RESOURCE-BASED INDUSTRIALIZATION in PENINSULAR MALAYSIA: A CASE STUDY of the RUBBER PRODUCTS MANUFACTURING INDUSTRY

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Abstract

Keywords: economic history; development studies; Malaysia; industrialization; rubber manufacturing; foreign direct investment; dualistic structure; export-orientation; technology transfer.

This economic history and examination of the rubber products manufacturing industry in Peninsular Malaysia contributes to the subject of resource-based industrialization in the field of development studies. The development of the industry is traced from the 1920s to 2005 when the Second Industrial Master Plan came to an end. The findings are that local interests control 80 per cent of the industry, with foreign direct investment in the remaining 20 per cent, either as subsidiary companies of overseas manufacturers or in joint ventures with Malaysian investors. The industry has a dualistic structure, with foreign-owned and joint venture companies typically being more heavily capitalized and employing a larger workforce than wholly Malaysian-owned companies. Foreign and joint venture enterprises are more likely to export a greater volume of production than local firms. Nevertheless, the industry as a whole has a strong export-orientation and Malaysian-based exporters sell into markets worldwide. A detailed examination of the industrial components production sector by means of a questionnaire indicates that Malaysian producers rely on the Malaysian Rubber Board for the transfer of manufacturing technology. Technology transfer in the foreign and joint venture sector is from parent companies and joint venture associates overseas. The conclusion is that the rubber manufacturing industry is vertically integrated with local production of natural rubber used as raw material to produce a range of goods for sale to domestic and international markets. The 80 per cent Malaysian component indicates a stable domestic industry ably supported by local technology resources.

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The work is dedicated to my wife, Rosa for her love and friendship over many years of married life.

List of Acronyms

ASEAN	Association of South East Asian Nations
DRC	Dry Rubber Content
EPU	Economic Planning Unit
EU	European Union
FEER	*Far Eastern Economic Review*
FMM	Federation of Malaysian Manufacturers
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GNP	Gross National Product
HICOM	Heavy Industries Corporation of Malaysia
IBRD	International Bank for Reconstruction and Development
IMF	International Monetary Fund
IMP	Industrial Master Plan
IRRDB	International Rubber Research and Development Board
IRSG	International Rubber Study Group
LRC	London Rubber Company
MCA	Malaysian Chinese Association
METDC	Malaysian External Trade Development Corporation
MIC	Malaysian Indian Congress
MIDA	Malaysian Industrial Development Authority
MITI	Ministry of International Trade and Industry
MRB	Malaysian Rubber Board
MREPC	Malaysian Rubber Export Promotion Council
MRPMA	Malaysian Rubber Products Manufacturers' Association
NDP	National Development Policy
NEP	New Economic Policy
NR	Natural rubber
OE	Original equipment (tyres)
OECD	Organisation for Economic Cooperation and Development

PAP	People's Action Party (Singapore)
Pernas	*Perbadanan Nasional Berhad* or National Trading Corporation
Petronas	National Petroleum Corporation
PNB	*Permodalan Nasional Berhad* or National Equity Corporation
R&D	Research and Development
RM	*Ringgit Malaysia*: the Malaysian currency
RRIM	Rubber Research Institute of Malaysia
RSS	Ribbed Smoked Sheet
SIRIM	Standards and Industrial Research Institute of Malaysia
SME	Small and Medium-sized Enterprise
SMR	Standard Malaysian Rubber
SPSS	Statistical Package for the Social Sciences
SR	Synthetic rubber
TARRC	Tun Abdul Razak Research Centre
TSR	Technically Specified Rubber
UMNO	United Malays National Organization
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
WTO	World Trade Organization

Peninsular Malaysia

Chapter 1

Background to the Study

1.1. Introduction

At independence in 1957, Malaysia was a classic colonial economy producing two industrial raw materials, rubber and tin, for export on international commodity markets. Fifty years later, in 2007 the economy was broadly based and diversified, with the manufacturing sector accounting for 30 per cent of Gross National Product (GNP) and the country classed as a Newly Industrialized Economy. The World Bank ranks Malaysia as a middle income country with a per capita income of US$9,947 and a Gross Domestic Product (GDP) of US$54,584 billion in 2007 (World Bank, 2009). The *Economic Report* for 2008/2009 published by the Ministry of Finance in Malaysia states that in 2007 the income per head in the local currency (*Ringgit Malaysia*, RM) was RM23,114 which is equivalent to US$14,483 purchasing power parity using the Malaysian database.

Today, Malaysia is a major producer of manufactured goods that account for over 50 per cent by value of total exports. In the commodity sector, tin deposits have been worked out while exports of crude petroleum oil and liquefied natural gas, palm oil and palm oil products, and timber and timber-based products have eclipsed natural rubber as export earners, as shown in Table 1.1.

Table 1.1

Major Exports: 2008

Product	Per Cent
Electrical and electronic products	38.5
Other manufactured products	13.0
Petroleum and LNG	17.0
Palm oil and palm oil products	10.0
Timber and timber products	3.5
Rubber	1.2

Source: Malaysia: Department of Statistics, 2009

The importance of the electrical and electronic products sector to the national economy is such that it has attracted a number of studies both by Malaysian and foreign academics. Similarly, the growth of the oil palm plantation industry and associated palm products industry since the 1950s has been of interest to economists in recent years. Gopal (1999), for example, analyses the development of the palm oil refining sector which by the 1990s processed 99 per cent of domestic production of crude palm oil. The refining of crude palm oil extracted from the fruit of the oil palm (*Elaeis guineensis)* in large oleo-chemical processing plants uses advanced engineering technology and adds high value to the crude product. The rapid development of this resource-based industry from 1970 onwards is regarded as a success in Malaysia's industrialization programme (UNCTAD, 1998; Gopal, 1999; Rasiah & Jomo, 1999; Jomo, 2001a). On the other hand, there is no similar analysis of the group of industries that uses natural rubber, a product of the tree crop, *Hevea brasiliensis*, to manufacture products as diverse as tyres, medical examination gloves and gaskets. The present study, therefore, is an attempt to fill that gap in economic studies on the development of manufacturing industry in Malaysia and, more particularly, on industrialization based on the utilization of an agricultural resource grown in the country.

On a personal level, the candidate has had a professional association with natural rubber that has lasted 45 years. It was in 1962 that as a newly qualified graduate in agricultural science, he sailed in a P&O liner to take up an appointment as Junior Assistant Planter on a British-owned rubber estate in Malaya. He subsequently worked on technical sales with a multinational manufacturer of fertilizers and agrichemicals visiting plantations throughout Malaysia. The next ten years were spent with an agricultural consultancy company on rubber development projects in South East Asia and West Africa. His final post was with an intergovernmental commodity body based in Kuala Lumpur where he had responsibilities for identifying and supervising programmes of benefit to the global rubber industry. The subject of this study, therefore, is of immense professional interest to the candidate and is regarded by him as the culmination of a long and successful career in the natural rubber industry.

1.2 Research Questions

By the first decade of the twenty-first century, Malaysia had been transformed from a primary commodity producer to a country with a substantial manufacturing base, with the industrial sector contributing one-third of Gross Domestic Product. The largest sector is the assembly by foreign-owned companies of electronic and electrical items from imported components in Free Trade Zones. The contribution the rubber manufacturing industry makes to export revenues is not detailed in Table 1.1 because the manufacture of rubber products is classed in government statistics under the 'other manufactured products' sector which provided 13 per cent of export revenues in 2008.

The foregoing narrative suggests that the production of manufactured goods from locally produced natural rubber has played its part in Malaysia's industrialization programme and that the contribution the industry has made to Malaysia's economic development is worthy of study. This statement leads to the formulation of a specific research question to be investigated in the thesis:

In what ways has the secondary manufacture of natural rubber produced in Malaysia contributed to the industrialization process and how important has this contribution been?

An additional subsidiary question has been formulated as a result of the literature review which demonstrates that ownership in the industry is divided between firms wholly controlled and operated by Malaysian capital and enterprises with overseas capital investment. The question is:

Whether there is structural dualism in the industry based on the ownership of assets?

The investigation attempts to answer these two questions by taking a broad historical viewpoint of the development of the industry since its beginnings in the 1920s to the present day and its links to the natural rubber production industry. The study investigates ownership patterns in the industry to establish how many manufacturing concerns are controlled by Malaysian interests and the number of companies that are foreign-owned or joint venture enterprises between local and overseas investors. An analysis is undertaken to establish whether there is a dualistic structure in the industry by comparing company size and business behaviour between firms with foreign capital involvement and wholly owned Malaysian firms. Finally, an assessment is made of the contribution the rubber

manufacturing sector has made to the economic development of Malaysia over the past fifty years.

1.3 World Rubber Industry

Natural rubber, a product of the tree crop *Hevea brasiliensis* is an agricultural commodity used in the manufacture of a range of domestic and industrial products essential to modern life. The *Hevea* tree is native to the forests of the Amazon basin and in the early nineteenth century rubber gathered from wild trees was used to make waterproof overcoats and footwear in the USA and Europe. The tree was introduced as a commercial crop into Asia in 1876 but large-scale development of rubber plantations in British, Dutch and French colonial possessions did not occur until the establishment of the mass production automobile industry at the beginning of the twentieth century. Supplies of natural rubber were cut off with the Japanese invasion of South East Asia in the Second World War. This led to the development in America of the synthetic rubber industry that uses crude petroleum oil as its raw material as a substitute for the natural product. Today, natural rubber and synthetic rubber are regarded as complementary products in a range of polymer materials available to manufacturing industry rather than as direct competitors. Most manufacturers use blends of natural and synthetic rubbers in their factory operations because each product has its own cost advantage and unique technical properties suitable for the desired specification of the end product. The ratio of consumption between natural and synthetic rubbers in recent years has stabilized to 40:60 in favour of synthetic materials.

Table 1.2

World Natural Rubber Production: 2005
'000 metric tons

Thailand	2,937
Indonesia	2,271
Malaysia	1,126
India	772
China	428
Other Asia	746
Africa	403
South America	200
World total	8,777

Source: IRSG (2007)

The importance of world trade in natural and synthetic rubbers is illustrated in the following figures. Total world rubber consumption in 2005 was 21 million tons divided between 12 million tons of synthetic material and nine million tons of naturally produced *Hevea* rubber (IRSG, 2007). In the case of natural rubber, world production in 2005 was 8.7 million tons as shown in Table 1.2. Asia is the major producing region that accounts for over 90 per cent of world production with Thailand, Indonesia and Malaysia being the largest producers

Table 1.3

World Natural Rubber Consumption: 2005
'000 metric tons

Asia/Oceania	5,470
Europe	1,558
North America	1,316
South America	538
Africa	120
World total	9,001

Source: IRSG (2007)

In 2005, the three most important consumers of natural rubber were China (2 million tons), the European Union (1.3 million tons) and the USA (1.2 million tons). Table 1.3 illustrates the world consumption figure of nine million tons by regional market.

The manufacture and marketing of rubber products is divided into three main production sectors: a) pneumatic tyres; b) general rubber goods made from solid rubber; and c) articles produced from liquid latex. The tyre industry is the single most important user of both natural and synthetic rubber, and accounts for approximately 70 per cent of total rubber consumption. Rubber product manufacturing is technologically driven. A review of the scientific discoveries that have enabled rubber to become an essential industrial raw material together with a description of the basic manufacturing processes for each of the three product sectors is provided in the Technical Appendix. The appendix also describes the processing methods for converting tree latex produced in the field into a stable product suitable to be used as a raw material input for manufacturing industry.

1.4 Structure of Thesis

Following this introduction to the study, Chapter 2 presents the theoretical framework to the thesis. The chapter reviews the theories that have been current at different times in the field of development economics since the emergence of development studies as a separate school within the body of economic theory. The ideas of contemporary theories on economic and industrial development within the international trading system receive special attention.

The following three chapters examine, in turn, the political history of Malaysia, the development of the industrial sector in the economy and the rubber manufacturing sector in particular. The political economy of Malaysia from the time of colonial rule and independence through the post-independence years is the subject of Chapter 3. The policies adopted by the authorities to encourage the development of a manufacturing sector over this of period time are traced in Chapter 4. The focus of Chapter 5 is the manufacturing industries that make rubber products from natural rubber. Rubber manufacture is investigated from the establishment of the first factories in the 1920s to 2005 when the number of manufacturing concerns had reached over three hundred and fifty. The chapter concludes with a discussion on linkage effects with other sectors of the economy and makes note that the industry has a dualistic structure.

The subject of Chapter 6 is the research methodology adopted in the study. The theoretical approach of using positive epistemology in an empirical study in the field of applied economic research is stated. Issues surrounding the triangulation of data collection and the ethics of conducting research in the Malaysian context are touched upon. A number of survey questions are posed for gathering data from primary and secondary sources. The practicalities of conducting a postal questionnaire survey in the Malaysian business environment are dealt with at length. The statistical techniques used in the study are described before the chapter concludes with an assessment of weaknesses in the research methodology.

A description and analysis of the data gathered from trade directories and a questionnaire sent to firms producing industrial rubber goods are presented in Chapters 7 to 10. Chapter 7

provides an overview of the rubber manufacturing industries and classifies the industries into eight production sectors based on the technology employed and the end use of the products. Basic economic data for the entire industry for the year 2005 are described. The chapter continues with an analysis of each of the eight product sectors in turn, based on information published in trade directories. A more detailed examination of the industrial products sector that manufactures intermediate parts and components for other industries is undertaken in Chapter 8. The analysis considers the range of products made by this sector, the structure of the sector, export sales, forward and backward links with other industries and the sourcing of industrial technology. Chapter 9 describes the other seven product sectors but limits the analysis to an examination of industrial structure and the pattern of export sales. A summary of the results for the entire manufacturing sector is presented in Chapter 10. The conclusion is drawn that for the rubber manufacturing industry taken as a whole there is a dual structure with foreign and joint venture companies being larger in size and more likely to concentrate on sales to export markets than local companies.

Chapter 11 answers the general research question and discusses the part the rubber industrial sector plays in the economy in the context of contemporary ideas in development economics and international trade theory. The chapter considers the limitations of the research study and suggests topics for further research in the Malaysian industry and in other rubber producing countries. The final conclusion is that the rubber manufacturing industries are well integrated into the economy and have contributed positively to the success of Malaysia's development.

Chapter 2

Review of Theories in Development Economics

2.1 Evolution of Development Economics

2.1.1 The Political Economy of Development: There is wide consensus that the genesis of development economics as a separate paradigm within the wider body of economic theory can be traced to the end of the Second World War. Williamson and Milner (1991: 8) consider that the main impetus for a new economic discipline came from political leaders who wished to plan for a world of prosperity after the Depression years of hyperinflation and massive levels of unemployment. On the other hand, Meier (1995: 86) is of the view that modern development economics arose as 'an economic counterpart to the political independence of emerging countries of Asia, Africa and the Caribbean'. Earlier, Meier (1984: 4) argued that the new economic paradigm was not formulated as a formal theoretical discipline but was fashioned as a practical subject to advise governments on how to increase the wealth of their newly independent nations.

In today's intellectual climate, there is a general viewpoint that development economics encompasses more than economic theory alone. According to a standard text by Todaro (2000: 8-12), the study of development economics includes an analysis of cultural and political requirements for economic growth within the context of the social system of individual countries, and the wider international order. The Singapore-based economist Lim Chong-Yah (1991: 19) also regards non-economic variables such as politics, culture, history and geography to play a critical role in the development process. At the London School of Economics, the influential neo-classical economic theorist, Bauer

(1991: 42) states that personal, cultural, social and political factors greatly influence economic achievement. In a similar vein, Knight (1991: 17) argues that development economists need to have a good knowledge of the economy as well as the social and political institutions of particular countries in order to pose and satisfactorily answer specific research questions.

One of the more significant political events which encouraged the study of the economics of developing countries as a distinct field of academic discourse was the Bretton Woods conference. The international meeting, held in the New England state of New Hampshire in 1944, established two influential economic institutions, the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD). The IMF's remit is to deal with short-term monetary issues whereas the IBRD, now transformed into the World Bank, promotes the flow of long-term development loans (Williamson & Milner, 1991: 8). In the face of opposition from the United States of America, a further conference held in Havana in 1947 was unable to agree on the formation of an International Trade Organization to stabilize primary commodity prices and to regulate commerce and trade matters (Meier, 1984: 10). It took until 1995 for the international community to agree on the establishment of the World Trade Organization (WTO), as the successor to the General Agreement on Tariffs and Trade (GATT), to complement the activities of the IMF and World Bank.

2.1.2 Structuralism and Neo-Classicalism: Development policies for the first two decades after the Second World War, up to the 1970s, adopted the received economic wisdom of the time of central planning as part of a command economy. These policies had been successfully implemented by all sides during the war years to produce huge

quantities of armaments and fighting equipment. In addition, there was the example of the Soviet Union, which after the 1917 revolution had transformed itself from a peasant economy to an industrial power with a massive standing army. Development planners emphasized maximization of GNP through planned investment in new physical capital, utilization of reserves of surplus labour and industrialization based on import substitution. These policies, which collectively are termed by Knight (1991) the 'structuralist school', were anti-price mechanism, supported government controls and emphasized the protection of trade and industry by imposing import tariffs and the licensing of new enterprises.

In the 1970s and 1980s there was a resurgence in the formulation of development policies based on neo-classical economics (Myint, 1987). Markets, prices and monetary incentives were all promoted and there was criticism of policy-induced distortions and the failure of command economy policies. The neo-classical school strongly emphasized ideas of the liberalization of foreign trade and active export promotion compared to the import substitution policies of the past.

