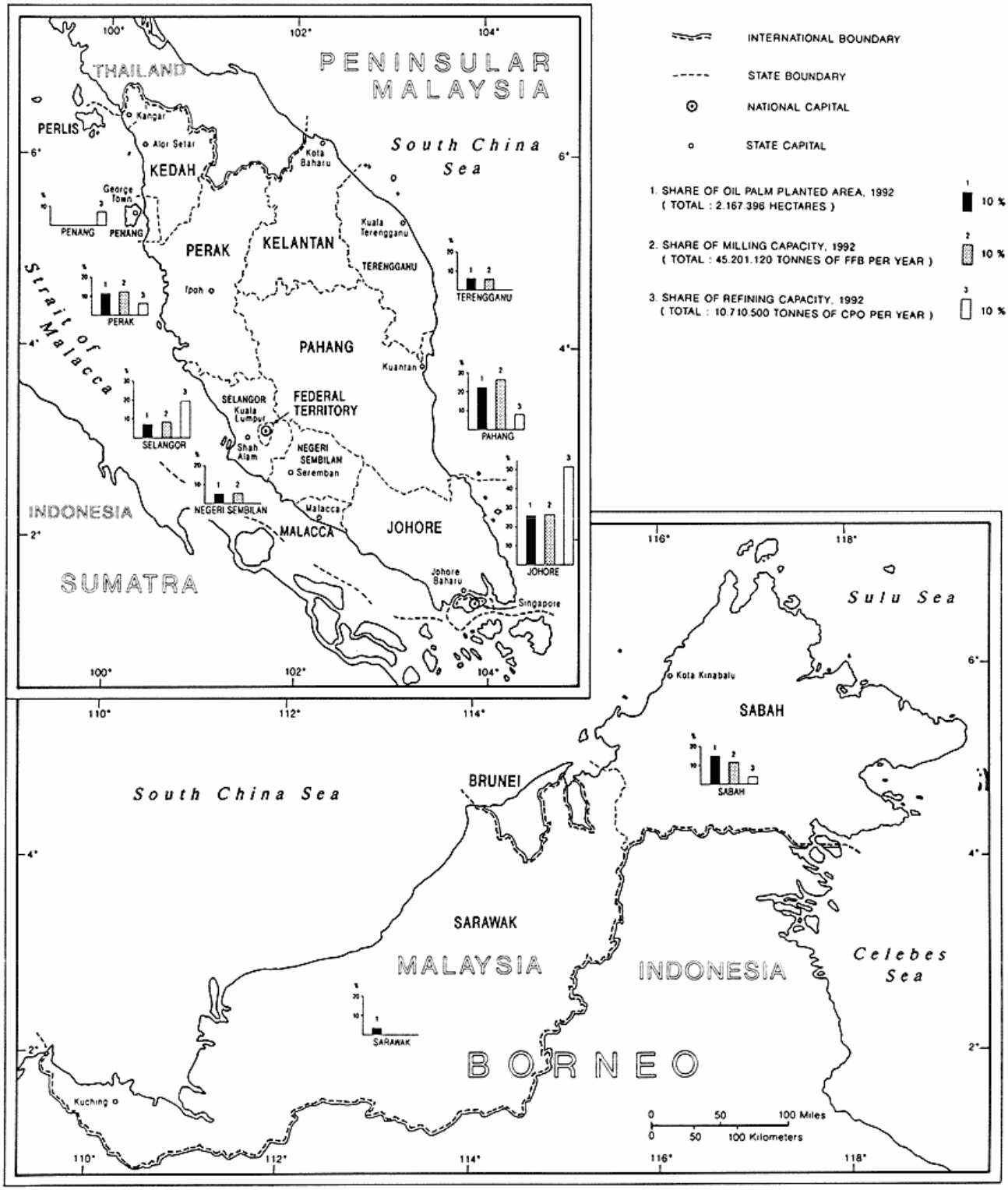

Figure 1. Malaysia. Distribution of oil palm cultivation and processing (% of total area and capacity). Note: Relative shares below 3% are omitted. Source: PORLA (Palm Oil Statistics, 1992)

tional macroeconomic considerations and run as follows: Agriculture and industry are mutually supporting and depending on each other at the macroeconomic level. Agriculture supplies raw materials to industry and food to wage labour. Agricultural exports are the most important source of foreign exchange in many developing countries thereby providing resources for imports of intermediate and capital goods necessary in the initial phases of an industrialisation process. The agricultural sector constitutes an important market for local industrial goods, partly of inputs to the agricultural production and partly of consumer goods for the rural population. In addition technological development may be stimulated by the demand for machinery for cultivation and processing of agricultural goods. Lastly, a strengthening of the linkages has the potential to change the structure of foreign trade; from exports of agricultural commodities to exports of processed agricultural products and possibly equipment for processing (see for instance Kaldor (1967)).

It is primarily agricultural economists like Mellor (1986, 1988/89) and Adelman (1984) that have refined and promoted this approach in the 1980s. Their arguments are based on formal two-sector models that reduce the complexity and the dynamics in the linkages to certain conspicuous sector relations such as production and exchange of standard goods between the sectors, demand for labour, or changes in the level of investments. The objective is to examine the effects of various state policies. The models are stylised – and usually rather idealised – versions of concrete social formations. Models based on the development process and the nature of the sectoral relations in Taiwan and South Korea are particularly popular.

The sectoral approach can be criticised in two respects. Firstly, the models do not adequately include social actors. In the simple version of the models the issue of social actors is reduced to a question of exchange of goods between sectors and growth of the aggregate income at the sectoral level. This leads to idealistic and simplistic policy recommendations. Secondly, the approach is not open for time and space specific variations in the structure of the sectoral linkages, i.e. open towards different types of social actors and their mutual relationships.