The two theoretical approaches of structuralism and neo-classicalism are regarded by Knight (1991: 14) as two ends of a spectrum in the choice of development policies. Weiss (1988: xv) also argues that each school contains important insights that should not be neglected by researchers whose basic sympathy might lie with another competing paradigm.

2.2 The Structuralist School

2.2.1 Cold War Rivalry: Theories of economic growth in the 1950s and 1960s were based on the experience of the post-1945 reconstruction of Europe under the United States-financed Marshall Plan in the west and Soviet-style command economies in the east. The ideological rivalries of the Cold War spilled over into a struggle for influence in the newly independent, developing countries with the United States of America, through its control of the World Bank, promoting capitalist economic policies while the Soviet Union and China supported Marxist doctrines. Development policies from both ideologies, however, emphasized the stimulation of an increase in GNP through capital accumulation and industrialization based on import substitution through a system of central planning (Chang & Rowthorn, 1995: 1-2).

2.2.2 Balanced Growth Models: The balanced growth or big push theory associated particularly with Rosenstein-Rodan and Nurske advocated simultaneous investment of capital over a wide range of industries. The application of investments across a number of sectors of the economy was said to be self-reinforcing, whereas attempts to develop too few sectors would run into inadequate demand (Bliss, 1989: 1192; Meier, 1995: 68). In 1960, W W Rostow published an influential analysis with the subtitle, *A Non-Communist Manifesto* as an alternative to Karl Marx's theory of political economy (Rostow, 1960/1990). Rostow argues that for all societies there are five stages of economic growth from a pre-industrial, traditional society to a final age of mass consumption. Central to Rostow's argument is the notion of *Take-off* when the scale of productive economic activity reaches a critical level and produces a massive and progressive structural transformation of society. The next stage in Rostow's schema is the *Drive to Maturity* which requires between ten and twenty percent of national income

to be re-invested. The Harrod - Domar growth model similarly emphasizes new capital formation as the major determinant of economic development. The more an economy is able to save, hence invest, then the greater the growth of Gross National Product. The Harrod - Domar model posits a capital-output ratio necessary for development and proposes that there is a numerical relationship between the amount of investment and increase in output (Hogendorn, 1996: 426-7; Todaro, 2000: 80-2).

2.2.3 Hirschman's Theory of Linkages: The theory of backward and forward industrial linkages (Hirschman, 1958) is widely regarded as one of the more significant concepts of development economics (Little, 1982: 42) since its introduction in 1958. Linkage theory is accepted both by the structuralist and neo-classical schools of economists and is so universal in its application as a tool by development planners that as A O Hirschman himself wryly remarks 'the linkage concept has achieved the ultimate success; it is by now so much of the language of development economics that its procreator is most commonly no longer mentioned when it is being invoked' (Hirschman, 1984: 96).

Linkage theory was developed as a counter argument to the balanced growth idea that industrialization could be successful only if it were undertaken as a large-scale effort, carefully planned on many fronts all at the same time (Hirschman, 1984: 96; Bliss, 1989: 1193). Hirschman formulated his concept of backward and forward linkages after observing that entrepreneurs followed a number of sequential rather than simultaneous solutions to problems that arose during the industrialization process. Basic to the theory is the idea that there are two mechanisms at work in the productive, industrial sector:

> *1. The input-provision, derived demand, or* backward linkage effects*, i.e. every non-primary economic activity, will induce attempts to supply through domestic production the inputs needed in that activity.*
>
> *2. The output-utilization or* forward linkage effects*, i.e. every activity that does not by its nature cater exclusively to final demands, will induce attempts to utilize its outputs in some new activities*. (Hirschman, 1958: 100).

Hirschman goes on to define satellite industries as small industries established in the wake of major industries which are of minor importance in comparison to the large, master industries. Satellite industries can be set up through a backward or forward linkage to either supply inputs to the major industry, or use the products and by-products of the major enterprise to manufacture intermediate and final consumer goods. In contemporary times, the industrial activities established as backward linkages are referred to as upstream industries whereas forward linkages are known as downstream industries. Hirschman gives, as an example, the cement industry as the major, master enterprise with multi-wall paper sack manufacture as a backward linkage or upstream activity, and cement block manufacture as a forward linkage or downstream industry (Hirschman, 1958: 102).

Agriculture in general is regarded by Hirschman as being characterized by a scarcity of linkage effects. He comments that by definition all primary production should exclude any substantial degree of backward linkage. Moreover, forward linkage effects in agriculture are weak because food production is consumed and agricultural commodities are exported with only minimal processing (Hirschman, 1958: 109). On the other hand, Meier (1995: 467) argues that the processing of primary-product exports by modern

methods in an expanding export economy is likely to provide a strong stimulus for the establishment of input-supplying industries.

2.2.4 Trade Pessimism Theory: The structuralist approach which regards trade as a mechanism of international inequality is associated with Raul Prebisch, Hans Singer and Gunnar Myrdal. The Prebisch - Singer thesis identifies specific rigidities, lags and surpluses, low elasticities of supply and demand, and market imperfections in the trading relations between industrialized and less developed countries. The basic argument is that there has been in the past, and there would continue to be a secular decline in the terms of trade of primary commodity exporters. The long-term worsening of trade patterns is due to such factors as:

a) low income elasticities for basic foodstuffs and other primary commodities;
b) differential rates of technological change favouring manufactured goods; and
c) a less competitive market structure in the manufacturing sector which is conducive to monopoly pricing.

This decline results in a long-run transfer of income from poor to rich countries that could only be ameliorated by industrialization promoted by import substitution policies (Singer, 1984; Weiss, 1988: 87-8; Cuddington, 1992; Greenaway & Milner, 1993: 46; Meier, 1995: 462-5; Hogendorn, 1996: 450-6; Todaro, 2000: 467). The thesis of the secular decline in the export trade of commodity producers, in the view of Little (1982: 70), was largely foreshadowed in the International Trade Organization debate in Havana in 1947 and became enshrined as the policy of the United Nations Conference on Trade and Development (UNCTAD) when Raul Prebisch was appointed Secretary General.

In a pessimistic analysis of socio-economic conditions and living standards ranging from the Indian sub-continent to Indo-China, the Swedish political economist and sociologist, Gunnar Myrdal in *Asian Drama* (1968) follows the Prebisch - Singer thesis of a long-term fall in demand for commodities. Written before the Green Revolution and the introduction of high-yielding cereal varieties to the wheat fields of the Punjab and padi swamps of South East Asia, Myrdal argues that if the level of development is low this leads in itself to a self-sustaining degree of poverty in a vicious circle of under development (Lim, 1991: 111).

2.2.5 Theories of Dualism and Enclave Development: The theory that in underdeveloped countries there are two distinct economies at work: a traditional, subsistence sector and an introduced, capitalist production system, was initially formulated by the Dutch economist, J H Boeke (1953). Boeke developed the theory of dualism from his study of the establishment and expansion of large-scale, rubber and oil palm estates in the north Sumatran plantation belt of the Netherlands East Indies. The dual sector model was expanded on and refined by W Arthur Lewis to include the modern industrial sector and became the general theory of development during the late 1960s and early 1970s (Todaro, 2000: 84). Based on his experience of Caribbean island economies, Lewis (1954/1992) argues that, in most countries, the rural, peasant subsistence sector is over populated, hence labour in the countryside has zero marginal productivity. In contrast, the urban, industrialized sector has a high productivity based on modern, capita- intensive technology. The industrial sector is, therefore, able to draw on an unlimited supply of workers with little or no loss of food production. Output expansion in the modern sector leads to increased wage labour employment as labour is gradually transferred from the low productive, non-wage subsistence sector. Thus, the

mechanism for development is a shift of labour from low productivity, subsistence farming to highly productive, industrial activities (Lewis, 1989: 1555). Myint (1987: 123-4) expands on the dual sector theory when he argues that there is fragmentation of factor markets and unequal provision of public services between the traditional and modern sectors. According to Hla Myint, the modern sector tends to be favoured by governments in the provision of physical infrastructure and social services. The industrial sector is characterized by the employment of high-wage labour and obtains low-cost finance from organized capital markets, whereas the rural economy has high rates of interest obtained from informal sources and pays only low wages.

Closely associated with the dual economy theory is the theory of enclave development. In colonial economies, Western-owned plantation and mining enterprises formed foreign enclaves in which capital and consumer goods were purchased from abroad, foreign managers and non-indigenous labour were employed, and profits and wage remittances were sent overseas. Furthermore, agricultural and mineral production was exported as raw commodities to the metropolitan countries and transported overseas by foreign-owned shipping lines (Myrdal, 1968: 445-52; Beckford, 1972; Lal & Myint, 1996: 191-2). Most economists agree that in modern times manufacturing enterprises owned by multinational firms that import capital-intensive technology employing few highly paid workers and using a high proportion of imported inputs in Free Trade Zones can lead to enclaves as much as the production of primary commodities (Hirschman, 1958: 112; Helleiner, 1973/1989: 306; Hogendorn, 1996: 448; Todaro, 2000: 485).

2.2.6 International Dependency Theory: The heterodox, radical approach that employs Neo-Marxist analysis in an examination of the process of development is

known as the international dependency school. Dependency theory which includes elements of history, sociology and politics in a Marxist dialectic discourse was first developed in Latin America where the main theorists were A G Frank, C Furtado, F H Cardoso and E Faletto. In Europe and Africa the dependency school is associated with the heterodox economist, A Emmanuel and Egyptian Marxist, Samir Amin respectively. The theory posits that the system of international politics and trade is characterized by huge, unequal, power relations between the wealthy capitalist, developed nations in what is termed the *centre* and the poor, developing world at the *periphery*. The periphery is exploited by the centre and is dependent on the centre which leads to the self-perpetuating condition of *underdevelopment*. Elite groups known as the *comprador* (Portuguese: buyer) class in the peripheral countries form alliances with international capitalists, which includes international aid agencies such as the World Bank as well as multinational companies, in order to maintain the state of underdevelopment. The *delinking* of trade and other external relations with the centre, according to dependency theorists, would lead to an autonomous, nationally directed path to fully developed status. In addition, within the less developed countries, a revolutionary struggle should be waged to free the *Third World* from direct and indirect economic control by their *First World* and domestic elite oppressors (Amin, 1976/1977; Frank, 1978; Frank, 1981; Amin, 1985/1990; Furtado, 1987; Weiss, 1988: 121-3; Balassa, 1989: 84; Lewis, 1989: 1555-6; Lim, 1991: 105-6; Meier, 1995: 107-11; Hogendorn, 1996: 444-6; Todaro, 2000: 91-4).

2.2.7 Role of Agriculture: The structuralist school regards the development process as the major structural transformation of an economy from a traditional agricultural society to one in which manufacturing industry is the leading sector. The policies to promote

industrialization have led Lipton (1977), Schultz (1987) and Timmer (1988) to conclude that agriculture has been neglected as a source of growth in early development strategies. Besides providing an unlimited supply of labour to industry, the subsistence farmers who remained on the land were to supply industrial workers in the towns with low-cost foodstuffs. Export agriculture growing commodity crops, on the other hand, was to earn the foreign exchange for industry to purchase capital goods for its expansion. The rural population was regarded as the primary market for the products of urban industry, and its taxes and savings could be invested in a burgeoning industrial sector (Bacha, 1980/1989: 316; Schultz, 1987: 20; Timmer, 1988: 289; Lewis, 1989: 1564; Meier, 1989: 327). In a note of caution, Weiss (1988: 84) and Meier (1989: 277, 327) state that structural transformation itself is dependent on agricultural progress and there are mutual supportive interactions between agriculture and industry.

2.3 The Neo-Classical School

2.3.1 Geo-Political Influences: In the 1980s, there was a paradigm shift in development economics from theories associated with the structuralist school to modern theories formulated from those of the founders of modern economics such as Adam Smith (1723-1790), David Ricardo (1772-1823) and John Stuart Mill (1806-1873). The change in intellectual climate was accompanied by the election of conservative governments in the United States of America, United Kingdom, Canada and West Germany who rejected economic policies of direct government intervention in trade and industry. Right wing governments, therefore, obtained the majority of voting rights in the International Monetary Fund and World Bank, and were able to appoint leading neo-classical economists to influential positions in both institutions. At the same time, there was a reduction in influence of organizations which were regarded as being more

fully representative of the views of the developing world, such as UNCTAD and the United Nations Development Programme (Todaro, 2000; 95). Finally, in 1989 there was the dismantling of socialist central planning and the establishment of capitalism in the former Soviet Union and its client states in Eastern Europe (Chang & Rowthorn, 1995: 2).

The catalyst for the rise of the neo-classical development paradigm was the spectacular economic performance of certain countries and territories of East Asia that had adopted private sector, export-oriented industrialization policies. The success of export-led growth, firstly of Japan, then in the Newly Industrialized Economies of South Korea, Hong Kong, Taiwan and Singapore was in stark contrast to the state-controlled, highly planned, import substitution models elsewhere (Corbo *et al*, 1985; Wade, 1990; World Bank, 1993; Chang, 1994; Garnaut *et al*, 1995; Lall, 1996). Neo-classical theorists such as Little (1982) and Lal (1983) challenged the *Dirigiste Dogma* of tight government control of economic growth of the structuralist school, and advocated the liberalization of trade and the removal of government-imposed restrictions. Their arguments received support from Myint (1980) and Bauer (1984a, 1984b, 1991) who, using the example of peasant farmers growing export commodity crops in South East Asia and West Africa, made the case for development policies based on minimal government intervention with international market forces.

2.3.2 Neo-Classical Theories: The neo-classical paradigm focuses on the effectiveness of market mechanisms as a means of allocating resources and emphasizes gains from participation in world trade. The neo-classical argument in a nutshell is for markets to be free of state control; promotion of foreign trade and export expansion; the

privatization of government monopolies; encouragement of direct foreign investment; the elimination of administrative regulations; and the removal of government-controlled price distortions in factor, product and financial markets. Todaro (2000: 96) regards there to be three main schools within the neo-classical paradigm:

a) free market analysis;
b) public choice theory; and
c) market friendly approach.

In free market analysis, markets alone are regarded as efficient; competition is effective, if not perfect; and technology and information is freely available and costless to absorb. The theory of public choice or new political economy suggests that minimal government is the best government. In this cynical approach, elite groups are expected to use power for their own ends so that the private sector seeks economic rents, governments seek power and bureaucrats seek bribes (Todaro, 2000: 96). On the other hand, the market friendly approach recognizes that there are imperfections in the product and factor markets in the developing world. Governments, therefore have an important role in facilitating the operation of markets especially through the provision of physical and social infrastructure.

2.3.3 Endogenous Growth Theory: The current thinking of mainstream development economists focuses on the theory of endogenous growth or new growth theory (Meier, 1995: 102-3; Meier & Rauch, 2000: 75; Todaro, 2000: 100-2; Todaro & Smith, 2003: 147). The term *endogenous growth* refers to a long-run increase in GNP that is determined by technical progress and human capital formation within the system governing the process rather than exogenous forces outside the system. New growth

theory relies heavily on neo-classical theories but differs from the traditional approach to the theory of diminishing returns for investment with regard to human resource capital. The theory regards investment in research and development (R&D) coupled with investment in education and training of endogenous human capital to be the main factors in promoting high rates of economic growth. Knowledge is treated as a public good and aggregate investment in knowledge capital leads to increasing returns to scale, compared to the diminishing returns of investment in physical capital. This allows investment in R&D and human capital to persist indefinitely and to sustain long-run growth in GNP and per capita income. The theory emphasizes the benefit of the exchange of ideas that comes with an open economy integrated into the wider global economy. A policy implication is that governments can promote growth by undertaking an active role in investments in human capital and by providing incentives to agents in the knowledge-producing R&D sector.

2.4 International Trade and Industrialization Theories

2.4.1 Comparative Advantage: The traditional theory of international trade is based on the theory of comparative advantage of the resource endowments of different countries which leads to specialization of production, and the exchange of goods through export and import trade. Specialization results in an efficient international division of resources, giving each country a higher real national income than it would have with no trade. The theory of comparative advantage was formulated by the classical economist David Ricardo who in 1817 chose the trade in wine and cloth between low-income Portugal and high-income England to illustrate his case (Meier, 1995: 455; Hogendorn, 1996: 435; Todaro, 2000: 469). The importance of the theory of comparative advantage to models of world trading systems is such that Riedel (1988: 115) has described Ricardo

as ‘the father of world trade’. Neo-classical theory has further explored the comparative advantage principle to modern conditions, prompting Myint (1987: 115) to state that the most important contribution of the neo-classical resurgence is to demonstrate to developing countries that they are able to increase their exports by following policies to exploit their comparative advantage. It is argued by Balassa (1989: 3) that the benefits of resource allocation according to comparative advantage leads to the exploitation of economies of scale and increased capacity utilization, improvements in technology, and increases in employment and investment.

On the other hand, in a historical analysis of world trade Landes (1998: 522) challenges the idea that international commerce is a positive-sum game in which all nations benefit. He cautions that comparative advantage is not fixed so it can move for or against a country, and the gains from trade are unequal because comparative advantage is not the same for all countries. Meier (1995: 456) argues that countries tend to ‘proceed up a ladder of comparative advantage’. Initially countries export commodities that are resource-intensive e.g. sugar, to products that are unskilled labour-intensive (textiles), to semi-skilled and skilled labour-intensive (electronics), to capital-intensive (machines), and finally to knowledge-intensive (computers and robotic equipment).

2.4.2 Heckscher – Ohlin Model: Ricardo reasoned in terms of a one-factor model in which the product of his single factor, labour, is different between countries. The Ricardian theory was expanded in the 1920s by the Swedish economists, E Heckscher and B Ohlin, and, in more recent times, by Paul Samuelson. The Heckscher – Ohlin model is regarded as the orthodox explanation of the principle of comparative advantage in contemporary trade theory. Its basic thesis is that countries differ in their relative

stocks of the different factors of production (land and natural resources, labour and capital), and that these differential factor supplies influence the costs of producing particular goods. Thus nations manufacture and export goods that intensively use their abundant factor and import goods that use relatively large amounts of the scarce factor. For example, a densely populated country with an abundant supply of labour, hence low wages, has a comparative advantage in the production of labour-intensive products such as textiles and clothing. On the other hand, a country with an abundant supply of investment finance finds it relatively cheap to manufacture goods whose production requires high capital funding and little labour. It therefore has a comparative advantage in, and exports, capital- intensive goods such as machinery and chemicals (Williamson & Milner, 1991: 32-55; Meier, 1995: 455; Hogendorn, 1996: 439; Todaro, 2000: 470; Todaro & Smith, 2003: 527-31). In the case of the production of tropical agricultural commodities and mineral extraction, Bliss (1989) argues that climate and geology make the cost of production relatively low. Whether or not the production of primary commodities is labour or capital intensive is incidental to the abundance of natural resources. Thus rubber and cocoa are grown in tropical countries because of climatic suitability not because there is an unlimited supply of labour. Similarly mineral and petroleum production depends on the abundance of geological reserves of metal ores and oil fields rather than domestic supplies of capital.

2.4.3 Porter Trade and Industrialization Theory: The Heckscher – Ohlin theory has been expanded in more recent times by new arguments that emphasize the role of market imperfections, product differentiation and consumption patterns, globalization and economies of scale (Greenaway, 1991: 156; Williamson & Milner, 1991: 56-81; Todaro & Smith 2003: 538-40). In *The Competitive Advantage of Nations*, M E Porter

(1990: 74-8) develops the Heckscher – Ohlin thesis and classifies production factors into a number of broad categories: physical resources; knowledge resources; capital resources and infrastructure. He then divides the factors into two classes, basic and advanced factors. Basic factors are passively inherited or their creation requires only modest investment, they include natural resources, climate, geographical location, and an abundant supply of unskilled and semi-skilled workers. A nation's advanced factors are often built upon the basic factors and comprise items such as modern communication systems, high quality and robust infrastructure, high investment in human resources, a specialized and well educated labour force, and well endowed research institutions and other knowledge resources.

The Porter model recognizes that whilst the advantages associated with basic factors have a considerable effect on the ability to compete, these advantages can easily be eroded by a lack of advanced factors. An industry is most likely to be competitive where there is an open economy with producers integrated into a discerning market, where there are supporting industries and there is rivalry among companies for market share. Porter argues that the central task of government trade policy in less developed countries is to encourage movement from comparative advantage based on natural resources and other basic factors to the creation of advanced factors. He sees intense competition among clusters of rival firms both domestically and in foreign markets as being the main source of economic benefits in a dynamic trade model. Porter follows the neo-classical argument that government policy can promote the process by not interfering with the development of competition (Hogendorn, 1996: 444).

2.4.4 Technology: Technology encompasses the raft of technical, managerial and institutional skills that allow industrial enterprises to utilize equipment and technical information in an effective and efficient manner. The term includes both 'hard' technology such as machinery and equipment with the accompanying operating instructions, and a 'soft' element that includes knowledge resources, specific know-how and human skills, and a business culture that accepts technical change. The Heckscher – Ohlin model takes technology to be both exogenous and fixed, that is to say, the most advanced technology is available to all countries at zero cost. However, as Williamson and Milner (1991: 71-3) point out, in real life technological conditions differ among countries. Moreover, technology is not a free input and is not transferred instantaneously from one country to another. Lall (1996: 27) argues that differences in performance between a small number of Newly Industrialized Economies that keep up with world technological advances and a majority of developing countries, that are unable to deploy even simple technologies, can be explained by differences in technological capabilities to handle industrial technologies and cope with technical change. There is a growing body of evidence that in international production networks the instructions and specifications from buyers in developed countries serve as a major source of technology transfer for firms in less developed countries (Meier & Rauch, 2000: 204). Meier (1995: 456) suggests that changes in comparative advantage can be expected to become even more rapid in the future as technological progress accelerates, initiation lags shorten and product life cycles speed up.

2.4.5 Product Cycle Theory: The product cycle theory (Vernon, 1966, 1971) focuses on the importance of the life cycle of manufactured products to give an explanation for international production. The cycle explains how the comparative advantage of a new

product is first acquired in advanced economies then transmitted to less developed economies (Meier, 1995: 456). The theory posits that innovation and new products are more likely to occur in a high-wage, capital-abundant country which supplies its overseas markets by exports. As the product becomes more mature, some degree of standardization of production operations takes place and relative production costs become increasingly important as competitors enter the market. At this stage, the firm has to choose a way to supply its foreign market either by increasing exports or setting up production facilities in importing countries with lower unit costs. The final stage of the product life cycle occurs when full standardization is achieved and knowledge becomes freely available. Production is likely to shift to less developed countries, particularly those where wage rates are relatively low. Thus exports from the high-wage economy decline and indeed may be converted into imports, while production in and exports from the low-wage economy will increase (Williamson & Milner, 1991: 73-5; Giroud, 2003: 32).

2.4.6 Export-Orientation vs Import Substitution: Greenaway (1988: 1-5) comments that the role which international trade may play in the development process has been a source of some controversy. At the strategic level, debate has focused upon the relative merits of inward-orientated and outward-oriented trade strategies. Proponents of the Prebisch - Singer trade pessimism school have typically emphasized the rigidities and inflexibilities of markets in less developed economies. By way of contrast, neo-classical theorists belonging to the trade optimism school have generally stressed the virtues of competition and the benefits of resource allocation being guided by the market mechanism. Developing countries, therefore, have a choice of an industrialization policy of protecting firms in import-substitution activities, or export-oriented activities

which they may pursue simultaneously for different sectors of the economy (Greenaway & Milner, 1993: 37).

2.4.7 Import Substitution Industrialization Policies: The most influential argument for implementing import substitution policies has been the infant industry argument. The argument is framed by reference to scale economies and dynamic learning effects that allow new industries to compete with established producers in other countries. New industrial activities require a learning period to master production operations and build up capacity to benefit from economies of scale. Therefore, new entrants in developing countries cannot be expected to compete with large-scale, overseas industries with established export markets. A policy of protection from import competition for a limited period allows the infant industry to expand capacity and gain market share until the costs of production fall to internationally competitive levels. Once this occurs the protection in the form of a tariff or quota on imports, or direct subsidy to domestic producers can be removed. The economy as a whole gains from the temporary protection because of the establishment of dynamic new industrial sectors (Weiss, 1988: 103; Greenaway & Milner, 1993: 49; Meier, 1995: 475; Meier & Rauch, 2000: 168; Todaro: 2000: 507-9; Todaro & Smith, 2003: 562-75). It is argued that the first stage of import substitution is characteristically easy because it involves production of non-durable consumer goods whose production requirements are well suited to the conditions existing in countries without previous industrial experience. The production of clothing, shoes, simple household goods and foodstuffs typically is intensive in unskilled labour, the scale of output is low and the technology is unsophisticated (Williamson & Milner, 1991: 290).

2.4.8 Export-Oriented Industrialization Policies: Economists of the neo-classical school argue that the result of import-substitution industrialization policies is indiscriminate high-cost protection for typically inefficient manufacturers producing for a small domestic market. A different development strategy was followed by a small number of economies in East Asia which from 1960 till the 1990s became the fastest growing area in the world. The economies of Japan, South Korea, Taiwan, Hong Kong and Singapore adopted a policy of industrialization through exporting to the international market (Corbo *et al*, 1985; Wade, 1990; World Bank, 1993; Chang, 1994; Garnaut *et al*, 1995; Lall, 1996). The core model of export-oriented industrialization, in the opinion of Krueger (1995: 16), is that 'the experience of the East Asian newly industrialised economies has clearly demonstrated that an outward-oriented trade strategy is not only viable, but is essential for prospects for rapid growth'. Grilli and Riedel (1995: 60) argue that an export-oriented industrialization policy is industrialization according to comparative advantage and no country can successfully industrialize against its comparative advantage. Their conclusion is the East Asian experience is, therefore, relevant to all developing countries. Krueger (1985: 197), who is one of the main advocates for trade liberalization, lists three important results of a successful export-oriented development strategy:

a) it permits countries to take better advantage of the technological opportunities available to them;
b) it prevents them from making costly mistakes associated with inner-oriented, restrictive trade and development strategies; and
c) it forces policies upon governments that generally lead to better economic performance by the private sector.

2.4.9 Globalization: The term describes the process by which the economies of the world become increasingly integrated, leading to a global economy and increasingly global economic policy-making, for example, through international agencies such as the World Trade Organization (Todaro & Smith, 2003: 510-13, 581-3). It is argued by Porter (1990: 14) that the globalization of industrial production decouples the firm from the factor endowment of a single nation. Multinational firms compete with one another using global strategies, selling their products and sourcing components and materials world wide, and locating their manufacturing operations in many countries to take advantage of low cost factors and spread political risk. Two publications by J E Stiglitz, *Globalization and Its Discontents* (2002) and *Making Globalization Work* (2006) discuss the challenges posed by globalization to the world economy, and the implication the process has for the policies of international financial and trade regulatory institutions.

2.4.10 Role of Government: The neo-classical resurgence saw a shift in attitude towards the central planning policies adopted by governments to promote industrial development. The extreme neo-classical position is characterized by a laissez-faire view of the world that successful economic development is the result of the invisible hand of market forces. Thus in trade and industrialization policy, the role of government is neutral with no intervention to support either import-substitution of export-orientation strategies (Greenaway & Milner, 1993: 58). The East Asian experience, however, led to a revisionist argument that economic growth is successfully encouraged, not only by good macroeconomic management (World Bank, 1993: 5), but by active intervention in the processes of investment and technical change in specific industrial sectors (Chang, 1994: 3; Meier, 1995: 557). Stern (1991/2000: 426), for example, states that there is a

substantial role for government in improving market functioning and private sector activity through such measures as building infrastructure, providing a regulatory and legislative framework which allows competition to work effectively, and intervening selectively in industry and agriculture. Revisionist theorists (e.g. Weiss, 1988; Wade, 1990) argue that in an active industrial policy, direct intervention by government is important in areas such as:

a) formulation of foreign trade and industrial policy;
b) industrial investment policy;
c) policy towards foreign direct investment and treatment of multinational investors; and
d) strengthening technological expertise.

In what they term the new 'Santiago Consensus' which reflects current World Bank thinking, Todaro and Smith (2003: 704) note that in the field of industrial policy the function of the state, besides providing a stable macroeconomic environment, includes encouraging technology transfer, providing export incentives and helping the private sector to overcome coordination failures. At a country level the success of governments in promoting industrial development is regarded by Lall (1991: 150-5) as being dependent on the availability of administrative skills, the nature of the country's ideology and the play of political forces within the country.

Chapter 3

The Political Economy of Malaysia

3.1 Introduction

It has been discussed in Chapter 2 that economic policy both globally, through the operations of international financial agencies such as the World Bank, and of nation states is influenced to a great degree by paradigm shifts in the discourse of political economy and historical events. No less so in the political entity of the nation state of Malaysia, that in its current form came into being a mere forty years ago. Malaysia, in political terms, comprises the nine states of Peninsular Malaysia (Malaya, West Malaysia), occupying the southern extremity of the Malay Peninsula of the Asian landmass, and the states of Sabah and Sarawak (Borneo states, East Malaysia), situated on the north coast of the island of Borneo.

3.2 Historical Background

The founding of modern day Malaysia is generally accepted by historians (Andaya & Andaya, 2001) to date from the establishment of the kingdom of Malacca (Malay: *Melaka*) in the late fourteenth century. Malacca was the last of the Malay trading states that had dominated the Straits of Malacca since the foundation of Srivijaya in southern Sumatra in the seventh century. Malacca's dominance may have lasted little over a hundred years (1396 - 1511) but it was the most important entrepôt, trading in locally produced tin and jungle resources, Chinese goods and spices from the eastern isles that were exchanged for cotton cloth and other goods imported by Indian and Arab traders from the west. The pursuit of control of the spice trade stimulated European

intervention in the Malay world: an area that is now the Philippines, the Indonesian archipelago and the Malay Peninsula. Armed conquest as well as the negotiation of treaties with local rulers by the Portuguese and Spanish for the establishment of European trading posts, then latterly the Dutch and the British eventually led to the end of Malay political and economic dominance in this part of South East Asia.

The Portuguese conquered the Malacca Sultanate in 1511 but after a number of attacks by the Dutch from 1606 onwards, it fell to a Dutch fleet in 1641. The British occupied the port and immediate hinterland during the Napoleonic wars (1795 - 1815) but handed the territory back to the Netherlands after the defeat of France until 1824 when it returned to British control. Rivalry between Great Britain and the Netherlands led to the negotiation of the Anglo-Dutch Treaty of 1824 that divided control of the littoral either side of the Straits of Malacca. The treaty allowed the British to pursue their interests in the Malay Peninsula whereas the Dutch followed theirs in Sumatra and Java. The first British possession on the peninsula was the island of Penang (Malay: *Pinang*), which was acquired by treaty in 1786 by the East India Company from the Sultanate of Kedah, a Malay princedom under the suzerainty of Siam. Sir Thomas Stamford Raffles of the East India Company founded the new trading post of Singapore (Malay: *Singapura*) in 1819. In 1826, Penang, Malacca and Singapore were grouped together to form the Straits Settlements, which was a dependency of British India until it became a Crown Colony under the Colonial Office in London in 1867.

The opening of the Suez Canal in 1869 made the shipping lane across the Indian Ocean to the Malacca Strait the fastest route to the East so that the ports on the offshore islands of Penang and Singapore expanded greatly in importance as increased tonnage of

steamships passed through them on their way to China, Japan and Australia. At the same time, the industrialization of western Europe and the north eastern United States significantly increased the demand for tin, a commodity found in abundance in the small Malay states on the west coast of the peninsula. The Malay chieftains who controlled land rights through customary tenure opened mines to exploit the tin ore reserves, and encouraged immigration of coolie labour from the southern provinces of China to work the mines. Capital finance for the mines was invested by influential merchants, both Chinese and British, who traded in the British administered enclaves of Singapore, Malacca and Penang. The sudden wealth and conflicting interests of the Malay chiefs boiled over into drawn-out disputes over control of tin-bearing land, while large-scale fighting between rival dialect groups broke out among the Chinese mine workers. With investments and exports threatened, the official British government policy of non-intervention in the Malay states came to an end.

In 1874, the British forced the paramount rulers of the states of Perak, Selangor and Negri Sembilan to accept British Residents who were charged with providing 'advice' to the rulers and their ruling councils on all matters except those regarding Malay religion and custom. The appointment of Residents whose political advice had to be followed, in a system of indirect rule, marked the introduction of British administration and governance across the Malay states. In 1896, Selangor, Perak, Negri Sembilan and Pahang united to form the Federated Malay States with a centralized system of government in the newly established federal capital, Kuala Lumpur. The kingdom of Siam, which claimed sovereignty over the northern sultanates of Kedah, Perlis, Trengganu and Kelantan relinquished control to Britain in 1909. These states together with the southerly sultanate of Johore retained many features of their own

administrations and collectively were termed the Unfederated Malay States. By the second decade of the twentieth century, the territory known as British Malaya comprised three distinct forms of government: the Straits Settlements ruled by the Colonial Office in London; the Federated Malay States with a central administration based in Kuala Lumpur; and the semi-independent Unfederated Malay States (Andaya & Andaya, 2001: Chaps. 1-5).

3.3 The Economy of Colonial Malaya

The establishment of British political and administrative control provided a congenial framework for the development and expansion of the tin mining and rubber tree crop plantation industries (Allen & Donnithorne, 1954; Lim, 1967; Jomo, 1986; Drabble, 2000; Andaya & Andaya, 2001). The Malays had been mining tin for many hundreds of years but when the surface deposits were exhausted at the end of the nineteenth century most Malays stopped production. Only Chinese and European mining operations had access to the capital resources to finance the machinery and large workforce needed to extract tin ore below the water table (Lim, 1967: 37-71). The abolition of slavery in the West Indies in 1833 provided the stimulus for the successful establishment of sugar cane estates, owned and managed by Europeans on the mainland across from Penang, using indentured labour from south India. In the late 1800s, there was an influx of European planters from Ceylon after disease had wiped out the coffee crop on the island. The coffee planters settled mainly in Perak, Selangor and Negri Sembilan where they grew coffee with migrant, south Indian workers until the introduction of the rubber tree from South America as a commercial crop. Chinese agriculturalists practised a form of large-scale, shifting cultivation growing pepper intercropped with gambier (used in tanning leather), or tapioca, known in other parts of the world as cassava or manioc.

After the land was exhausted it was abandoned to revert to secondary jungle, but when rubber cultivation became an attractive proposition it was planted with rubber trees and sold to Chinese and European speculators including London-based plantation companies (Jackson, 1968; Tate, 1996). Despite a land alienation policy that favoured the establishment of large estates (Drabble, 1973: 72-6; Jomo, 1986: 66; Jomo, 1990: 5) significant Malay peasant participation in rubber cultivation began from 1909, four years after rubber first became a plantation crop on a large scale (Jomo, 1986: 64). Both rubber and tin industries grew rapidly so that by the 1920s British Malaya became the largest producer of the two commodities in the world (Lim, 1967).