An alternative theoretical approach is based on the concept of a vertical production line. A vertical production line includes all the activities involved in the production of a particular final product. It encompasses the actual extraction/cultivation of raw materials and the further processing into both intermediate goods used in other vertical production lines and final consumer goods. It also includes the production of equipment and intermediate goods used in the extraction/cultivation and further processing of primary materials. In addition to these activities, the vertical production line includes all the services necessary for the flow of raw materials from their source to the private or industrial consumers, i.e. activities related to producer services, storage, transport, financing, distribution, etc.

The concept of a vertical production line can be directly applied to the linkage between agriculture and industry. In this context a vertical production line consists of specific economic activities in agriculture and industry linked through the cultivation and processing of one type (or set) of agricultural crops. At this analytical level social agents should be included in the theoretical framework. For this purpose it is fruitful to divide the concept of a vertical production line into two interrelated categories, viz. the filière and the complexe (Bertrand, 1988).

The filière denotes the material flow through the production line and specifies the linkages between the different activities and the goods produced in each of them. In principle, a filière accounts for all the technical processes related to the cultivation and processing of a specific type of agricultural raw material. A filière also indicates the "leakages" in the production line as it takes into consideration production for subsistence as well as stocks held. A national filière indicates the material flow within a given country including external trade. There is no a priori assumption related to the category filière that all the technical activities involved and possible flows of material, which are outlined at the abstract level, will be found in any given national filière at the concrete level. On the contrary, it is to be expected that only parts of it are present in most countries, particularly among the developing countries.

The development potential related to the expansion and strengthening of productive linkages in a national filière is only realized under certain conditions. It depends on the social agents involved (including the nation state). In some situations there are identical interests among the dominating agents concerning the establishment of a coherent filière. In other situations strategic considerations of individual agents would render the establishment impossible. The category of complexe denotes this social organization of production, the agents involved and their mutual relations. In addition to the central social agents involved in the production and processing activities of the filière, a number of other agents are active: firstly, agents who supply the filière with goods and services (suppliers of capital goods, financial institutions, consulting firms, research and development institutions, etc.); and secondly, agents who distribute the products, both in their physical distribution (transportation) and functional distribution (commercial networks).

At the abstract level the central social agents in a na-

tional complexe are subdivided into three separate groups: foreign, private national or state-controlled. Within these three general groupings it is possible to distinguish between sub-groups of agents such as: proper transnational capital and foreign bilateral capital, simple commodity producers and capitalist producers, federal and local institutions and capital. Nothing prompts the individual agents in these groups and sub-groups to be in a firm and constant alliance; contradictions between agents within a certain group or sub-group are found simultaneously with alliances between groups. However, state policy, in principle, has different possibilities of regulating, controlling and sanctioning agents in each of these three groups.

Formulations of state policies in terms of vertical production lines are infrequent. Policies are predominantly formulated in terms of sectors (agriculture, industry, commerce, service) and based on traditional means such as credit, tax, licence, and research policies. Policies in sector terms, though, have different effects on different parts of the vertical production line and might eventually be counter-productive to the integration and expansion of the very same vertical production line.

Methods and Data Material

The vertical production line is a concept that can be easily adopted to form a methodology. The textural context, i.e. the different processes involved in the cultivation and processing of a specific agricultural raw material, marks the vertical production line with certain characteristics that must be accounted for in the method. Thus, models of the filière and complexe of the vegetable oil industry can be constructed (see Fold (pp. 31-37, 1993) for details).

In short, the national filière is divided into three segments, viz. the agricultural segment (cultivation of oil crops), the primary processing segment (milling of oil crops into crude vegetable oil and oil cake/meal) and the secondary processing segment (refining and further processing of crude vegetable oil). This division forms the starting point for the model of a national complexe. It consists of the producer blocks that belong to each of the segments. Each producer block is constituted by a specific type of production or processing activity and characterised by its particular set of social agents. The material flow is organized (physically as well as functionally) in the intermediary blocks: the raw material and their processed

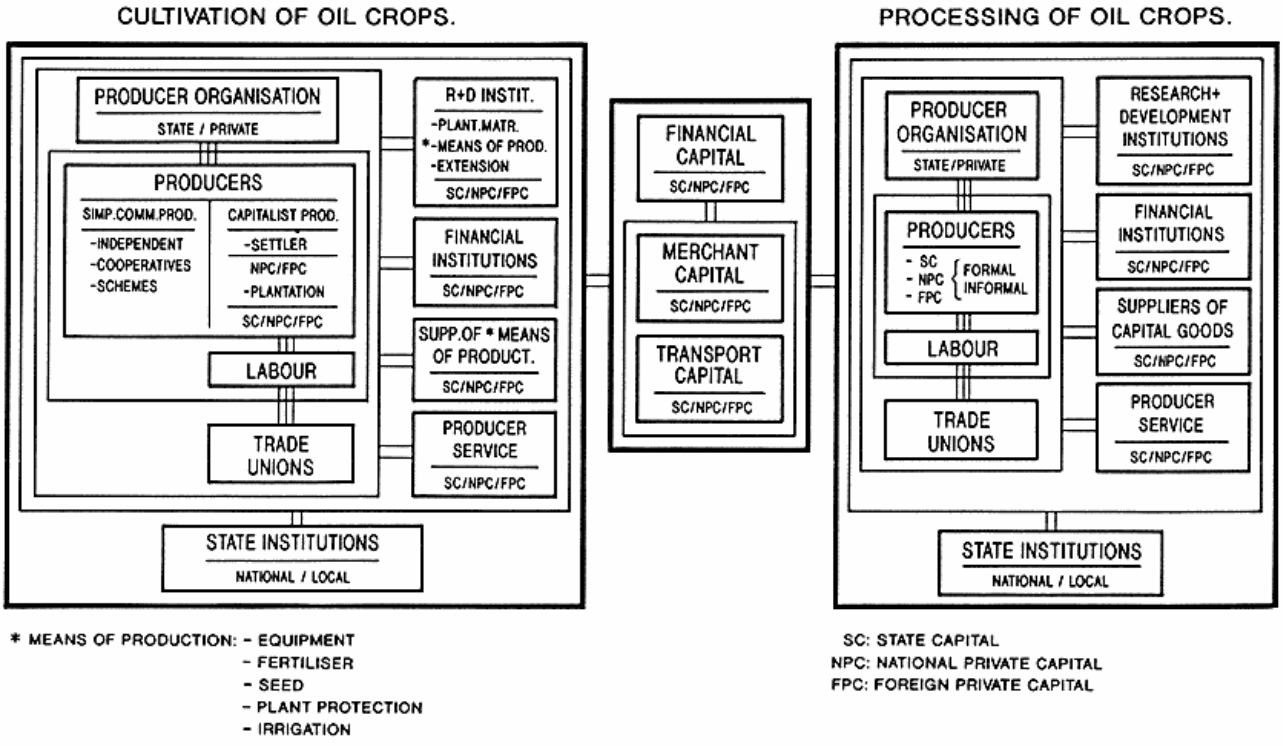

Figure 2. The complexe of a national vegetable oil industry.

forms are transferred through the vegetable oil industry from one producer block to another (see figure 2; for technical reasons, only the agricultural segment and primary processing segment are represented).

These models constitute a basis for the organisation of data collection and analysis. In this study the starting point for data collection was the secondary processing segment (the refining process). Data was collected through a questionnaire-based investigation of ten refining companies selected according to their range of products, customers (trading agents, agents involved in further processing, export customers, etc.), degree of vertical integration (at company level), ownership, size (in terms of capacity), and localisation (industrial complexes, rural areas).

The investigation was structured by the concept of industry governance system (see Storper & Walker, 1989); the industry governance system refers to a collection of mechanisms and institutions that govern the vertical production line and, in turn, makes up its characteristics. It is constituted by the markets involved, the supply system, the strategic alliances between agents in the complexe, trade associations, and state institutions.

The information obtained in the questionnaire investigation was subsequently used as a basis for a selection of a number of informants among other types of social agents in the vegetable oil industry (suppliers of raw materials, buyers of processed goods, capital goods suppliers, consultancy firms, transport companies, etc.). Interviews with this group were carried out in a less structured manner. This broadens the study to other parts of the vertical production line (complexe) and enables illumination of issues discovered in the initial questionnaire investigation. Finally, relevant state institutions were identified and interviews implemented. Primary statistics and secondary material were collected and worked into the final analysis.

The procedure – starting from a "core" block and then systematically broadening out the study into the rest of the vertical production line – does not aim to cover all of the agents involved and their mutual relations. Rather it seeks to highlight the salient linkage problems in the vegetable oil industry under study. The advantages of the method consist of its logical cogency and its sensitivity to catch the specific dynamics in a concrete national complexe.

The Ethnic Dimension of the Malaysian Development Strategy

Growing ethnic and social conflicts in the Malaysian social formation were the underlying reason for a change in the development strategy around 1970, officially expressed in the so-called New Economic Policy (NEP). The Malay fraction of the ruling political alliance pressed for a more visible and important role for the Malays in the economy, previously dominated by foreign capital and local Chinese-owned capital. Apart from a larger share of corporate assets, the Malays were also to be enrolled as consumers and producers (i.e. as wage labourers) of industrial goods.

NEP consisted of two basic objectives: firstly, to reduce poverty and secondly, to reduce social differences between ethnic groups. Both objectives were scheduled to be achieved by economic growth based on expanded state participation in the economy and reorientation of the industrialization strategy in favour of manufactured exports respectively. Growth was the pivot of NEP ensuring that the relative redistribution of wealth was based on new activities and not on existing assets – Chinese or foreign.

In practice, the two general objectives were pursued by two different sets of policies, one directed primarily towards agricultural/rural development and the other directed primarily towards industrial/urban development. The reduction of poverty was carried out through development programmes aiming at poor households, mainly poor Malays in rural areas. New forms of policies have, however, not been identified; rather, old measures from the colonial period are intensified and streamlined (Drury, 1988; Jenkins & Lai, 1989). Firstly, access for smallholders to credit and alternative marketing channels was improved and subsidies to paddy farmers were expanded substantially in the mid-1970s. Secondly, a resettlement programme was intensified absorbing an increasing number of poor (Malay) households and enlarging the cultivated area of export crops, primarily palm oil and rubber. In addition, activities by other state-controlled organizations that offered services to existing villages in connection with the transformation of fringe land to plantation-like production of the same export crops were increased.

While the poverty reduction was primarily reflected in state- financed activities in rural areas, the reduction of social differences between ethnic groups has been a major issue of state regulation of the urban industrial sector (Jesudason, 1990). Firstly, the Government pressed for industrial employment of more Malays in all positions ranging from unskilled workers to technical and adminis-