Lal and Myint (1996:108) classify both colonial Malaya and post-independent Malaysia as a 'land abundant country' in a classification system based on the classical economics school of resources and endowments of land, labour and capital. They define land abundant countries as those for which capital is scarce relative to both labour and land; labour is scarce relative to land; and land is abundant relative to both capital and labour. When British-administered Malaya opened up the economy to foreign investment to produce plantation and mining exports, native Malay, peasant farmers were comfortably off in the traditional padi agricultural sector because of abundant land resources. Malays, therefore, were not willing to work as wage labourers in estates and mines. Thus, large inflows of immigrant labour from southern India and the southern provinces of China were encouraged for the expansion of primary exports. This created a plural society in which equity is viewed as a triangular relationship among foreign investors in mines and plantations, Indian and Chinese immigrant workers and their descendants, and indigenous Malay fishermen and peasant farmers growing subsistence rice and smallholding rubber (Jomo, 1986; Lal & Myint, 1996: 143). In his classification of the

colonial economy, Junid Saham (1980: 7) regards there to have been three parallel economic systems of a) a peasant economy of rice cultivation, fishing and mixed farming; b) export production of tin and rubber; and c) a free trade economy in the entrepôt islands of Penang and Singapore.

In a discussion on the dualistic relationship of plantations and mines with the traditional farming and trading economy in developing countries, Lal and Myint (1996: 191-2) argue that primary commodities such as natural rubber and tin are produced by large-scale economic enterprises in the modern sector using capital intensive technology. Mining and plantation firms obtain their labour supply from a well developed labour market based on a regular wage system. They have ready access to modern banking and financial institutions for a supply of capital and credit. Whether foreign or domestically owned, they can draw upon an internationally available supply of managerial and financial resources and up-to-date technology. Provided the available natural resources are sufficiently abundant for profitable exploitation, exports from modern plantation and mining industries can expand, more or less independently of the state of organizational development in the rest of the economy. Drabble (2000: 109-10), in his economic history of Malaysia, notes that the structure of the Malayan economy in the early twentieth century exhibited several aspects of the dualistic paradigm of colonial export economies. There was a clear division into the foreign-owned, capital-intensive, estate and mine sector, and the indigenous, labour-intensive, rice farming sector. Drabble argues that the dualistic paradigm, whilst useful as an analytical device, tends to draw distinctions sharper than those observable in Malaysia at this time. The factor making a two sector analysis questionable was the presence of immigrant Asian communities who were becoming increasingly domesticated despite their foreign origins. The Chinese and

Indians constituted a layer between the unquestionably foreign western interests whose ownership lay outside the country, and the indigenous Malay population. In the rubber industry, for example, there was a continuum from the larger estates over 400 hectares in area (mostly European-owned), down through smaller estates (40 – 400 ha) and large to medium smallholdings (10 – 40 ha) with Chinese predominant in both, and the 'true' smallholdings under ten hectares. The true smallholding sector also had a substantial Chinese ownership but was predominantly owned by Malays whose holdings typically were less than two hectares. At this time, all producers used the same basic production techniques for processing raw rubber and planted unselected seedlings. A similar situation obtained in the mines sector with European-owned companies quoted on western stock exchanges operating highly capital-intensive, floating dredges whereas Chinese and some smaller European mines used the less capital-intensive, gravel-pump technology (Lim, 1967: 49-51).

A distinctive feature of the colonial period was that the economy was an open economy operating in a laissez faire system. Apart from government expenditure on ports and rail and road transport infrastructure, Malaya's development was undertaken almost entirely by private enterprise. Colonial economic practice centred on minimal taxation, strict avoidance of deficits and an essentially unprotected market (Jesudason, 1989: 48). Allen and Donnithorne (1954: 51) consider that development under British rule cannot be described solely in terms of western investment. They state that Asian, especially Chinese, entrepreneurial activity made an immense contribution. The nineteenth century establishment of European mercantile trading companies known as Agency Houses, in the opinion of Drabble (2000: 48), nevertheless, greatly increased the scale of trade with the outside world. Merchants, both Asian and European, spread out from the major

ports and were the connecting links that transmitted to the hinterland the 'pull' factor of demand emanating from the industrialized countries of the West. Agency House firms in Penang, Malacca and Singapore were active in promoting and funding much of the primary production of tin and natural rubber. Drabble concludes that in the case of Malaysia, trade functioned as the prime 'engine of growth' in economic development.

The economy of Malaysia before independence can be described as a classic case of a colonial economy supplying raw materials to the metropolitan country and providing a market for manufactured imports from the United Kingdom. Wheelwright (1965: 90), for example, describes the economy as being heavily dependent on rubber and tin commodity exports, with reliance on imports for most of its manufactured goods, and a substantial proportion of food. Most of the import, export and financial agencies were in the hands of firms largely owned and controlled in the United Kingdom, to which trade was primarily oriented. The dependence on outside sources for essential foodstuffs and manufactured products paid for by export revenue from the trade in rubber and tin is remarked on by Lim (1975: 2) who regards the colonial system as one of 'imposed free trade' (Lim, 1992: 97). Lim (1975) illustrates his statement with an analysis of import/export statistics towards the end of colonial rule when earnings from rubber and tin accounted for 85 per cent of gross export revenue or 40 per cent of GDP, whereas imports of consumer goods, including food, made up 66 per cent of total imports.

3.4 Japanese Occupation: 1942 – 1945

The military subjugation of South East Asia by Japan in the Second World War (1937 – 1945) was in large measure driven by the aim to gain control of a region considered vital to the Japanese economy (Drabble, 2000: 149; Cooper, 2001: 8-10). The war

began in 1937 with the Japanese invasion of northern China, then spilled over to Europe when Germany invaded Poland in 1939, while the USA joined the war in 1941 after the Japanese attack on Pearl Harbor. The Japanese army landed in the northeastern state of Kelantan in December 1941 and swiftly overran the peninsula. Malaya was forcibly incorporated into the Greater East Asia Co-Prosperity Sphere after the fall of Singapore to the Japanese in February 1942. From 1942 to the Japanese surrender in 1945, Malaya was ruled under a military administration centred on Singapore (renamed *Syonan*). In 1943, the northern Malay states of Perlis and Kedah on the west coast, and Kelantan and Trengganu on the east were returned to Siamese control for the duration of the war (Andaya & Andaya, 2001: 257-64; Cooper, 2001: 119-270).

The Japanese imposed a planned, command economy based on self-sufficiency in food production and industrialization built around the processing of local raw materials. Exports were to consist of what was required for the Japanese war effort. Rubber production in Malaya and elsewhere in South East Asia came almost to a standstill during the occupation. Rubber growing countries had sold their production almost entirely to the USA and Europe before the war but now the markets were cut off. The Allied blockade made it difficult to ship to Japan which, in any case, was a relatively small consumer. Rubber export earnings, which, pre-war had constituted the bulk of Malayan exports, were slashed to zero while imports of consumer goods from the West ceased. The standards of living of the bulk of the population were drastically reduced and thousands of estate workers were thrown out of employment (Chin, 1974: 82-7, 162-6; Tate, 1996: 496; Drabble, 2000: 149; Cooper, 2001: 328-42). When the war was over, Malayan rubber production recovered very rapidly so that by 1947 production was more than before the Japanese invasion (Lim, 1967:86).

3.5 Pre-Independence Years

From the end of World War Two until independence in 1957, economic development was characterized by reconstruction of the economy, particularly recovery from war damage caused by the Japanese occupation, and by further expansion of the export commodity sector (Schätzl, 1988: 29). The Korean War (1950 – 1951) gave a boost to the economy through increased demand for the strategic materials, tin and rubber, and GDP increased by over 60 per cent in one year (Lim, 1967: 18; Mohamed Ariff, 1991: 171). Political instability throughout the Far East, the wars in Indo-China and the self-imposed isolation of Burma, in the opinion of Mohamed Ariff (1991: 171), gave Malaya an advantage by default when the commercial activities of Rangoon and Saigon moved to Kuala Lumpur and Singapore. In keeping with the received economic wisdom of the time, the colonial authorities, soon after the British reoccupation, set up an Economic Secretariat for the whole of Malaya. The Secretariat produced plans to enable the government to guide private enterprise 'to directions which are the most desirable for progress in accordance with decided policy' (Tate, 1996: 551). However, as Tate (1996: 552) comments, the 'decided policy' was primarily dictated by the needs of the Sterling Area and Great Britain's own economy rather than the requirements of Malaya's post-war reconstruction. On the other hand, Drabble (2000: 165) is of the view that the more dirigiste policy towards the economy of the colonial government was confined to the public sector whereas the stance towards the private sector was for the most part laissez faire. Nevertheless, the reaction of the mainly British business interests to the introduction of economic planning was one of vehement opposition to interference in the traditional preserves of free enterprise (Tate, 1996: 553).

The International Bank for Reconstruction and Development (IBRD) was commissioned to report on the development of Malaya and Singapore in 1955 and the Bank's recommendations became the blueprint for the economic and social development of the independent Federation of Malaya in 1957 (Wheelwright, 1965: 17; Junid Saham, 1980: 8; Jomo, 1986: 221). The report noted that the 1953 per capita level of national income at US$250 was the highest in the Far East. Drabble (2000: 160) also comments that in 1950 the per capita income of US$1,828, in 1985 constant currency, was easily the highest in Asia including Japan (US$1,208). He regards Malaya's leading position in this measure to be primarily due to its high level of export earnings relative to the size of the population. The Paris-based, Organisation for Economic Cooperation and Development (OECD) notes that before independence the free enterprise, colonial economy was prosperous in comparison with other South East Asian countries because of the profitable tin mines and rubber plantations (Lim & Pang, 1991: 21). The IBRD also highlights the importance of rubber and tin exports, and notes that their export value represented about 85 per cent of all exports. The main recommendations of the Bank report were an import substitution policy to develop secondary industries to supply the domestic market, a programme of agricultural diversification to reduce the dependency on natural rubber, and development of the social and physical infrastructure. In reviewing the economy, the IBRD mission (1955: 13-14) stated:

> *By Asian standards, the Malayan economy has reached a relatively advanced stage, not only in the level of per capita income but also in structure: it is a more varied and complex economy than is characteristic of most underdeveloped countries. Power, transport, communications and other basic facilities; a considerable foundation of secondary industry has been established;*

there is a substantial nucleus of skills and enterprise; standards of public administration are high; and institutional patterns and habits of commerce and finance are correspondingly advanced.

3.6 Independence and the Formation of Malaysia: 1945 – 1965

The immediate postwar period was a time of rapid political change, which culminated in the establishment in 1948 of the Federation of Malaya, with its capital in Kuala Lumpur, embracing the former Federated and Unfederated Malay States, and the Settlements of Penang and Malacca. Singapore remained outside the federation as a Crown Colony because of its strategic trading and military importance to British interests (Andaya & Andaya, 2001: 264-74). Even before the end of the Japanese occupation, the Colonial Office in London had been making plans to merge all the small states and settlements on the peninsula into an independent Malayan Union. There were plans to include Sarawak and North Borneo in the new Union but the territories were finally omitted and both became Crown Colonies in 1946, while the free port of Singapore with its strategic army, naval and air force bases was not included in the colonial administration's proposals. The plan for the merger into the Malayan Union transferred the tenuous *de jure* sovereignty from the Malay sultans to the British government and abolished many of their privileges. The proposed political settlement gave equal rights and citizenship to all residents in the Union, including the substantial Chinese and Indian communities on the basis of local birth or ten years' residence. There was an immediate and strong reaction by the Malay population against the Malayan Union plan and a new, political force, the United Malays National Organization (UMNO) was established to oppose the Union. The strength of Malay opposition was such that the proposals for union were revoked and the Federation of

Malaya was created in 1948. The Federation returned sovereignty to the Malay rulers, enforced more restrictive citizenship rules and gave special privileges to members of the Malay race.

Many Chinese, especially those who had carried on a guerrilla war against the Japanese, felt betrayed by the British and joined the Malayan Communist Party to fight for an independent Malaya under Communist rule. At first, the party waged an open struggle mainly through their control of the trade union movement but later took up armed insurrection that resulted in the declaration of a State of Emergency in mid-1948. However, much of the Communist Party's political support waned when the Chinese-based, Malayan Chinese Association (MCA) together with the Malayan Indian Congress (MIC) joined forces with UMNO to negotiate for full independence. The 'Alliance' comprising the three communally based political parties overwhelmingly won the 1955 Federal elections on a platform of independence for the Federation of Malaya. Independence from British rule was declared on 31 August 1957 (Andaya & Andaya, 2001: 269-82).

Singapore, with its majority Chinese population became self-governing in 1958 with matters of internal security and defence still maintained by the British who were due to relinquish control in 1963 when it was expected that Singapore would gain full independence. The Malayan government, which was still fighting Malayan Communist Party insurgents, was concerned that the communists might take control of Singapore after British withdrawal. The Malayans proposed the idea of a federation comprising Malaya, the Borneo colonies of Sarawak and North Borneo, Singapore and the oil-rich Sultanate of Brunei. During negotiations, Brunei declined to join the new political

entity. A consensus was reached among the other four parties with the British authorities and the Federation of Malaysia came into being in 1963. Political differences arose almost immediately between the People's Action Party (PAP) of Singapore and Malaya's UMNO, which championed the interests of the Chinese and Malays respectively. With a growing threat of communal violence and political battles becoming more heated, the Malay-dominated government enforced Singapore's secession from the Federation of Malaysia in 1965 (Fryer, 1970: 209; Lee, 1998; Andaya & Andaya, 2001: 282-93).

3.7 Post-Independence Economic Policy

At the time of independence in 1957, Malaysia had an export-oriented strategy based on the primary production of natural rubber and tin. The country had 'a level of administration, technology, physical and commercial infrastructure and a world trading position that was considerably in advance of most other countries in the South-East Asian region' (Md Zainuddin Salleh & Zulkifly Osman, 1982: 125). The economic strategy followed in the years after independence was essentially a continuation of the free market trade and industrial policies of the colonial government. There was, however, extensive intervention by the government to promote rural development, and to provide social and physical infrastructure, particularly in rural areas (World Bank, 1993: 134). Bowie (1991: 69) comments that the development efforts of the newly independent state were focused on the rural-agricultural sector whereas the private sector was left to largely determine the course of development in commerce and industry. Snodgrass (1980: vii) describes the overall strategy as one that assigned the development of industry, tin mining and much of commodity tree crop agriculture to the private sector, which was overwhelmingly foreign or ethnic Chinese in its ownership

and management. The role of government was seen by Snodgrass to be a passive facilitator of industrialization whereas its role in rural development was that of a much more active promoter because of government policy intended to improve the lot of the predominately rural Malays. He also states that the continuation of policies of liberal capitalism coupled with monetary and fiscal conservatism was 'what powerful foreign and Chinese business interests wanted, and what the World Bank recommended' (Snodgrass, 1980: 47). On the other hand, Jomo (1986: 221) considers that the main departure from the economic policy of colonial times was that the state actively intervened to promote industrialization. Nevertheless, as Cho (1990: 54) and Bowie (1991: 69) argue, the state's role was essentially a passive one by providing sites for industrial development, provision of infrastructure and a benign environment for private investment. The World Bank (1993: 134) states that while the government did protect domestic industries under its import substitution programme, rates of protection were low and, importantly, the state did not promote individual sectors.

3.8 Agricultural Development Strategy

The newly independent government retained most elements of the pre-war economic patterns including a free market economy inside the country relying on economic incentives to expand export production from the peasant sector, and from the mining and plantation sectors (Myint, 1972: 28-9). Higgins (1982: 148) notes that after independence Malaya still had vast tracts of tropical rain forest on suitable land that allowed a continuation of the policies of successive colonial governments of expansion of large-scale, modern, technologically advanced, plantation agriculture. A World Bank report (Young *et al*, 1980: 19) commented on the dualism in the agricultural sector in

the 1960s characterized by a modern, estate sector with high productivity and a traditional, smallholder sector featuring low productivity and low incomes.

The development strategy adopted by the government was to diversify the agricultural resource base by increasing the rate of replanting old rubber, new planting of natural rubber and oil palm on logged forest land, opening of new land for rice production, and the improvement of irrigation and drainage in existing rice lands (Chong, 1982: 185). During this period, there was increased public expenditure to improve physical infrastructure and provision of social services in health and education in rural areas. In projects undertaken by the Federal Land Development Authority, landless Malay farm workers and fishermen were settled on massive land development schemes growing oil palm and rubber. Other government agencies were established to assist existing rubber smallholders to replant their land, and allow rubber and padi producers market their crop (Fryer, 1970: 223-65; Jomo, 1986; Shamsul & Perera, 1977; Shamsul & Lee, 1988; Abdul Samad Hadi, 1994: 52-5; Lal & Myint, 1996: 144; Islam & Chowdhury, 1997: 233). As noted by the World Bank in its review of agricultural pricing policies (Jenkins & Lai, 1989) and in the analysis by Lal and Myint (1996: 197-8), the investment to pay for these development programmes came from a transfer of resources from the modern, export sector of plantations (and mines) to the traditional, peasant sector of Malay padi farmers and rubber smallholders.

A number of commentators, including the World Bank (Jenkins & Lai, 1989), have noted that Malaysia provided a clear exception to the urban bias and anti-agricultural bias of development theories of the 1960s and 1970s by investing in irrigation projects for rice production, and land settlement programmes for rubber and oil palm cultivation.