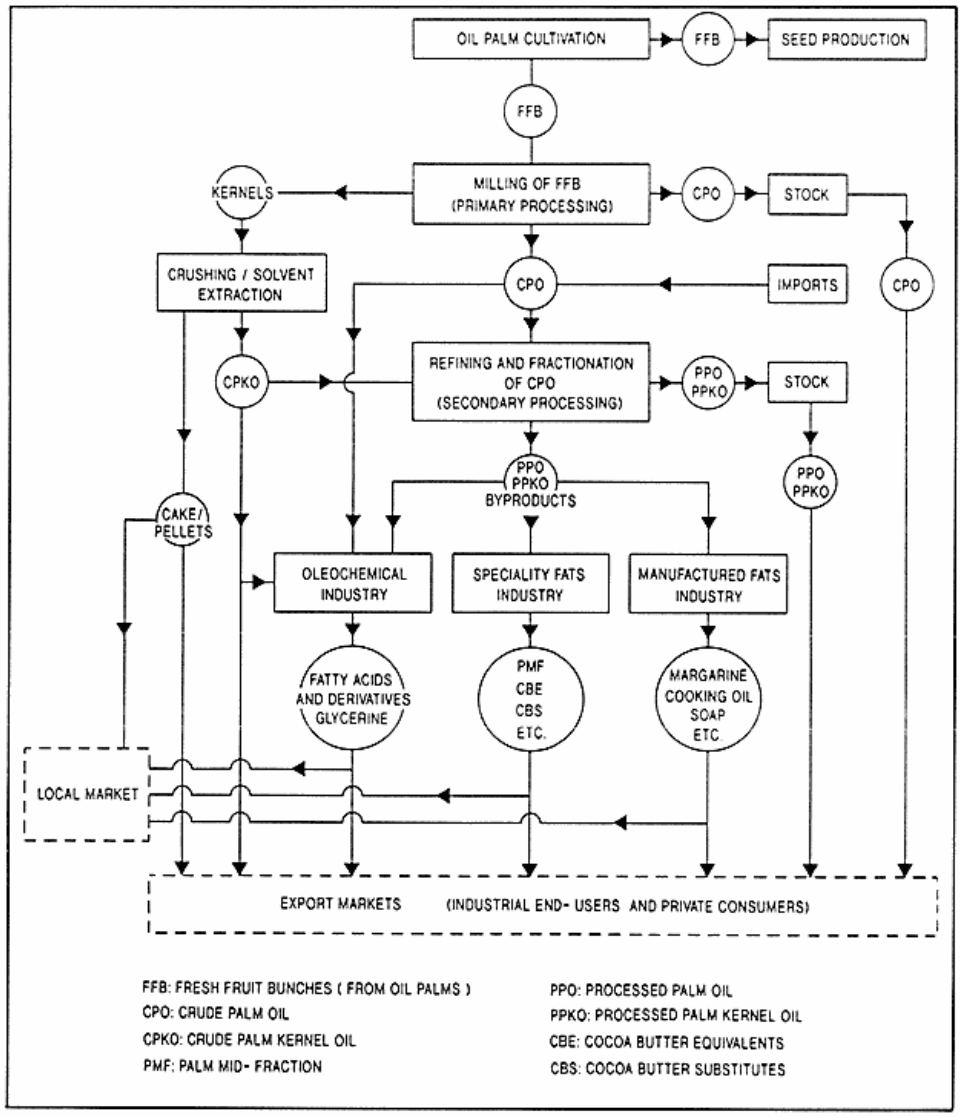

Figure 3. The palm oil filière in Malaysia.

trative managers. Secondly, and in line with the redistribution aspect of NEP, equity shares were to be distributed according to specified targets – by 1990, 30 % held by Malays, 30 % by foreigners and 40 % by other Malaysians (Chinese and Indians). One of the means consisted of state capital buying up shares in existing private agricultural, industrial and financial companies on behalf of the Malays. The private, foreign-owned estates early became one of the primary targets and by the early 1980s state capital virtually controlled the whole estate sector.

Thus, the development of the Malaysian palm oil industry is decisively influenced by the distributional considerations laid down in the official development strategy. The industry has served as an important vehicle for a state-led, relative redistribution of resources to the benefit of the Malays: the resettlement programme in terms of income generation through the cultivation of oil palms and the state ownership of estates in terms of redistribution of wealth. It is within this context of "Malayization" of the economy that the development of the palm oil industry must be examined.

Organization of the Malaysian Palm Oil Industry

A schematic model of the palm oil filière is outlined in figure 3. It is notable that all agricultural production takes place within the world market, i.e. oil palm fruits (in commercial terms: fresh fruit bunches (ffb)) are not produced for subsistence in Malaysia. Palm oil is extracted from palm fruits; between 500-2000 fruits with an individual weight of 3-30 g are attached to a fruit bunch which develops in 5 to 6 months. Palm kernel oil is extracted from the kernel in each fruit. After 3-4 years, oil palms produce fresh fruit bunches (ffb) continuously although not at regular intervals. The number of bunches produced by each palm averages 8-15 per year when productivity is good but 18-24 bunches per year have been recorded (see Wood (1986), Tan Kiap Seng (1987) and Hartley (1988) for details).

Primary processing (milling) results in two vegetable oils with different compositions of fatty acids, viz. palm oil and – after crushing – palm kernel oil. Crude palm and palm kernel oil are either exported or transferred to secondary processing, where they are refined and/or fractionated. The secondary processed products are exported or further processed into higher value added products in the oleochemical, speciality fats or manufactured fats industries, respectively. In addition, crude oils are used in the oleochemical industry. Products from these three industries are either exported or sold on the domestic market to consumers and industrial end-users. In the following sections the different agents in the palm oil industry complexe are described and the nature of intra-industry markets illuminated. For reasons of space the agents and markets involved in the production of higher value added products as well as the organization of the international palm oil trade are not included in the paper.

The Agricultural Segment: from proper and 'disguised' estates to en independent smallholders

Although oil palms are grown in a largely similar pattern all over Malaysia, differences prevail in efficiency and daily practice. These differences are related to ownership, organization of production, and the size of individual land holdings as well as to agro-ecological conditions. In social and economic terms it is relevant to distinguish between the following types of producers:

* Estates
  - proprietary-owned (local private capital)
  - company-owned (state capital, local private capital, foreign private capital)
* Federal Schemes (organized smallholders)
  - FELDA
  - FELCRA
  - RISDA
* Local State Schemes
* Independent smallholders

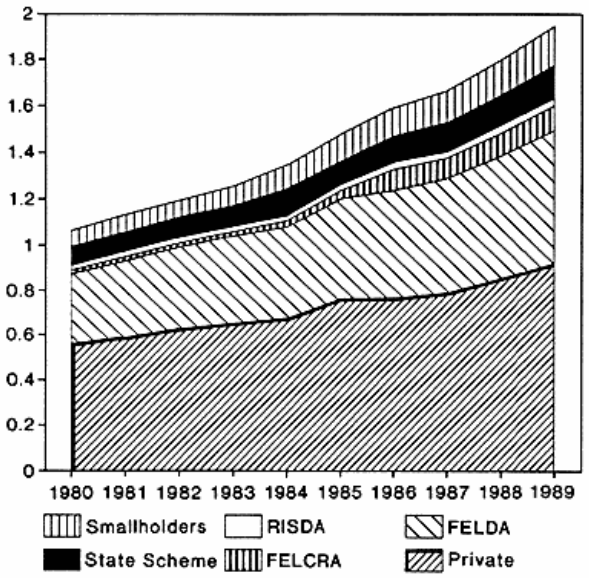

Figure 4. Oil palm area by different types of producers, 1980-1989 (million hectares). Source: PORLA (Palm Oil Statistics, various issues)

Oil palm acreage of estates, which constitute the largest category, increased considerably during the 1980s at the same time as their share of total area planted with oil palms decreased (see figure 4). The growth of hectarage has been highest in federal schemes for group smallholders, (local) state schemes and among independent smallholders. In absolute terms expansion has been largest within the framework of private estates. Whereas expansion of the oil palm area owned by estates primarily took form of replanting on former rubber areas, federal schemes expanded primarily on virgin land. In the following sections some basic characteristics of each type of producer are outlined.

Estates

Up to 1960 oil palms were only grown on estates. Cropped area increased to about 55,000 hectares in 1960 after a relatively modest growth since the start of activities in the

1920s. The production was totally dominated by British, Danish and French capital (Gullick, 1981). In the following years a large number of rubber estates ventured into oil palms using the state-financed replanting grants as a subsidy to convert former rubber land to more profitable and less labour intensive oil palms. Rubber faced increasing competition on the world market owing to the sharp drop in prices of synthetic rubber products during the 1960s, in turn caused by technological breakthroughs in the petrochemical industry. Prices on natural rubber, although fluctuating widely, followed a declining trend (Pollak, 1980).

The plantation sector was totally dominated by foreign (including Singaporean) capital. Already before the Second World War, most of the initially planter-owned rubber estates were linked to so-called agency houses based in the UK. If cyclical down-turns of commodity prices or other factors wiped out individual planters/groups, the agencies took over assets with their own funds or raised capital in the UK to continue production (Tan Tat Wai, 1982).

This institutional set-up enhanced the centralization of plantation capital during the 1950s as large numbers of planter-owned estates were sold to the agency houses owing to the political and military situation in the country when Independence seemed imminent. The process resulted in the creation of a small number of dominating plantation companies: in 1974, the five largest companies controlled about 45 % of the total estate area under oil palm, and together with about a dozen of other plantation groups, they controlled about 70 %. With few exceptions locally owned estates were far smaller (in 1972, 90 % of Malaysian estates were less than 800 ha) and primarily owned by Chinese businessmen, who invested in plantation agriculture by capital accumulated from tin mining or trading (Khera, 1976; Tan Tat Wai, 1982).

The ownership structure in the estate sector changed dramatically during the early 1980s (Jesudason, 1990; Cheong, 1990). In 1976 one of the largest plantation companies, Sime Darby, was taken over by the Malaysian Government through one of the parastatals (Pernas) established to acquire assets for the Malays in accordance with the objectives of the NEP. This transaction was followed by a bold move in 1981 when another of the large plantation companies, the Guthrie Corporation, was taken over in a raid on the London Stock Exchange. After this lesson the remaining plantation companies and large groups, until that time hesitant to restructure, sold off the majority of their assets to various parastatals. As a result all of the major plantation companies and a large number of plantation groups came under control or direct ownership of the Government. Thus local ownership was increased; as on the 31st of December, 1988, the locally owned share of oil palm hectarage was 93 % (Dept. of Statistics, 1988).

The change in ownership did not change the highly commercial orientation of plantation companies but paved the way for the entry of politically allied Malays in estate and company management, thus strengthening the link between policy decisions by Government and commercial practices in an agricultural subsector with a strong impact on national economic and political development. The association that represents all the large plantation interests in the country, the Malaysian Oil Palm Growers' Council (MOPGC), is now considerably dominated by state capital. Members of MOPGC account for about three-quarters of the total oil palm area in Malaysia (MOPGC, 1990). Surprisingly, there are no close relations between the state-controlled plantation companies and other forms of state capital, i.e. FELDA (see below), one of the major constituent bodies in the association. Local estates, primarily Chinese-owned, form another constituency but this group is apparently impossible to organize within the broader framework of the MOPGC. Generally, the MOPGC is described as consisting of mutually suspicious groups.

Organized Smallholders

The other main type of producer is constituted by smallholders organized under different public schemes. A common feature is the attempt to gather a number of smallholders under an estate-like form of organisation, capable of exploiting the economies of scale related to plantation operations. The basic assumption behind these schemes is that public institutional support is necessary if smallholders are to grow oil palms. Otherwise barriers to entry are too huge for smallholders as supervision on maintenance and harvest in addition to the organization of daily transport to mills are of decisive importance and too costly for individual smallholders. Supply of low quality ffb would be the end result, thus reducing the standard of the mill product.

However, the schemes are organized in different ways and the degree of centralized control of operations differs from scheme to scheme (Barlow, 1986; Malek Mansoor & Barlow, 1988; Khera, 1976). Generally, supervision and control by the central public body have developed from loose to more tightly structured systems. Local smallholders are only involved in the projects as providers of land and receivers of dividends, whereas management and marketing operations are carried out by a public body.

Thus, all types of schemes take over "normal" estate practices concerning the organization of production. But the same efficiency and economics of scale are not obtained owing to the relatively small size of plantations and a relatively lower level of management capability. In this perspective, activities by these public bodies on behalf of the smallholders serve as a means to distribute welfare in the form of money subsidies to certain rural target groups. The struggle for state subsidies in the form of plantation activities embodied in different institutional set-ups becomes an imperative to all local communities wishing to remain in their traditional surroundings. At the same time, schemes are an important means in Government policy to reduce urban migration and gain political support.

Of decisive importance in the overall picture of group smallholdings is the resettlement schemes within the organizational framework of FELDA (see Tunku Shamsul Bahrin & Lee Boon Thong (1988), Robertson (1984), Halim Salleh (1991), and Sutton (1989)). These schemes are located relatively far away from existing rural villages and consist of urban settlements in connection with large newly established plantations on soil and topography of secondary suitability compared with the well-established private estates.