There is general agreement among these observers that Malaysia avoided an urban-based development strategy because of the political power of rural Malay voters in keeping the Alliance coalition in power (Wong, 1979: 99; Jenkins & Lai, 1989: 1; Cho, 1990: 84; Lal & Myint, 1996: 334). On the other hand, in a later, more general World Bank report (1993: 134) it is argued that the government was restrained from implementing incentives against agriculture by the economic and political importance of the 'plantation sector'. However, the Bank does not say whether the term *plantation* includes the Malay and Chinese smallholding and government-owned land scheme sub-sectors, as well as the technologically advanced, foreign-owned large estates.

3.9 Post-Independence Political Settlement

Underlying the policies of free international trade and a favourable, investment climate within a stable financial framework, was the ethnic settlement bargained among Malays, Chinese and Indians in 1957. The leaders of the three groups came to an agreement that the Chinese and Indians would recognize the primacy of Malay political power, and of the special rights and privileges for Malays, in return for full citizenship rights and a voice in government (Jomo, 1986; Andaya & Andaya, 2001). This bargain also meant that the Chinese would continue to have economic dominance as long as they did not challenge the political dominance of the Malays (Islam & Chowdhury, 1997: 232). Islam and Chowdhury conclude that the communal settlement contributed to Malaysia's economic growth in the first decade of independence in three ways. Most importantly, it ensured that Chinese economic dynamism was not interrupted; it shielded the state from rent seeking during the import substitution industrialization phase of the 1960s; and it provided stability that made Malaysia attractive to foreign investment.

The policy of extending the Malay race special rights and political privileges created resentment among the Chinese and Indian communities who also felt that their own cultures were being submerged. This dissatisfaction resulted in the non-Malays voting in large numbers for predominately Chinese-based opposition parties in the May 1969 general election. The Alliance of UMNO, MCA and MIC parties won but lost its two-thirds majority and thus its power to alter the constitution. Severe racial riots broke out in Kuala Lumpur and the fighting, mainly between Malays and Chinese, left 196 dead, according to official figures, with non-Malay deaths exceeding those of Malays by six to one. Parliamentary government was suspended for eighteen months and replaced by a National Operations Council that ruled by decree (Bowie, 1991: 82; Crouch, 1994: 15; Drabble, 2000: 196; Andaya & Andaya, 2001: 297-9; Kua, 2007).

The previous official hands-off approach towards non-Malay commercial and industrial activities was abandoned in favour of extensive state regulation of the economy. There was, therefore, a marked shift from the relatively laissez faire, open economy and social system followed since 1957 to a more authoritarian and interventionist role for government, especially in directing the economy. The new strategy, according to Snodgrass (1980: 60), boldly recognized and confronted the problem of Malay economic inferiority and presented remedies, which stressed movement of Malays to different sectors of the economy and to urban areas. The policy to promote Malay participation was implemented by the creation of numerous state-owned corporations to act as proxies for Malay business enterprises in the economy (Bowie, 1991: 83; Gomez & Jomo, 1997: 32-8; Drabble, 2000: 199). Three Malaysian commentators, Jomo (1986: 300), Khoo (2000: 215) and Kua (2007: 3, 123) also consider that one of the aims of the new economic development strategy was to create a Malay capitalist class and a Malay

middle class by using public funds and intervention by the state bureaucracy on a massive scale.

3.10 New Economic Policy: 1970 – 1990

The package of measures to improve the economic status of the Malays was termed the New Economic Policy (NEP) and was scheduled to last for a twenty year period, from 1970 to 1990 (Jomo, 1986: 256-68; Mehmet, 1986: 6-9; Drabble, 2000: 197-202; Andaya & Andaya, 2001: 301-21). The NEP had two official objectives:

a) restructuring of the economy and society in order to eliminate the close identity between race and economic function; and

b) eradication of poverty irrespective of race.

These two aims were to be achieved by a restructuring of employment to reflect the ethnic composition of the population and a redistribution of shares in the national corporate wealth. There was to be no arbitrary division of existing assets but, rather a redistribution of the much larger national 'cake' that was expected to result from continued economic growth so no group would be worse off in absolute terms (Drabble 2000: 197).

Andaya and Andaya (2001: 301) comment that by the early years of the twenty-first century it is possible to make an informed assessment on the social effects of the NEP on Malaysian society but only the passage of time will provide the perspective necessary for historical evaluations and judgements. Nevertheless, when the NEP came to its formal conclusion in 1990, it had, in large measure, achieved many of its declared objectives while its influence on the economy and Malaysian society continues to the present day. In 1970 it was estimated that some 49 per cent of all households were

below the poverty line of RM33 per month (Andaya & Andaya, 2001: 302). By the beginning of the present century, the respected *Far Eastern Economic Review* reported that the numbers of households living below the poverty line had dropped to five per cent (*FEER*: 9 Oct 2003). One significant development during the implementation of the NEP has been the expansion of the middle class, which by 1990 made up almost a third of the workforce. The increase in the Malay component was particularly striking. In 1970 when the NEP was introduced the proportion of the Malay workforce employed in middle class occupations was only 13 per cent, while by 1990 the figure had risen to 27 per cent (Andaya & Andaya, 2001: 315). Equally impressive was the increase in Malay employment in the manufacturing sector which, according to Andaya and Andaya (2001: 318), rose from 29 per cent in 1970 to 49 per cent by 1990. There were important changes in equity ownership over the same period. The ownership of corporate assets in 1970 compared to the official figures at the end of the NEP is recorded by Drabble (2000: 197, 202) although Andaya and Andaya (2001: 313) note that there are commentators who consider that the Malay share is underestimated.

Table 3.1

Corporate Wealth
%

	1970	1990
Malay	2	20
Other Malaysian	35	45
Foreigners	63	25
[Unaccounted]		10

Source: Drabble, 2000

By the conclusion of the NEP programme, there had been an important shift in the contribution that the two largest sectors of the economy made to Gross Domestic Product. In 1970, agriculture contributed some 30 per cent of GDP but only 16 per cent

by 1990; by way of contrast the manufacturing sector rose from 14 per cent in 1970 to 30 per cent of GDP in 1990 (Drabble, 2000: 188, Table 10.4). In employment terms, agriculture fell from 48 per cent to 23 per cent of the workforce, and there was an increase in employment in the manufacturing sector from 8 per cent to 29 per cent over the same period (Drabble, 2000: 189, Table 10.5).

3.11 National Development Policy and Asian Currency Crisis

The successor to the NEP that ended in 1990 is the National Development Policy (NDP). The NDP restates many of the NEP's aims, such as promoting balanced development and optimizing growth, maintaining racial harmony, as well as eliminating social and economic inequalities in society. Under the NDP the emphasis is less on the transfer of wealth and more the rapid development of an active Malay business community, while the mention of ethnic quotas and targets are omitted (Milne & Mauzy, 1999: 72-3; Andaya & Andaya, 2001: 318). The long term goal of the NDP is for Malaysia to work towards attaining first world status by the year 2020 by raising the national average income to the same level as highly industrialized countries (Andaya & Andaya, 2001: 321).

High growth rates in the 1990s resulted in year on year increases in GDP and corresponding socio-economic gains with a rise in standards of living and full employment (Milne & Mauzy, 1999: 75; Khoo, 2000: 222). In mid-1997, the Asian currency crisis that began with the collapse of the Thai currency and stock market spread to neighbouring countries in South East Asia including Malaysia (Mallet, 1999: 142-3; Khoo, 2000: 213; Stiglitz, 2002: 89). Speculation on foreign exchange markets caused the value of the Malaysian currency, the *Ringgit Malaysia* to almost half in value

from April 1997 to January 1998 while, the Kuala Lumpur Stock Exchange share index fell by 40 per cent. By 1998 there was a full-scale recession with a severe loss of business confidence and the danger of major conglomerates becoming insolvent. Malaysia refused intervention by the IMF and introduced a package of capital control measures to insulate the economy from externally generated risks caused by further currency speculation. The *ringgit* was fixed at RM3.80 to the US dollar and its convertibility was abolished so that all international trade had to be conducted in foreign currencies. Other measures included controls on transfers of funds out of the country by Malaysian residents and the repatriation of all offshore *ringgit* accounts, together with a temporary freeze on the payment of dividends on foreign portfolio capital. Internally, there was a sharp reduction in interest rates with the objective to prevent bankruptcies of major companies quoted on the Stock Exchange (Milne & Mauzy, 1999: 176-7; Khoo, 2000: 231; Ishak Shari, 2001: 73; Stiglitz, 2002: 93). The currency control measures went against IMF policies and Malaysia was severely criticized during the crisis by the international financial community (Andaya & Andaya, 2001: 321; Stiglitz, 2002: 122). However, in the opinion of Stiglitz (2002: 125): 'In retrospect, it was clear that Malaysia's capital controls allowed it to recover more quickly and with a far smaller legacy of national debt burdening future growth than countries such as Thailand, which had followed the IMF advice'. Moreover, Stiglitz comments that because overseas corporate investors are primarily concerned about economic stability, there is little evidence that the capital control measures discouraged foreign investment but, on the contrary, investment from overseas actually increased.

Government development policies since 1998 continue to be based on the NDP with an industrialization strategy emphasizing export-oriented industries and encouragement of

foreign investment. At the turn of the century, growth rates relied heavily on the manufacturing and service sectors that represent the country's strength after the currency crisis (Giroud, 2003: 113). Manufacturing remained the fastest growing sector throughout the 1990s so that by the early 2000s it contributed some 33 per cent of Gross National Product. Politico-economic policies introduced under the NEP and continued in the NDP programme have resulted in a redistribution of economic wealth to the Malay ethnic group coupled with a consolidation of Malay political control. Nevertheless, over this period of time, the standard of living of all Malaysian citizens, regardless of ethnicity, has improved. In October 2003, the *Far Eastern Economic Review* reported that the per capita income was estimated to be almost US$4,000, with more than 60 per cent of households owning luxury consumer goods such as motor cars and television sets.

3.12 Conclusion

Since independence in 1957 until the present day, there has been an unprecedented change in the economy of Malaysia from a country largely dependent on the export of primary commodities to a Newly Industrialized Economy exporting mainly manufactured goods. Social changes have been equally important with the majority of the population becoming urbanized and obtaining employment in secondary manufacturing and the tertiary service sectors rather than in the primary sector of tin mining, fishing, peasant farming and plantation agriculture.

Chapter 4

The Development of Manufacturing Industry in Malaysia

4.1 Industrialization under British Rule

An examination of the literature on the development of the manufacturing sector in Peninsular Malaysia indicates that there are two schools of thought regarding the influence of colonialism on the industrialization process. One school of economists argues that under colonialism a dual economy developed: an externally oriented, primary producing sector centred on tin mines and rubber plantations; and a sluggish, Malay, subsistence economy largely outside the orbit of direct British control and capitalist relations of production. The conclusion of this model is that the colonial economy supported by the policies of the colonial state severely inhibited Malaysia's industrialization until well after independence (Overton, 1994: 35). The leading advocate of this school is Jomo Kwame Sundaram, (known in the literature as Jomo, K S), of the University of Malaya, who unequivocally states that industrialization began with independence in 1957 (Jomo, 1993: 1). However, the argument is confounded, to a large degree, by whether or not Singapore is to be regarded as part of British-administered Malaya prior to 1957. Thus, the report of the IBRD mission that examined the economy of Malaya in 1955 states that Malaya comprises the Federation of Malaya and the Colony of Singapore. The report then made separate recommendations on economic development for the Federation and Singapore (IBRD, 1955). Surprisingly, Jomo (1986: vii-viii) also argues that: ‘Economically, culturally, and, at times, even administratively, the now independent city-state of Singapore (Singapura)

was also very much part and parcel of Malaya, and the term "Malaya" often refers to the island as well'. The first Prime Minister and architect of Singapore's independence, Lee Kuan Yew (1998: 21) in his autobiography comments that Singapore and Malaya had always been governed as one territory by the British with the Malayan peninsula being regarded as Singapore's hinterland. Indeed, Lee (1998: 515) writing about the formation of Malaysia in 1963 states that his policy, at the time, was that Singapore should become the industrial hub of the new country.

These arguments suggest that, before Singapore's expulsion from Malaysia in 1965, it is difficult to separate clearly the industrial development of the two territories while they were under British rule. Indeed, Brookfield (1994: 6) regards any attempt to view the economy of the peninsula in isolation from that of Singapore before the late 1960s as illusory. Nevertheless, from a present day, Malaysian perspective, it is argued that the industrialization of Singapore had an inhibiting influence on the development of the manufacturing sector in Peninsular Malaysia. This Kuala Lumpur-centric viewpoint is put forward by Jomo (1993: 1) when he writes that Singapore was the regional centre for the British Empire where most industries for Malaya were concentrated and when Malaya achieved independence in 1957 without Singapore 'the newly independent hinterland lost much of its modest industrial sector'. In extending the argument, Jomo (1993: 290) contends that the industrialization of Singapore under colonialism did not contribute to, but pre-empted and discouraged the development of manufacturing in the Malayan hinterland. The importance of the manufacturing sector in Singapore within newly established Malaysia is remarked on by Drabble (2000: 186), who notes that the forced withdrawal of

Singapore in 1965 removed much industrial capacity from the country.

In addition to the 'Singapore factor' referred to above, a number of commentators have provided reasons for the lack of encouragement of industrial development under the laissez faire policies of colonial rule. Jomo (1993: 1), for example, cites British imperial policy decided in London for the colonies to supply raw materials to British industry and provide a market for manufactured imports from the United Kingdom. In Malaya itself, the colonial authorities discouraged local manufacture, according to Jomo and Edwards (1993: 18), because domestic production would reduce the revenue collected by import duty when products entered the country. The influence of the powerful rubber and tin primary industries is also regarded as an important factor in preventing the establishment of a manufacturing industry base. The largely British-owned rubber and tin interests argued that protection of local consumer industries would raise the cost of living for plantation and tin mine workers which in turn would bid up wage rates, thus reduce the profitability of the two most important sectors of the economy (Wheelwright, 1965: 97; Jesudason, 1989: 48; Jomo & Edwards, 1993: 18). In addition to the policy of the import of cheap consumer goods in order to keep wages low, Wheelwright (1965: 97) considers that the labour-intensive, rubber plantation industry took the attitude that an expansion of manufacturing would offer alternative employment for estate labour, and so increase pressure on plantation wages.

The alternative school to the one that regards the industrialization process to have been inhibited under the colonial regime argues that the two primary industries of rubber and tin

provided a firm industrial foundation for rapid expansion of the manufacturing sector after independence. In a review of industrialization in colonial Malaya, Rasiah (1995: 45-68) examines the manufacturing linkages that evolved from the two major export industries and challenges the argument put forward by the 'anti-colonial' school. Rasiah argues that foreign investment in tin and rubber production played an important role by providing effective demand for inputs, while, at the same time, encouraging the diffusion of industrial technology that led to considerable manufacturing growth during the colonial period. Rasiah and fellow commentators such as Thoburn (1973/1975a, 1973/1975b, 1977), Brookfield (1994b) and Overton (1994) advance the viewpoint that the precursor of the modern manufacturing sector emerged under the open economy and laissez faire conditions of colonial government. There are two main thrusts to this argument. The first is that the expanding primary sector stimulated the development of both backward and forward linkages to a nascent manufacturing sector. Rubber and tin production provided a market for manufactured inputs (backward linkages) such as engineering products made by local firms that had the natural advantage of proximity of location to plantation and mines. Furthermore, the production of natural rubber was a source of raw material for the establishment of downstream industries (forward linkages) that made simple rubber products such as rubber-soled shoes, and bicycle tyres and inner tubes using labour-intensive technology in small manufacturing enterprises. The second thrust to the argument is that rubber estates and tin mines were a training ground for skilled workers such as mechanics and clerical staff, as well as a larger unskilled, industrial labour force that learned ways of working which were easily transferable to the expanding manufacturing sector.

In pre-independence Malaysia, the major industries were processing facilities for milling estate and smallholding raw rubber into export-grade material, and smelting tin ore into tin ingots (IBRD, 1955: 11; Wheelwright, 1963: 212; Drabble, 2000: 136). In an early study on western investment in colonial Malaya, Allen and Donnithorne (1954: 216) trace the establishment of the modern engineering sector to the late nineteenth century when a British company opened a shipyard in Singapore that undertook repair work and built small craft for the coastal trade. In the first decade of the twentieth century, the company expanded its operations into the peninsula, especially the capital, Kuala Lumpur and Ipoh, the centre of the Kinta Valley mining industry, to manufacture tin dredges and rubber milling machinery. The manufacture of tin mining and rubber processing machinery required the establishment of iron and steel foundries and associated engineering workshops where this equipment was fabricated (Allen & Donnithorne, 1954: 216; Thoburn, 1977: 201; Rasiah, 1995: 59). With the growing demand from the tin and rubber production industries, as well as copra and palm oil processing from coconut and oil palm agriculture, there were substantial levels of technology transfer from Western-owned engineering firms to local Chinese enterprises through the sub-contracting of manufacture and construction works (Thoburn, 1977: 186-206; Rasiah, 1995: 67) so that, at independence in 1957, Peninsular Malaysia had a fair number of small-scale, metal engineering firms owned primarily by ethnic Chinese (Rasiah, 1999: 231). In addition to engineering inputs, the requirement for fertilizers by the plantation industry led to the establishment, in the 1930s, of a local importer with a plant that produced fertilizer mixtures on the outskirts of Kuala Lumpur (Puthucheary, 1960: 56; Tate, 1996: 407). Natural rubber production provided a source of raw material for the development of

forward linkage activities through the establishment of downstream rubber goods industries and this topic is discussed at length in Chapter 5.