The development of the resettlement programme has been impressive in pure quantitative terms: in 1988, 441 schemes had been established totalling a cropped area of about 750,000 hectares, of which two thirds were planted with oil palm, close to a fourth with rubber and the remainder with cocoa, coffee and sugar-cane (FELDA, 1988). FELDA is now the single biggest agent in the oil palm growing part of agriculture.

The cost of basic infrastructure in the settlements as well as for administration and management is covered by allocations from the federal development budget to FELDA. But costs related to the establishment of plantations, maintenance of oil palms in the initial phase, housing and site development and subsistence allowance to settlers during the maturity period are paid back by the settlers over a 20-year period. The period may be extended if incomes drop considerably owing to sharp declines of the palm oil price on the international markets. Further, as the sale of land is only allowed with the approval of FELDA management and because individual accumulation of more than 4 hectares of land under oil palm is out-ruled, social differentiation is halted effectively.

Independent Smallholders

During the 1970s and 1980s oil palm land owned and operated by independent smallholders expanded considerably to about 170,000 hectares nearly all located at the Peninsula. By statistical definition independent smallholders operate oil palm areas up to 40 hectares, but most units are in practice much smaller, about 3-5 hectares. Most smallholders are ethnic Chinese and their holdings are on average larger than oil palm holdings owned by independent Malay smallholders. In general, maintenance and harvest are based on family labour whereas clearing and planting are carried out by employed contractors. Income is normally supplemented by sale of other crops and/or wage labour from off-farm work. Yields are far below those obtained in the estate and group smallholding sectors, a combined result of insufficient extension services, poor planting materials, low fertilizer application, and poor maintenance and disease control (Malek Mansoor & Barlow, 1988).

In short, productive conditions of independent smallholders are distinct from those of group smallholders on two main issues. Firstly, production is neither organized under centralized management nor carried out according to relatively high technical standards as in the group smallholdings. Secondly, fluctuations in world market prices are directly transmitted to independent smallholders in the price of ffb while, to a certain extent, they are cushioned by the wage and payment mechanisms for group smallholders – as well as for estate workers.

The Primary and Secondary Processing Segment: Concentration and emergent diversification

Owing to the characteristics and bulky character of ffb, transport is a determining factor for the location of mills for primary processing. Actually, economies of scale are limited in the sense that there is a trade off between the capacity of the mill and costs and duration of transport. Thus, the milling industry in Malaysia is located in the main producer regions, i.e. primarily in Johore and Pahang (in 1990 about 60 % of total capacity on the Peninsula) and secondly in Perak, Sabah, Selangor, Negri Sembilan and Trenganu (PORLA, 1990).

Some of the mills are located on estates or in connection with resettlement schemes, owned by estate companies and FELDA, respectively. According to available statistics from 1988, 45 mills are located on estates and 58 are located in connection with resettlement schemes (Dept. of Statistics, 1988; FELDA, 1988). The remaining 119 mills in Malaysia are operated and owned by so-called "independent" millers; either by smallholder and (local) state organizations or linked to comparatively small private estates. Figures on the importance of fully "supply-depen-

dent mills" are not available. Thiran (1984) claims that in 1981, 29 out of 171 mills in operation fully depended on supply from smallholders or small estates. This structure in the primary processing industry leaves little room for intermediaries as ffb transactions mostly are carried out as intra-company trade. Private dealers or Farmer's Organizations are only important in areas where smallholdings under oil palms are common (Thiran, 1984).

However, independent millers dominate the Palm Oil Millers' Association (POMA). It is considered as a weak organization due to the fragmented ownership structure of palm oil mills in the country. Besides, milling is a subsidiary segment in the corporate strategies of the large plantation companies serving both agricultural production and secondary processing facilities.

The technological development in the Malaysian oil milling industry (the primary processing segment) has resulted in much better process control and production of high quality crude palm oil. Most crude oil is sold subject to a contract, usually the one issued jointly by the two producer organizations, MOPGC and PORAM (the Palm Oil Refiners Association of Malaysia). The contract specifies the volume, time and location of deliveries and the maximum level of various impurities. On PORAM's initiative inclusion of further specifications are being negotiated between the two parties (PORAM, 1990).

Higher quality of crude palm oil within narrow specifications reduces processing costs and increases the stability and quality of secondary processed goods. For edible purposes crude palm oil is refined to remove what is considered as an unpleasant taste, odour and colour, and to increase the shelf-life of products. Further, the specific composition of saturated and unsaturated fatty acids in palm oil can be utilized to derive a liquid oil and a solid fat. In the process, known as fractionation, palm oil is crystallized by controlled cooling into a fraction with a low melting point (olein) and a fraction with a high melting point (stearin). Virtually all Malaysian refineries in operation have installed refining as well as fractionation plants and both processes have become integral parts of the secondary processing industry. The combinations of refining and fractionation result in a large number of different end- and by-products suitable for different edible and non-edible purposes (PORAM, 1989).

Up to the early 1970s, crude palm oil was shipped to markets in the industrialized countries but gradually the need for new markets became incontestable. However, exports to developing countries – at that time in notorious deficit of secondary processing capacity – were only possible if the palm oil was refined before shipment.

During the 1970s, investment in secondary processing activities, i.e. the palm oil refining industry, was stimulated by generous fiscal benefits as part of the effort to promote export-oriented industries. The regulation of the segment was virtually non-existent and new agents entered the stage. Foreign capital was dominated by Japanese and Indian capital that quickly responded to the opportunities for exports of processed palm oil from Malaysia. Japanese capital consisted of interests with specific technical and management capacity in marketing and production; they formed joint ventures with (Malaysian) state capital. Indian capital started to operate in joint ventures with local private capital, often based on ethnic links, and used their already existing trade relations in India and neighbouring countries. Similarly, capital from Singapore linked up with local private Chinese capital. With few exemptions the plantation companies, dominated by capital from the UK, did not venture downstream. Apparently, they were limited by their own traditional conception concerning their position in the division of labour (Khera, 1976; Bek-Nielsen, 1989; Chalmin, 1988; Ariff, 1985).

After a short "Klondyke" period in the industry, increasing competition for raw materials restricted full utilization of capital equipment. Even though crude palm oil was locked in Malaysia by an export duty system (see Sahathavan Meyanathan, 1989) the uncoordinated expansion of capacity in the refining industry caused some of the weaker and non-efficient producers to close temporarily or completely in the early 1980s. As this first round of restructuring came to an end, new agents entered the scene, viz. the (by then) state- controlled plantation companies, the organization managing the resettlement programme (FELDA) and transnational companies including large Malaysian capital groups. New refineries were erected and some of the existing refineries were taken over, revamped and expanded with state-of-the-art refining technology. This resulted in a tremendous increase of capacity towards the end of the decade, which resulted in a new round of restructuring.

In this second round the pressure on small and inefficient producers increased as margins diminished but this time also well-managed and efficient production units had to reorient their commercial strategies if they chose to withdraw from the race for economies of scale. Various forms of specialization, vertical integration or different combinations of strategies are pursued by the refineries that still operate (Fold, 1993). Pursuing economies of scale is primarily carried out by independent refineries without any interests in agricultural production but with knowledge and access to markets of growing importance in the South. Furthermore, profits are gained from trade and marketing of standard palm oil products whereas the importance of efficiency in production is reduced. The

average conditions of production are spread throughout the whole industry due to maturity of secondary processing technology and no medium-term prospects for technological "leapfrogging".

The two "rounds" of adjustments in the refining industry partly resulted from pressure by different fractions within the refineries' trade association (PORAM) for specific policy adjustments concerning the issuance of licenses. In the first period of excess capacity the industry appealed for strict regulation of existing licences and preservation of formal barriers to entry for new investors. However, as powerful refining interests needed to expand capacities, the previous stand was reversed. In the late 1980s, when overcapacity in the secondary processing industry increased seriously once more, PORAM reversed its stand again and demanded a stop for new entrants.

The regulating state institution, the Malaysian Industrial Development Authority (MIDA), has so far acted with compliance towards the demands from the industry, although current restructuring may continue in the form of expansions, mergers and take overs among existing refineries. MIDA, an agency under the Ministry of Trade and Industry, monitors and regulates all manufacturing activities in the refining industry and beyond, including the issuance of licences for production. All agents involved in trade with palm oil products need a licence from PORLA (see below). The refineries are therefore also obliged to be registered with PORLA.

As world market prices for standard palm oil products declined during the late 1980s, the struggle between agricultural producers and industrial processors intensified. Since the early 1980s the issue at stake has been the local supply and price of crude palm oil. The dispute is caused by the immanent contradiction between producers of agricultural raw materials (interested in high prices) and independent processing industries (interested in high margins). In the case of Malaysian palm oil this contradiction is even further pronounced as the lion's share (about 75 % in the late 1980s) of exported standard products is directed towards markets in the South. These markets operate under budget restraints and are usually dominated by a single customer, i.e. a state- controlled institution that handles food imports. Therefore, a low and competitive unit price means higher volume of exports and consequently, a higher revenue for independent refineries.

One way to solve the clash of interests between raw material producers and processors is to organize the industry in a limited number of cartels, each consisting of plantation groups and refineries. Around 1990, conciliatory state policies were apparently stimulating initiatives taken by participants in the industry to implement such a construction among the major interests in the palm oil industry (Vijaya Bharathi, 1990), but so far not with visible results. Indeed, due to the nature and organization of the world market for palm oil, chances of successful cartellization are meagre. The "world market" for palm oil (and for oil seeds, oils and cakes in general) is dominated by either national economic agents under state control or transnational companies and it is regulated through a contractual system established, monitored, revised and expanded according to the needs of the dominant participants for "fair trade" (ITC, 1990).

Oiling the Industry: The suppliers of goods and services

Owing to the sheer size of the plantation sector in Malaysia, oil palm plantations in particular, numerous suppliers of capital and intermediate goods (fertilizers, pesticides, herbicides, weedicides, transport equipment etc.) operate in the country, either as locally established manufacturers or as importers of products. Among the suppliers are transnational companies in the chemical industry but also subsidiaries established by large plantation companies. The latter have been established primarily to cater for own needs and secondly to conquer a share on the domestic market, based on intra-company product and process development. Some of the large plantation companies have also established consultancy firms that offer various producer services (management, accounting, etc.) to smaller estates.

Technological development in the Malaysian palm oil industry takes place within the framework of either public institutions or innovating companies taking up leading positions in the industry. A public research institution, the Palm Oil Research Institute of Malaysia (PORIM), was established in 1979 to carry out research for the benefit of all agents within the industry. It was a result of pressure by the estate sector in more than a decade for a public research body modelled on a similar institution in the rubber industry. Research and development takes place in relation to all aspects of the agricultural process (breeding of high yielding palm, agronomic practices, transport systems, etc.) and product development, particularly in the preservation of quality and the replacement of other oils with palm oil for food and non-food uses (PORIM, 1988). Research also focuses on new commercial uses for palm oil. Activities are financed by participants in the industry through a cess and research objectives and research proposals are determined by represen-

tatives from companies and the state; results are freely disseminated.

As regards company-based research and development activities, most of the results related to improvements of agronomic practices and to handling operations of fully and semi-processed products are disseminated through scientific institutions (associations, journals, seminars, etc.). Various biotechnological techniques are known and mastered by all the large plantation companies (including FELDA) and PORIM. However, the companies apparently compete concerning their efforts to systematize the procedures necessary for successful vegetative propagation.