The second plank of the school that considers the rubber and tin primary sectors in promoting linkages with secondary industries revolves around the transfer of technological skills to the workforce. From their establishment, rubber plantation and tin mining companies operated as industrial concerns that required capital, managerial expertise, wage labour, specialization of production and a degree of technical knowledge (Graham & Floering, 1984; Goldthorpe, 1987; Overton, 1994: 36; Lal & Myint, 1996: 191). Thoburn (1977: 210) argues that if a new technology provides local people with the ability to act as an industrial workforce, it has both increased factor productivities and generated externalities. The skills of fitters, electricians and other technically trained workers are useable by almost any manufacturing industry while the expertise of managers, supervisors and clerical staff are also transferable to industries outside of tin and rubber production. When it comes to the mass of estate labour, Thoburn (1977: 216) considers that rubber tapping skills are of little use outside the plantation industry. On the other hand, Overton (1994: 45) argues that the labourers working on plantations constituted a disciplined, wage earning, rural proletariat well suited to the demands of an expanding, industrial production sector. In a similar vein, Higgins (1982: 148) comments that in sharp contrast to neighbouring countries, at independence Malaysia had half of the labour force already in the modern plantation and mining sectors.

4.2 Industrialization in Post-Independence Malaysia

The most comprehensive accounts of manufacturing during the transitional period from colonial Malaya to independence are by the World Bank (IBRD, 1955) and Wheelwright (1963, 1965). At the end of colonialism, foreign investment was still largely concentrated in the primary sector, although as Rasiah (1995: 45) argues, a significant share of manufacturing industry had developed from the linkages generated from rubber and tin production. The IBRD mission considered that the manufacturing sector of the time was relatively well advanced by Asian standards (IBRD, 1955: 11) and classified secondary industries under five categories: handicrafts; processing of primary commodities (tin, rubber, oil palm and coconut); engineering including machinery for tin mines and rubber processing; and other manufacturing. The Other Manufacturing sector included the local manufacture of bricks and concrete building materials, cement, metal cans and glass bottles, soap made as a by-product from copra milling and palm oil production, and the production of rubber goods (IBRD, 1955: 304). In 1955, manufacturing and construction accounted for 5.3 per cent of GDP and roughly 10 per cent of the labour force. Most firms, approximately 80 to 90 per cent, were in Chinese ownership and the typical firm was small, with less than 20 workers and privately owned (Drabble, 2000: 169).

The 1955 IBRD report recommended a limited import-substitution policy to build up secondary industries to cater for the domestic market for consumer and manufactured goods. The mission did not consider that Malaya possessed any comparative advantages for large-scale industrialization and cited lack of a complex of basic raw materials for advanced manufacturing the absence of local sources of cheap power and fuel, and relatively high

wages (IBRD, 1955: 84; Drabble, 2000: 169). The government accepted the bank's recommendations and in 1958 enacted the Pioneer Industries Ordinance with the objective of encouraging industrialization. The main features of the act were exemption from corporation tax for five years to manufacturers whose production was new to the country and tariff protection for the new industries. The government created two independent agencies: the Tariff Advisory Board and the Federal Industrial Development Authority (later the Malaysian Industrial Development Authority, or MIDA) to administer applications for pioneer status (Lo, 1972: 74-90; Shepherd, 1980: 182).

The World Bank's viewpoint (Young, 1980: 84) of Malaysia as a location for investment in the manufacturing sector in the period immediately after independence was positive because of political stability together with minimal interference by government, ample availability of finance, good infrastructure and a plentiful supply of well educated labour. The official attitude to heavy foreign participation in manufacturing industry, at the time, was positive and policy did not discriminate against overseas capital. Foreign investors were generally thought to represent a source of capital, technology and business skills which could be tapped if manufacturing was to grow rapidly (Snodgrass, 1980: 210). Over the period 1958 – 68, foreign firms relocated in virtually all industries to circumvent tariffs, enjoy tax holidays and benefit from entry to the domestic market so that in the space of ten years foreign-owned companies dominated in the manufacturing sector (Rasiah, 1995: 105; UNCTAD, 1998: 21).

Drabble (2000: 169) questions why Chinese entrepreneurs did not play a more prominent

role in the pioneer incentive programme in view of their predominance in manufacturing at the time of the country's independence. He suggests that the major reason lay in the corporate type of ownership and organization structure encouraged by the authorities that followed the pattern of established British Agency Houses and multinational companies. The incentives of the Pioneer Industries Ordinance favoured more capital-intensive industries that employed skilled workers (Thoburn, 1977: 160; Verbruggen, 1987: 365), compared to the traditional, Chinese-owned, labour-intensive, family businesses.

In a small country such as Malaysia, the domestic market began to show signs of saturation after a decade of rapid industrialization (Chong, 1982: 185; Verbruggen, 1987: 365; UNCTAD, 1998: 21) and it became apparent that this type of policy provided insufficient employment opportunities for a growing labour force. Nevertheless, Osman-Rani (1982: 263) concludes that the results of the import-substitution policy for economic growth included some degree of diversification, a move into manufacturing, a reduction of dependence on imported goods and the creation of some employment opportunities. He notes that the import of consumption goods such as food, beverages and consumer durables decreased by almost half, from 47 per cent in 1961 to 27 per cent in 1970. On the other hand, Osman-Rani argues that most new industries were based on imported materials or imported intermediate goods so that there was a low ratio of value added and poor linkage effects with the rest of the economy. In a critical analysis, Jomo and Edwards (1993: 19-24) state that the import-substitution policy encouraged economic rent seeking through tariff protection, the remittance of profits out of the country by foreign firms and high domestic prices of goods manufactured in Malaysia.

4.3 Export-Oriented Industrialization under the New Economic Policy

As the 1960s drew to a close there was a realization that further employment opportunities were limited under the import-substitution policy followed since independence. This led to a shift to export-orientation in industrial strategy signalled by the replacement of the Pioneer Industries Ordinance by the Investment Incentive Act in 1968. The 1968 Act provided tax incentives based on criteria such as export performance and the degree of local content in manufactured products (Shepherd, 1980: 182). Following the racial riots of 1969 and the imposition of government by decree, the authorities formulated the New Economic Policy (NEP) in order to solve the communal problems that presented the primary threat to the future of the nation. Introduced in 1970, the NEP was to have a dominant impact on the politics and economic development of Malaysia over the next 30 years. In the view of Andaya and Andaya (2001: 301), debate over the historical impact of the changes wrought by the NEP is likely to continue for some time to come. Nevertheless, there is a substantial volume of literature that records the influence the NEP has had on economic growth and industrialization policies.

'Malayanizing' the economy had been a goal of the three five-year development plans introduced between 1956 and 1970 but there had been little progress in eliminating the pre-independence pattern of foreign and local Chinese ownership of the corporate sector. The NEP addressed the problem of maintaining economic growth while ensuring that more resources and more opportunities became available to Malays. The policy had two principal objectives: firstly, a reduction and eventual eradication of poverty irrespective of race; and secondly a restructuring of society so that identification of race with economic

function would be reduced and ultimately eliminated. The government assured the non-Malays that restructuring would occur through sustained economic growth, not through redistribution of existing resources, so that 'no particular group experiences any loss or feels any sense of deprivation in the process' (Andaya & Andaya, 2001: 303). While the NEP had an economic dimension, in the opinion of Milne and Mauzy (1999: 51), its declared objective was political with the ultimate goal of achieving national unity, whereas Jesudason (1989: 74) regards the NEP as an important tool for consolidating Malay political power by increasing Malay control of business. The place that industrial policy had in the overall scheme, therefore, was not solely the maximization of economic growth. More fundamentally, it was to modernize and urbanize the Malays under the social and economic restructuring objectives of the New Economic Policy. The objectives of industrialization were to transform the modern sector in two ways: firstly, to change the racial composition of employment, and secondly, to restructure the control and ownership of assets on behalf of the ethnic Malays (Mehmet, 1986: 75).

The switch to export-oriented industrialization coupled with the political imperatives of the NEP to give employment opportunities to rural Malays provided a fresh impetus to industrial growth. Two main types of export-oriented industry were encouraged. There was promotion of natural resource-based exports based on the older, well established production of rubber and tin, and the newer, expanding primary commodities of palm oil and tropical timber. More importantly, however, was the development of a labour-intensive, light industrial sector that manufactured textiles, footwear and garments, and assembled electrical and electronics goods from imported components. The establishment of export

processing enclaves in the form of Free Trade Zones and Licensed Manufacturing Warehouses led to the rapid uptake of these facilities by transnational corporations. Multinational companies, particularly those assembling electrical and electronic products, were attracted by an environment that allowed 100 per cent foreign ownership, exemption from custom duties and provided generous fiscal incentives for export. There was, in addition, an abundant supply of Malay migrants from the countryside into the urban, industrial sector that kept labour costs low (Osman-Rani, 1982: 270; Lim & Pang, 1991: 37-9; Jomo & Edwards, 1993: 25; World Bank, 1993: 135; Tham & Mahani, 1999: 56).

The discovery and exploitation of substantial offshore reserves of petroleum oil and gas in the mid-1970s and early 1980s coupled with firm commodity prices for rubber, palm oil, tropical timber and tin had a positive impact on government revenues. Windfall profits from petroleum exports were channelled into state-owned enterprises such as the National Trading Corporation (Malay: *Perbadanan Nasional Berhad,* acronym Pernas) and National Equity Corporation (Malay: *Permodalan Nasional Berhad* or PNB) that were used to purchase controlling interests in foreign companies in the primary sector. The largest plantation and industrial conglomerate in Malaysia, Sime Darby, which was listed on the London, Singapore and Kuala Lumpur stock exchanges, was taken over by Pernas in 1976 through a boardroom coup. In the early 1980s, PNB made successful, hostile takeover bids on the London Stock Exchange in flagship British companies such as the Guthrie plantation group and London Tin. Other plantation companies, including those controlled by Danish and French capital as well as British companies, entered into negotiations with PNB and other quasi-government enterprises to relinquish ownership to Malay interests (Lim, 1988:

19-26; van Helten & Jones, 1989: 179-86; Jesudason, 1989: 84-97; Tate, 1996: 579-98; Gomez & Jomo, 1997: 38; Drabble, 2000: 199; Andaya & Andaya, 2001: 312-13). Commenting on the takeover of British plantation companies in the implementation of the NEP, Barlow (1996: 599) states that shareholders had little to complain about in the methods chosen or the compensation paid. Non-Malaysian shareholders who wished to dispose of their holdings were able to do so at prices determined by open market activities on the London Stock Exchange at a time of high commodity prices. By handling the plantation sector in this way, Malaysia reinforced its credibility and good reputation in international financial circles. Barlow concludes that it was this international financial credibility that made the country so successful in its bid to attract the vast sums of capital investment required to finance Malaysia's thrust into manufacturing.

In a perceptive analysis, Jesudason (1989) examines the impact of the Malay/Chinese ethnic divide on the industrial strategy followed by the Malay dominated government in the implementation of the New Economic Policy. He argues that the policy of the state was to subsume economic development under politico-cultural objectives of expansion of the political power of the Malay elite while realizing the aspirations of the mass of Malays to elevate their economic status. After the formulation of the NEP, the Malay political leaders and bureaucrats wanted Chinese businessmen to open up ownership and employment opportunities to the Malays. Chinese business, as represented by the Malaysian Chinese Association political party and the Chinese Chambers of Commerce, on the whole resisted this policy and chose not to invest in manufacturing. The larger Chinese enterprises expanded domestically in property and hotel development, plantation agriculture and equity investment on the Kuala Lumpur Stock Exchange as well as stock markets overseas. Small

to medium Chinese businesses, on the other hand, chose not to invest at all in order to avoid compliance with the provisions of the Industrial Coordination Act, 1975 which regulated employment and investment under NEP objectives (Shepherd, 1980: 184-5; Jesudason, 1989: Chap. 5; Lim & Pang, 1991: 22; Drabble, 2000: 199; Andaya & Andaya, 2001: 312). In examining the role of multi-national companies, Jesudason (1989: 167) argues that although the stated aim of the NEP was to reduce the influence of foreign-owned businesses, the Malay leadership encouraged direct foreign investment to help realize their political ambitions. The Malay elite favoured multinational companies because:

- They were an alternative source of investment to the Chinese business sector.
- Foreign companies were concerned solely with business factors and did not enter the political debate on the future of Malaysian society.
- Compared to the traditional, family-owned businesses of the Chinese, multinational firms operating in a number of overseas countries found it easier to comply with NEP policies of increased ownership and executive opportunities for Malays.
- Multinationals provided high levels of employment for rural Malays.

The thrust of Malay strategy, according to Jesudason, was to replace the role of foreign investment in the technologically simple sectors such as banking, plantation agriculture and tin mining, and to co-opt multinationals in the technologically more demanding, manufacturing sector. Mohamed Ariff (1991:124) also argues that Malaysia regarded direct foreign investment as a major conduit for technology transfer because the country needed foreign technology more than investment by overseas capital.

Other commentators, including Snodgrass (1980: 210), Bowie (1991: 132), Jomo (1993: 11), Lal and Myint (1996: 280), and Gomez and Jomo (1997), have concurred with the argument that Malay economic nationalism has sought to limit the economic dominance of the Chinese by using the financial power of foreign direct investors as a counterweight to entrenched Chinese business interests. In a critical comment on industrial strategy under the NEP, Jomo (1993: 297) argues that the 'ethnic obsessions' of the Malay-dominated government have discouraged viable projects funded by Chinese domestic investment in favour of industrialization under foreign auspices. Lim and Pang (1991: 38), on the other hand, note that the constraints of the NEP and the government's sensitivity to nationalistic sentiments curtailed the spread and dominance of foreign investment in the domestic-oriented and resource-based industries where foreign ownership was restricted. Similarly, Taylor and Ward (1994a: 106) comment that although Malaysia has depended heavily on foreign investment to achieve rapid industrial growth, there have been two countervailing forces affecting such investment: the desire to industrialize and the need to extend local ownership.

4.4 Heavy Industries Promotion: 1980 – 1985

Up till 1980, manufacturing, apart from the resource-based industries, had concentrated on processing imported raw materials, food and chemicals, and assembling imported components such as electronics for export and motor vehicles for the domestic market. The then Minister of Trade and Industry, Dr Mahathir Mohamed did not consider that this was a pattern conducive to economic progress and industrialization (Milne & Mauzy, 1999: 64), and he was concerned that the country was too dependent on primary commodities

(Jesudason 1989: 118). Under the direction of Mahathir, who became Prime Minister in 1981, Malaysia launched an ambitious, heavy industries policy with the establishment of the Heavy Industries Corporation of Malaysia (HICOM) with the remit to plan, identify, initiate, invest in, and manage such large-scale, manufacturing projects. The intent was to form joint ventures with foreign corporations in the creation of heavy industry, and to promote technology transfer and the training of a skilled labour force (Andaya & Andaya, 2001: 313).

The heavy industries strategy, known as the 'Look East Policy', was inspired by the examples of Japan and South Korea, and was designed to give state agencies the leading role in the operation of large-scale, capital-intensive, import-substituting industries. The new industries would make use of cheap energy from offshore oil and natural gas fields and hydroelectricity power to produce intermediate, industrial goods and consumer durables for the domestic market. Investment came from a combination of public funds through HICOM, petroleum profits from the National Petroleum Corporation (Petronas), and private foreign investment capital, especially from South Korea and Japan. East Asian technology was sourced through multinational firms, such as Mitsubishi, in joint ventures to establish a national automobile project to produce the Proton motor car, an iron and steel plant, cement factories, and motor cycle engine plants. The policy had pronounced import-substitution characteristics with cheap government credit and other subsidies, together with heavy tariff protection. The intermediate objectives were technology transfer and creation of linkages with other sectors of the economy, while the long-term goal was that of export competitiveness. Most of the HICOM industries suffered heavy losses because of high

production costs, stiff international competition from other multinationals, gluts in the world markets and massive debts. Then in 1985, there was a collapse in commodity prices that bought about a severe recession in Malaysia (Mohamed Ariff & Semudran, 1990: 42; Mohamed Ariff, 1991: 11; Bowie, 1991: 111; Jomo & Edwards, 1993: 28-9; Crouch, 1994: 22; Rasiah, 1995: 107; UNCTAD, 1996: 5; Godement, 1997: 6; Tham & Mahani, 1999: 57; Drabble, 2000: 200; Khoo, 2000: 216; Felkner, 2001: 134; *Far Eastern Economic Review*: 2003).

4.5 First Industrial Master Plan: 1986 – 1995

The failure of the heavy industrialization policy to generate high economic performance led the government to commission the United Nations Industrial Development Organization (UNIDO) to recommend a detailed sector-by-sector strategy to guide industrial development (Anuwar, 1992: 1; Lim, 1992: 97; Giroud, 2003: 109). The Industrial Master Plan (IMP) was prepared jointly by personnel from UNIDO and the Malaysian Industrial Development Authority (MIDA) and extended over a ten year period from 1986 to 1995 (UNIDO, 1991: 53). The 1986 – 1995 plan focused on changing industrial planning policy from a largely laissez faire approach to a target-oriented one within an open, free enterprise economic system (Anuwar Ali, 1992: 32). The plan is highly confidential, subject to the Official Secrets Act, and remains outside the public domain (Anuwar, 1992: 34). On the other hand, Jomo (1990: 134) states that 15 of the 22 volumes were released although he does not say whether availability of the report was restricted to certain favoured academics such as himself, or not. The sensitivity of the contents of the report, however, is in no doubt because it contains ‘a remarkable

combination of sober - even critical - analysis *(sic)* of Malaysia's industrial heritage and current problems' (Jomo, 1990: 135). In the opinion of Taylor and Ward (1994a: 114), Malaysia had great difficulty in reconciling its industrial development objectives with its NEP goals relating to the restructuring of ethnic employment and equity ownership. In support of this argument, they quote the following statement on page 17 of the IMP report: 'often these objectives mutually pose constraints to each other and reduce the number of policy choices available to the Government'.

Structural weaknesses identified by the IMP in past industrialization policies include lack of local industrial, technology capacity leading to over-dependence on foreign expertise; a shortage of experienced engineers and technicians coupled with lack of technical training programmes; excessive protection of domestic industry leading to poorly efficient working practices and decline in motivation to upgrade technology and management systems; biases to large firm and capital-intensive industries; weak inter-industry linkages; over-concentration in electronics and textiles in Free Trade Zones; and constraints imposed by NEP restructuring efforts (Cho, 1990: 206; Jomo, 1990: 140; Anuwar, 1992: 9-11).

The ten-year plan for industrialization as stated in UNIDO's midterm review of the IMP (UNIDO: 1991: 51-2) focused on accelerating growth and enhancing development of selected industries more attuned to Malaysia's resource availability and comparative cost advantage, and moving from an inward-looking, domestic-oriented manufacturing base to one which is export-oriented. The basic strategies recommended in the IMP report are:

- Accelerating outward-oriented industrialization, with a focus on large-scale expansion of manufactured exports.
- Developing resource-based industries for export.
- Diversifying and upgrading non-resource-based industries for export.
- Selectively promoting strategic heavy industries to support export industries.
- Modernization and rationalization of the industrial structure.
- Developing technology and manpower.
- Taking into consideration existing infrastructure when planning the physical location for new industries.

The IMP is a study of twelve industries (seven resource-based, including rubber products, and five non-resource-based) and provides detailed policy packages designed to guide structural change in each subsector. The conceptual framework of development is to identify priority products in each manufacturing subsector, for example, palm oil products in the resource-based sector, and electronics and electrical equipment in the non-resource-based sector. The major thrust of the strategy for each group of industries is characterized by an outward-oriented industrialization approach. The plan argues for a free trade regime, keeping infant industry protection to a minimum while advocating incentives for import substitution and the elimination of discrimination against exports (UNIDO, 1991: 53). According to Felker (2001: 135), recommendations covered the following areas:

- lists of specific products to be promoted;
- goals for industry structure;
- targeted investment incentives;

- sector-specific institutions for technological and human skills development;
- strengthening sectoral business associations.

The government implemented the IMP recommendations immediately (Jomo, 1990: 141), and introduced the Promotion of Investment Act, 1986 to provide liberal investment incentives to foreign investors. The act relaxed restrictions on foreign equity to permit 100 per cent foreign ownership in projects exporting more than 80 per cent of output, and majority ownership by overseas investors for firms exporting at least half of their production or supplying inputs to an export company located in a Free Trade Zone (Anuwar, 1992: 35; Drabble, 2000: 202; Felker, 2001: 135; Giroud, 2003: 110).

4.6 Second Industrial Master Plan: 1995 – 2005

The success of the First Industrial Master Plan in reviving export-led growth in a period of buoyant global economic activity, by the early 1990s, had generated new pressures for structural change. The boom had already outstripped the IMP's targets for inward investment, industrial output and export growth. On the other hand, Felker (2001: 145) regards the IMP to have done little to improve structural weaknesses in the manufacturing sector. There still remained weak, local technical capabilities and a shallow, industrial infrastructure with few intra-, or inter-industry linkages.

The Second Industrial Master Plan (IMP2) was launched in 1995 for the period 1996 – 2005. The second IMP proposed no major reversal in industrial policy but recommended a continuation of the promotion of investment, strengthening of industrial linkages, export

orientation and improved, human resource, training programmes. The plan addressed weaknesses in industrial structure including technological dependency, lack of indigenous technological capability and poor linkages. The structural paradigm recommended is the Porter-model, cluster-based approach whereby strategies focus on the development of clusters of industries with groups of firms acting as dynamic cores of high value-added industries (Porter, 1990; Tham & Mahani, 1999: 58-9; Giroud, 2003: 111).

There are three industry clusters:

- Resource-based: these are naturally evolving clusters, highly dependent on local factors including inputs, ownership and technology. Resource-based industries include the manufacture of products from rubber, palm oil, wood and petroleum.
- Policy driven: these are industries created by government policy interventions that are almost totally dependent on foreign technology. The automobile and automotive components, steel and machinery industries are examples of policy driven industries.
- Internationally linked: export-oriented, multinational corporations situated in Free Trade Zones producing electronic components, electrical appliances and textiles, are example of this cluster.

4.7 Role of Government

Jomo (2001a: 472-3) considers that in matters of industrial policy, state intervention was especially pronounced from the 1970s up to the mid-1980s. The intervention was motivated by the priority given to interethnic, economic redistribution and compromised

by the rent-seeking activity of the politically influential. He argues that in the case of heavy industrialization in the early and mid-1980s, the policy was driven by the political executive with little input by technocrats. The policy did not attempt to achieve international competitiveness or to provide support for other industries seeking to become competitive in the global market, even in the long run. The opinion of Jomo is that such interventions have obscured other industrial policy interventions that have been conceived and implemented on a more considered basis such as the First and Second Industrial Master Plans of 1985 and 1995. Nevertheless, Jomo (2001a: 481) concludes that the role of government has been crucial in achieving the structural transformation of the economy and the high degree of industrialization in Malaysia.

4.8 Conclusion

This chapter and the previous one have traced the influence of the main political and economic factors on the development of Malaysia, since independence in 1957, to become a country with the status of a Newly Industrialized Economy. Over the past fifty years, Malaysia has been transformed from a producer and exporter of two primary commodities, tin and natural rubber, to a newly industrialized country producing a diverse range of manufactured goods. It has been argued that industrial development, from colonial times onwards, has been undertaken almost entirely by private enterprise, both local and foreign, working within a congenial political and administrative framework.

The success of Malaysia in creating a favourable infrastructure for industrial development since independence is amply demonstrated by the fact that the country today is among the

world's leading exporters of manufactured good such as semiconductors, room air-conditioners, rubber gloves, and audio-visual equipment. There are over 200 industrial estates and 14 Free Trade Zones where firms export more than 80 per cent of their production even though they import most of their raw materials. In addition, there are three specialist, industrial parks founded in the 1990s equipped with modern facilities for advanced-technology, manufacturing activities and R&D companies. The considerable efforts to attract foreign investors have borne fruit so that currently more than 4,000 international, manufacturing companies from over 50 countries have operations in Malaysia (Giroud, 2003: 113).

Chapter 5

Rubber Manufacturing in Malaysia

5.1 Introduction

The focus of Chapter 5 is to examine developments in the rubber manufacturing industries in Malaysia since *Hevea* rubber became the most important commodity crop in the early twentieth century. Initially the scene is set by tracing the growth of the rubber planting industry and undertaking an examination of rubber exports and imports for the period 2000 – 2005. The overview of the rubber products manufacturing industry is divided into three periods that reflect the main macro-economic policies and specific industrialization strategies followed from British rule to the present day, the details of which form the substance of Chapters 3 and 4. The first period is from 1920 to 1970 when laissez faire policies were dominant within an open economic system even though, in the 1960s, some protectionist measures such a tariffs on imports were implemented to assist in the establishment of a domestic industrial base. The second phase covers the period 1970 to 1985 when there was greater government intervention in promoting industrialization under the New Economic Policy to re-align control of economic activities in favour of the politically dominant Malay ethnic group. The third period in the review is from 1985 to 2005 when two ten-year Industrial Master Plans were implemented and the manufacture of rubber products was identified as a priority industry for expansion within the resource-based sector of the economy.

5.2 Natural Rubber Production

Hevea trees were introduced into the Malay Peninsula in 1877 and rubber swiftly became the leading commercial crop. Individual Chinese and European planters were the pioneers in cultivating rubber but small proprietary estates were soon overtaken in area by larger properties owned by joint stock companies floated on the London Stock Exchange. Malay and Chinese smallholders also enthusiastically planted their land with the new crop despite official disapproval by the colonial authorities.

The rate of expansion of *Hevea* cultivation in the early decades of the twentieth century was so rapid that Allen and Donnithorne (1954: 106) describe the development of the rubber planting industry as 'one of the greatest achievements of Western colonial enterprise'. The large area planted to rubber trees, the vast sums invested in rubber production by smallholders and plantation companies, and the huge export revenues produced during colonial times and the immediate years after independence made rubber one of the twin pillars of the economy. In 1955, the World Bank economic mission, for example, reported that rubber trees occupied about 65 per cent of the entire cultivated area of Malaya and rubber production contributed approximately 60 per cent of export earnings (IBRD, 1955: 10). From the early 1900s until 1991, Malaysia was the world's largest producer of natural rubber before losing its premier position to Thailand and Indonesia (Barlow *et al*, 1994: 61). The output of rubber from Malaysia over the past 100 years is shown in Table 5.1.

Table 5.1

Production of Natural Rubber
1910 – 2005

Year	'000 metric tons
1910	6
1920	183
1930	467
1940	603
1950	761
1960	764
1970	1,269
1980	1,530
1990	1,292
2000	928
2005	1,126

Source: 1910 – 1990, Barlow *et al*, 1994: 31-32, Table 2.3
2000 and 2005, IRSG, 2007

5.3 Exports and Imports of Natural Rubber

The Technical Appendix describes the processing methods for converting field latex into solid rubber grades and liquid latex concentrate. In Malaysia technically specified rubber (TSR) is produced under the Standard Malaysian Rubber (SMR) scheme that was introduced in 1965. Before the establishment of the SMR specifications almost all solid grades were made into Ribbed Smoked Sheet (RSS) and crepe rubbers.

Table 5.2 shows Malaysia's exports of natural rubber by grade in 2000 and 2005. In 2005 rubber exports totalled 1.13 million tons, of which SMR grades accounted for 1.06 million metric tons or some 94 per cent of total exports. SMR20 derived from field coagulum and used in tyre manufacture is the most important grade by volume and accounted for approximately half of SMR production. The tonnage of exports of latex concentrate, RSS and other rubbers such as pale crepe is insignificant in comparison with exports of SMR

granulated rubber. In 1968, shortly after the introduction of the SMR scheme, SMR grades accounted for only seven per cent by volume whereas RSS exports were 61 per cent; crepe rubber was 17 per cent; latex concentrate 14 per cent; and other rubbers one per cent of total rubber exports (Thoburn, 1977: 132, Table 6.1).

Table 5.2

Exports of Natural Rubber by Type
2000 and 2005
'000 metric tons

	SMR	Latex	RSS	Other	Total
2000	854.1	91.8	9.9	22.1	977.9
2005	1,056.0	56.0	8.0	8.0	1,127.9

Source: MRB, 2007

Another difference between the production of rubber for export in the 1960s and the early 2000s is that until the mid-1980s Malaysia basically produced and exported all its rubber output. The current situation is that off-take of raw rubber by manufacturing industry together with a decline in rubber production by estates and smallholdings have led to massive over-capacity in processing facilities. The shortage of domestically produced natural rubber has forced SMR processors and some rubber product manufacturers to source part of their raw material from neighbouring ASEAN countries and even further afield. Growing domestic demand has resulted in an increase in rubber imports from 31,500 tons in 1985 to 782,000 tons in 2000 and 462,000 metric tons in 2005. The major import is latex concentrate from Thailand that is used in the latex dipped goods sector, whereas a number of producers of general rubber goods import small quantities of TSR

grades. Rubber processors import mainly raw coagulum together with low grade sheet rubbers and some TSR for milling and upgrading into tyre grade SMR20 material (Abdul Hamid Sawal 2001: 109). Table 5.3 provides details of imports into Malaysia by type in 2000 and Table 5.4 shows the volume and source of rubber imports in 2005. Total imports in 2005 were 461,857 metric tons of which 292,720 were latex concentrate and 169,137 tons were dry rubber.

Table 5.3

Imports of Natural Rubber by Type
2000
metric tons

Latex	TSR	Sheets and others	Coagulum	Total
435,281	46,707	146,439	153,247	781,674

Source: Abdul Hamid Sawal, 2001, 109, Table 1

Table 5.4

Imports of Natural Rubber by Country
2005

Country	Metric Tons	%
Thailand	336,260	72.8
Indonesia	48,072	10.4
Philippines	32,125	6.9
Burma	22,514	4.9
Vietnam	6,730	1.5
Cambodia	2,672	0.6
Others	13,484	2.9
Total	461,857	100.0

Source: MRB (2007)

5.4 Rubber Goods Manufacture: 1920 – 1970

The production of natural rubber from the *Hevea* tree provided a source of raw material for the fabrication of rubber goods and allowed the development of the rubber products manufacturing industry in Malaya. Thoburn (1973/1975a: 20; 1977: 160) comments that local manufacture of rubber goods was carried out long before the Second World War. In 1926 the British Agency House, Harrisons and Crosfield who were secretaries and agents for a large number of rubber plantation companies invested capital in the Linatex manufacturing company. Linatex, originally called the Wilkinson Process Rubber Company after the inventor of a method of low temperature vulcanization of liquid rubber, produced abrasion-resistant rubber products used in the local tin mining industry, and mining and mineral extraction industries overseas. By the 1930s, Linatex was exporting rubber products to mining companies in North and South America, Europe, Australia and countries in southern Africa (Nickalls, 1990: 101-4, 120-1, 144, 241-2).

Drabble (2000: 136) reports that in 1923 a Chinese businessman Tan Kah Kee, one of the richest men in Malaya with interests in rubber, pineapple, rice, sugar and shipping (Coates, 1987: 225), established a factory in Singapore to make rubber-soled canvas shoes that exported most of its production to South East Asia and China. The first record of the manufacture of rubber footwear in Malaya proper was in 1937 when the Czech company, Bata, that had production facilities in India, began production in Klang when it brought staff from its Indian operations to train local workers (Allen & Donnithorne, 1954: 216; Rasiah, 1995: 60). Allen and Donnithorne noted that two Chinese firms recruited skilled labour from Bata and opened shoe factories in Klang about the same time. Two firms,

Shum Yip Leong established in 1921 and Fung Keong founded in 1939, are located in Klang where the Bata factory is situated. It is a reasonable assumption that these two Chinese-owned businesses are those mentioned by Allen and Donnithorne especially since one company, Shum Yip Leong still makes rubber boots even though its main business today is the manufacture of industrial products. Indeed, the probability is that the Shum Yip Leong Rubber Works was making rubber shoes before the Bata factory was built in view of the fact that it was in business well before Bata came to Malaya. On the other hand, the other firm, Fung Keong Rubber Manufactory nowadays restricts its business activities in Klang to the manufacture of tyres and tubes for motorcycles and bicycles, inner tubes for commercial vehicles and solid industrial tyres. There are five other firms founded in the colonial era that are still in business today. Nam Bee was founded in 1938 and is a compounder producing masterbatch as well as tyre retread materials. The Kinta Rubber Works, established in 1940 in the tin mining centre of Ipoh, is a manufacturer of moulded, extruded and calendered industrial products. Kayel Rubber Products was also established in the 1940s and is a manufacturer of retreading products for export as well as being a major retreader in Malaysia. In 1956, just prior to the date of independence, the firms of Swan Rubber and Sun Yuen Rubber began manufacturing operations. Swan Rubber is a manufacturer of industrial rubber goods and Sun Yuen makes a range of tyre inner tubes for small wheelbarrows through to massive earthmovers as well as tyre retreading materials (MRB, 2006; MRPMA, 2006).

In 1955, the World Bank (IBRD, 1955: 304) reported that the secondary rubber manufacturing sector in the Federation of Malaya included the production of rubber

footwear, hoses, belting, and bicycle tyres and inner tubes. The view of the Bank mission was that the production of rubber goods had the advantage of using a local material and Wheelwright (1963: 212), commenting on the World Bank report, states that the simple rubber products manufactured at the time were labour-intensive operations that involved little capital equipment. In his pioneering study of the ownership of plantation and industrial companies in Malaya, Puthucheary (1960: 131) noted that by the early 1950s there were 'about 32' factories making rubber goods of which 31 were Chinese-owned and 'some of the Chinese rubber goods factories are quite big and are comparable in size to the large Bata factory in Klang'. Rasiah (1995: 60-1) states that the output of footwear, rubber soles and heels, sheeting, matting, foam rubber goods, tubing and hoses as well as tyres and inner tubes for bicycles grew substantially in the 1950s. The production of footwear, and bicycle tyres and tubes rose sufficiently to enable exports of these products for the first time after the disruption to trade caused by the Second World War. In 1955 Malaya exported 5.3 million pairs of shoes and slippers, and exports of bicycle tyres and tubes grew by 20% annually in the period 1953 to 1955 (Rasiah, 1995: 60-1).

The World Bank report of 1955 recommended a strategy for the economic and social development of Malaya that was adopted by the Alliance government after independence. On the issue of rubber manufacturing, the report did not consider that Malaya could become a major centre for the production of rubber goods because raw rubber is cheap to ship relative to its market price; and it is a small part of the production cost of its most important end use in tyres. The World Bank mission concluded that the most economic location of rubber manufacturing industries is in the major centres of consumption.