Even the smallest of the Malaysian refineries have established their own laboratory testing facilities to ensure the quality of final products during processing and storage (Maycock, 1989). These facilities are also used to check the crude oil delivered from suppliers. However, as a majority of the refineries concentrate on standard products, there is not much scope for research and development in products beyond the improvement of quality. It is only the largest, more specialized and technologically advanced refining companies that are engaged in systematically planned research and development of new products. Most of them are furthermore related to research and development divisions in transnational companies.

Technological improvements in milling operations and secondary processing of crude palm oil are transferred into standard equipment which is available on an open market, locally or abroad in the industrialized countries. The manufacturing of milling equipment has been successfully domesticated (Thoburn, 1977). Today, the demand is almost fully covered by local equipment manufacturers, a situation completely reversed compared to the initial phase of the industry's development. Due to the bulky nature of milling equipment and the relatively simple technology embodied, exports of capital goods are not important. Rather, the technological capacity is increasingly transformed into exports of services in the form of management contracts related to the lay-out of plantations and erection of mills in neighbouring countries. A small number of independent engineering companies are involved in the production and maintenance of milling equipment and all the major plantation companies have established subsidiaries that handle the company mills and sell services to smaller milling companies.

However, the production of equipment for secondary processing is still controlled by transnational companies based in the industrialized countries. Those who conquered the market in Malaysia were the ones that in due time established local subsidiaries or contracted local agents with the ability to provide after sale services (Fold, 1993). This proved to be an efficient way to link up with consumers, i.e. the palm oil refineries, obtain information concerning operational problems and use it to improve their product. As the demand for secondary processing equipment decreased in Malaysia towards the end of the 1980s, the successful capital good producers started to operate in Indonesia, the second country on the list of major palm oil producing countries.

The Institutional Set-Up for State Regulation

All agents that operate in the agricultural production of ffb (except the independent smallholders) are required to obtain a licence and pay fees to the Palm Oil Registration and Licensing Authority (PORLA), an agency under the Ministry of Primary Industries. PORLA was established in 1977 by an Act of Parliament to oversee the "orderly growth and healthy development" of the palm oil industry in Malaysia. Actually, all agents involved in the supply, sale, purchase, milling, storing, export and import of palm oil products have to obtain licences before they engage in commercial activities. This includes intermediaries such as dealers and brokers as well as surveyors and chemists. PORLA's main function is to ensure that rules, conditions and restrictions attached to the individual licence are adhered to. The institution is empowered to impose penalties on agents not observing the practices prescribed and may even withdraw licenses from agents who violate the rules.

In addition, PORLA monitors the contractual systems that regulate domestic as well as export trade with palm oil products; particular attention is paid to the fulfilment of quality requirements. To ease monitoring all trade in palm oil products has to be registered with PORLA within 24 hours after contracts are concluded. Data collected concerning production, trade (markets and volumes) and stocks of palm oil products are disseminated on a monthly basis. Information on prices is released daily and used as a guide to determine the price of ffb by the involved agents.

Thus, in principle PORLA is able to monitor and regulate all activities in the palm oil industry. However, the institution is not considered as a strong instrument for the implementation of structural policies towards the industry as collected information is primarily used for statistical purposes besides the sheer enforcement of the PORLA Act (MIDA/UNIDO, 1985). One explanation might be found in the broad composition of the board, including representatives from economic ministries (Ministry of Primary Industries, Ministry of Trade and Industry, and Ministry of Finance, respectively), PORIM, FELDA, MOPGC, local representatives from East Malaysia, and

representatives from organizations covering the processing segments (POMA, PORAM and MEOMA, the palm kernel oil producers' organisation). Many of these organizations are made up by different vested interests and it is highly doubtful whether forceful structural policies stand a chance in this all-embracing, conciliatory board.

Conclusion

The palm oil industry in Malaysia is characterized by direct involvement of state capital in the agricultural and primary processing segments. These two segments of the complexe are closely linked due to the specific requirements of the crop. State capital is also directly involved in the secondary processing segment but there are pronounced differences in the degree of domination. The secondary processing segment is dominated by foreign and national private capital whereas state capital takes up a dominant position in the agricultural and primary processing segment. Besides, a comprehensive resettlement programme paved the way for further penetration of the agricultural segment by state institutions.

Within this vertical production line, the markets for raw materials and intermediate goods are ruled by contractual systems but monitored by a state institution. As the trade in raw materials (fruit bunches) usually takes place in the form of intra-company transactions, the system is most important on the market for primary processed products. These products are traded according to contracts negotiated by the producer organisations for capital operating in agriculture and secondary processing, respectively. However, the market is not "free" in the ordinary sense; all primary processed products are kept within the national filière due to an export duty fixed by the state. The duty was introduced in order to stimulate the establishment of secondary processing activities.

The local price is close to the world market price and this tends to dichotomise the agents in the vertical production line. Producers of agricultural raw materials struggle with secondary industrial processors on the volume, price and quality of raw material supplies. This dichotomisation is aggravated by the two groups' different interests in relation to the price level of raw materials. Agricultural producers are interested in high unit prices while industrial processors are interested in high unit margins. Thus, if the markets for secondary processed products operate under a (foreign currency) budget restraint, then the price level would become a decisive factor for the size of processors' revenue; lower unit price means higher revenue and vice versa. The existing policies cannot cope with this problem and future regulation is probably moulded by the most influential group of the agents directly involved.

However, it is not evident that the interests directly linked to state capital will determine the outcome. In this case, dominating private agents in the secondary processing segment hold a strong position as they provide the key to a large part of the world market, viz. the developing countries without sufficient secondary processing capacity.

In this study, not a single "free market" has been encountered even though the Malaysian palm oil industry is far from operating in a centrally planned economy guided by the "state". All markets are regulated in one way or another, i.e. they are monitored by state institutions, guided by contractual relations, structured according to the needs and power position of the dominating agents on the specific market, etc. The study shows that both "the state" and "the market" are complex aggregates, far from having a monolithic structure. In that sense, markets and states are not necessarily contradictory means for the regulation of linkages between agriculture and industry. Thus, there is a case for a selective use of regulatory mechanisms in the planning and implementation of industrialization strategies.

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