Nevertheless, the report recommended the local manufacture of rubber goods to supply the home market, especially foam rubber products and the establishment of a single modern tyre factory to produce tyres for motor cars, light vans and trucks (IBRD, 1955: 306-7; Wheelwright, 1965: 17).

The British rubber manufacturer, Dunlop established a local subsidiary, Dunlop Malayan Industries with a factory in the new town of Petaling Jaya on the outskirts of Kuala Lumpur in 1961. The factory initially manufactured automobile tyres and inner tubes, and foam rubber products for domestic sales. It later extended its range to include golf balls and adhesives. The company had pioneer status and benefited from tariff protection on imports of car and commercial vehicle tyres which was introduced under infant industry protection policies recommended by the IBRD development plan for industrialization (Wheelwright, 1965: 92; Thoburn, 1977: 160). Other rubber manufacturing companies that started operations in the late 1950s and 1960s include the Sun Rubber Corporation, originally Fock Hee Sun (1957, retread materials); Autoways (1962, retreaded tyres); Yap Hoi Kong (1962, general rubber goods); Universal Cable (1967, insulated cables); Kulitkraf (1968, military boots); Aerofoam and Weifong (1969, foam mattresses and upholstery), (MRB, 2006). Thoburn (1973/1975a: 19; 1977: 160) reports that by 1970 there were a total of 50 rubber manufacturing companies, including five capital-intensive firms listed on the Kuala Lumpur Stock Exchange, and that the industry employed over 8,000 workers. The total value of the output of rubber products in 1970 was RM119.5 million, divided into domestic sales of RM102.8 million (86 per cent) and exports of RM16.8 million (14 per cent), (Abdul Hamid Sawal, 2001: 111, Table 5). The rubber manufacturing sector consumed

22,129 metric tons of raw rubber in 1970 which, according to Thoburn (1977: 160), accounted for 1.3 per cent of Malaysia's rubber production.

Table 5.5

Rubber Goods Manufacturers
1950 – 1970

Date	Number of firms	Number of employees
1950	32	5,700
1963	45	5,565
1970	50	8,375

Source: 1950: IBRD (1955: 301, Table 1, 1947 census); Puthucheary (1960: 131)
1963: Lo (1972: 150, Appendix 1, Table 2.4, 1963 census)
1970: Thoburn (1973/1975a: 19, Table V); Thoburn (1977: 160)

Table 5.5 shows the growth in the number of manufacturing firms for the twenty-year period, from 1950 to 1970. The number of enterprises involved in the manufacture of rubber products rose from approximately 30 firms before independence in 1957 to 45 establishments in the years immediately afterwards, then to 50 manufacturing companies in 1970 when the New Economic Policy was introduced. Over the same twenty-year period the number of workers employed by the industry expanded from 5,700 to more than 8,000. The censuses taken in 1947 and 1963 (see Table 5.5 for references) provide additional information about the status of the rubber manufacturing sector. The 1947 census indicates that 4 per cent of the labour force was employed in secondary rubber manufacture out of a total working population of just over 143,000 workers, whereas the 1963 census states that the workforce in rubber products manufacture was 8 per cent of the total employed in the

secondary manufacturing sector. The census of 1963 provides figures to show that in addition to the rubber manufacturing industry producing rubber goods, there was also a 'backyard' sector involved in the retreading of tyres, consisting of 162 small firms employing on average only three workers each.

5.5 Rubber Goods Manufacture: 1970 – 1985

After the introduction of the New Economic Policy in 1970, there was a change in direction in government policy on industrialization. The infant industry protection policies advocated by the 1955 World Bank report were replaced by policies designed to encourage export-oriented industries while supporting import substitution for consumer goods. As tariffs on several pioneer status industries fell, import substitution gradually lost its significance in terms of output and in the generation of employment (Rasiah, 1995: 106). The main emphasis was on the development of a new light industrial sector assembling electrical and electronic goods from imported parts, and the production of textile and clothing in Free Trade Zones. Of secondary importance was the promotion of resource-based manufacturing using natural rubber, palm oil, tropical timber and tin. One of the first decisions taken under the New Economic Policy in the rubber manufacturing sector was in 1972 for Pernas, the government trading and investment arm, to enter into a joint venture with the American multinational, Goodyear Tire and Rubber Company to manufacture automobile tyres, thus breaking the *de facto* monopoly of Dunlop Malaysian Industries (Junid Saham, 1980: 46).

An examination of the literature about the development of the rubber industries sector over the period 1970 to 1985 indicates that there is a dearth of information compared to earlier years. It is suggested that there were two main factors that influenced economists of the

time for their lack of interest in the rubber manufacturing industrial sector as a topic of research. Firstly, the perception of policy makers and leaders of the plantation industry that natural rubber production, therefore, the manufacture of rubber goods, was a mature industry incapable of further development. An alternative, more pessimistic view widely held at the time was that rubber tree crop agriculture was a sunset industry destined for eventual decline within Malaysia. The lack of confidence regarding *Hevea* rubber production was strengthened by the view that oil palm was the commodity crop of the future. The 1970s and 1980s were a time of rapid expansion of oil palm culture as the area planted to oil palm in Peninsular Malaysia increased from 260,903 ha in 1970 to 1.7 million ha in 1990. Oil palm was planted to the exclusion of other perennial crops on new land by rural development agencies such as the Federal Land Development Authority, while in the private sector the large plantation companies converted vast acreages of old rubber due for replanting to more profitable and less labour-intensive oil palm. The second significant factor was the success of Free Trade Zones in attracting multinational firms to set up operations in Malaysia so that by 1987 exports of manufactured products surpassed the value of the major primary commodities for the first time (World Bank, 1989: 3). However, as the Bank review noted, the export manufacturing sector was dominated by transnational and foreign companies located in Free Trade Zones. Thus, commentators on Malaysia's industrialization policy concentrated their investigations almost exclusively on the expansion of export business generated in free trade enclaves, especially the development of the electronics sector, whereas agricultural economists focused their attention on the burgeoning palm oil sector.

Nevertheless, the number of industrial firms making rubber products increased from approximately 50 in 1970 to 135 by 1985, according to figures published by the Malaysian Rubber Board (Abdul Hamid Sawal, 2001: 111, Table 5). This represents a substantial expansion of the sector, with 85 new companies being founded over 15 years while output value increased five-fold from RM120 million to RM650 million over the same period. The increase in exports of rubber goods during this period was impressive. Exports rose from RM17 million in 1970 to RM215 million in 1985: an increase of almost RM200 million in 15 years. These figures indicate a change in marketing strategy for the rubber industry in line with government policy to promote export production. In 1970 the emphasis was on supplying the local market, with most production being sold within Malaysia and 14 per cent of output being sold into export markets. However, by 1985 overseas sales had increased to one-third of total production. Despite the expansion in rubber manufacturing, Anuwar Ali (1992: 40) notes that rubber goods production grew at a slower rate than the overall manufacturing sector in the decade from 1971 to 1980. He states that the average annual growth rate of rubber products manufacture increased by 5.0 per cent, compared to an increase of 11.4 per cent for the total manufacturing sector.

5.6 Rubber Goods Manufacture: 1985 – 2005

In 1985 a severe economic recession struck Malaysia, caused by a combination of a collapse in world commodity prices, failures in the heavy industrialization policy that led to large financial losses in HICOM industries, and a downturn in the electronics business. The bleak economic climate forced the government to re-appraise its policies on

industrialization and it commissioned the United Nations Industrial Development Organization (UNIDO) to prepare the First Industrial Master Plan (IMP1).

The plan advocated an export-oriented industrialization strategy based on the expansion of the production of resource-based, manufactured goods in order that the economy could expand in line with government policy objectives. The rubber manufacturing sector was identified as a priority sector in a group of seven resource-based industries where Malaysia was regarded as having a natural comparative advantage. The long-term strategy was to make the manufacture of rubber products one of the leading industries in the resource-based sector, and convert rubber plantation agriculture from a primary commodity exporter into the raw material base for a vertically integrated, export-oriented, manufacturing industry producing intermediate and consumer rubber goods. To this end, IMP1 set a target to increase local industrial consumption of natural rubber from 65,000 metric tons in 1985 to 300,000 metric tons in 1995 (UNIDO, 1991:53; Anuwar Ali, 1992: 41; Abdul Samad Hadi, 1994: 58). The UNIDO recommendations accorded priority to the inflow of foreign investment on the assumption that overseas capital would provide the greatest impetus for technological upgrading. The role of direct foreign investment was expected to spearhead Malaysia's resource-based industrialization by enhancing the natural comparative advantage of the existing resource base, and producing medium to high value-added manufactured products that could compete successfully on the world market (UNIDO, 1991: 62).

The emphasis of the IMP's development strategy was on the expansion of the tyre industry, designated the priority product area within the rubber manufacturing sector, and to raise Malaysia's share in world tyre production to 1.5 per cent by 1995. The strategy also aimed at strengthening the research institutes of the Malaysian Rubber Board to become centres of excellence in applied research for rubber manufacturing in general and tyre manufacture in particular (UNIDO, 1991: 53; Abdul Samad Hadi, 1994: 58). The IMP's objectives for the rubber products sector are detailed by Anuwar Ali (1992: 47):

- To encourage aggressive export promotion and development of selected key rubber products, particularly tyre and latex-dipped goods, by improving the level of competitiveness through adopting cost-reduction measures and increasing productivity and product quality in order to meet IMP export targets.
- To encourage greater foreign investment, especially by multinational corporations, in order to gain access to export markets and attain greater cooperation with them in R&D activities.
- To place Malaysia in the forefront of R&D in rubber manufacturing as well as in natural rubber production through more financial support to local and overseas institutions.

The second Industrial Master Plan (IMP2) covered the period 1996 – 2005 and divided its recommendations for the development of the manufacturing sector into three clusters of industries: internationally-linked, policy-driven and resource-based. The manufacture of rubber goods was once again identified as one of the priority areas under the resource-based cluster but, unlike the first plan, IMP2 did not set any specific targets for the rubber

manufacturing sector. The plan proposed an overall strategy that development should be technologically based, with the emphasis on complementary linkages with R&D, industrial design, automation of factory operations, distribution and marketing activities. In particular, IMP2 envisaged a greatly strengthened role for government and private research institutes in R&D in rubber technology and the rationalization of marketing efforts in the rubber sector. The second plan recommended diversification of the range of rubber products in order to reduce over-reliance on latex- dipped goods, and identified rubber engineering and industrial products as having potential for high added value by the application of advanced technology (Ong, 2001).

UNIDO's recommendations for linkages from research through to manufacture and marketing in a vertically integrated, rubber growing and manufacturing industry led to a number of organizational changes in the institutions involved in the regulation of rubber trading and research into natural rubber. The Malaysian Rubber Board (MRB) was established in 1998 from a merger in Malaysia of the Rubber Research and Development Board, the Rubber Research Institute and the Rubber Exchange and Licensing Board, and in the United Kingdom with the Malaysian Rubber Producers' Research Association. The MRB's activities to carry out research and promote downstream industrial activities are undertaken in two operational units, the Rubber Technology Centre at Sungai Buloh, Selangor and the Tun Abdul Razak Research Centre (TARRC) at Brickendonbury, near Hertford in England. The two centres carry out applied research into rubber technology, concentrating on latex and engineering applications, and TARRC undertakes fundamental research in polymer science and the study of elastomers. As part of the MRB's remit to

assist in the development of rubber manufacturing industries, both centres carry out specific research on industry problems, and offer consultancy and contract research services for individual manufacturers. The Rubber Technology Centre, in particular, is involved in providing laboratory testing and quality control services for local firms to maintain and improve the quality of rubber products (Ong, 2001; TARRC, 2007). The Malaysian Rubber Export Promotion Council (MREPC) came into being in 2000. The council's mission is to undertake market promotion of rubber manufactured goods in world markets with particular support being given to small and medium enterprises. As well as assistance in the promotion of made-in-Malaysia rubber products, MREPC activities include the identification of new export opportunities and facilitating market access in existing export markets (MREPC, 2007).

Table 5.6 gives a profile of the rubber goods manufacturing industry over the twenty-year period from the start of the first Industrial Master Plan to the end of the second plan in 2005. The table shows that the number of industrial enterprises increased by over 200 firms from 135 companies in 1985 to 357 by 2005. There was a spectacular increase in the use of natural rubber in rubber manufacturing over this period, from some 50,000 metric tons in 1985 to 352,000 tons in 1995, thus exceeding the target set under IMP1, and rising to 483,000 metric tons when IMP2 came to a close. In 2005, natural rubber consumption by manufacturing industry came to 483,000 tons accounting for some 43 per cent of Malaysia's production of 1.12 million tons of raw rubber. The value of exports of rubber manufactured goods greatly exceeded those of raw rubber, totalling RM8.03 billion, compared to natural rubber exports of RM5.79 billion in 2005. Export sales of rubber

products increased from 33 per cent of the industry's output in 1985 to 80 per cent of production in 2005, in line with the export-oriented strategy recommended by UNIDO in the two Industrial Master Plans.

Table 5.6

Rubber Products Manufacturing Industry: 1985 – 2005

Year	Number of companies	Employment	Rubber consumption (metric tons)	Output (RM million)	Exports
1985	135	18,339a	50,291	650.95	215.27
1990	255	36,290	187,592	2,108.44	1,876.67
1995	292	52,885	351,895	4,422.99	3,866.98
2000	319	63,125	419,323	7,089.53	5,685.55
2005	357	63,112	482,889	10,093.80	8,031.00

a) 1986 employment figure
Source: Malaysian Rubber Board

The expansion in the number of enterprises making rubber products between 1985 and 1995 is a result of the sudden upsurge in demand for latex medical examination gloves in the USA and Western Europe following the worsening of the AIDS crisis. Malaysia, as the world's largest producer of latex concentrate with a well established industrial infrastructure and strong technical support from the Rubber Research Institute, was the most attractive country for foreign multinationals and local companies to invest in medical glove production. As a result the number of firms more than doubled in ten years with the dipped latex goods sub-sector experiencing remarkable growth (Abdul Hamid Sawal, 2001: 109). However, as Abdul Hamid Sawal (2001: 110) and Ong (2001: 117) note, the MRB recognized that the dominance of latex goods production is the greatest weakness of the

rubber products industry because of its very narrow product base. It is for this reason that IMP2 recommended the need to broaden the range of products and to promote high value-added industrial rubber manufactures.

5.7 Dualistic Structure

In an overview of the rubber manufacturing sector, the UNIDO mid-term review of the first Industrial Master Plan commented that the major feature of the industry was the existence of a large number of small and medium, locally owned firms mainly producing for the domestic market. These companies were generally weak in export trade and were unable to compete in terms of price, quality and specifications, as well as after-sales service with larger enterprises established wholly or jointly by foreign transnational companies (UNIDO, 1991: 75). Taylor and Ward (1994b: 153-5) argue that the industry was underdeveloped despite its resource base and the comparative advantage of Malaysia's leading position as a natural rubber producer. Taylor and Ward note the dualistic structure of the sector with a small number of large firms controlled by multinational enterprises, and a large number of small and medium-sized industries owned by local companies. The large foreign companies operated factories that were technologically advanced because they had access to the latest manufacturing techniques from abroad. Foreign financial control meant that marketing strategy on export sales and procurement policy on the purchase of manufacturing inputs were decided overseas. In contrast, the smaller Malaysian companies employed less advanced technology with generally poor quality control in manufacturing operations. The multinational rubber manufacturers tended to be situated in Free Trade Zones in Kuala Lumpur and the adjoining Klang valley, and concentrated on the production of latex

products for export. On the other hand, Malaysian producers, typically, produced footwear, and industrial and general rubber goods that were sold into the domestic market. Tham and Mahani (1999: 65) also state that the technology of manufacturing is dependent on ownership and size of operations. Wholly foreign-owned firms and joint ventures are larger in size and employ more advanced technology than local companies. Ten years after the publication of the UNIDO mid-term report, the Director General of the Malaysian Rubber Board and the Deputy Chief Executive Officer of the Malaysian Rubber Export Promotion Council in their papers on the status of the second Industrial Master Plan (Abdul Hamid Sawal 2001; Ong 2001), noted that there was a relationship with ownership, size of operations and industrial technology employed. Wholly foreign-owned and joint venture firms tend to be larger and use more sophisticated technology sourced overseas from parent companies or foreign partners. On the other hand, local manufacturers generally operated on a smaller scale and utilized off-the-rack manufacturing processes provided by overseas suppliers of industrial machinery.

5.8 Linkage Effects

On the question of linkages with other sectors of the economy, UNIDO commented that businesses producing rubber goods had few backward linkages with manufacturers of factory machinery because the industrial machinery sector was dominated by a large number of small and medium firms producing machinery and equipment for primary commodity producers such as tin mining, palm oil processing and the processing of natural rubber (UNIDO, 1991: 103). However, Abdul Hamid Sawal (2001: 112) states that in 2001 there was local manufacture of glove and other dipped goods machinery even though tyre

fabrication machinery as well as moulding and extrusion equipment were imported from overseas. The chemicals used in the rubber manufacturing industry were still largely imported. The rubber products sector, however, had backward linkages with producers of a limited number of inputs because of the domestic manufacture of carbon black filler, kaolin filler, zinc oxide, stearic acid and whiting agents such as titanium dioxide and calcium carbonate. Ong (2001: 119) questions whether the local production of other rubber chemical agents would be cost-effective in view of the fact that chemically complex accelerators and activators are used in relatively small quantities in manufacturing operations. Rubber product manufacturers had forward linkages with local manufacturing industries including automobile and motor cycle manufacturers and assemblers, the transport equipment industry, footwear producers, the construction industry, and manufacturers of machinery and equipment (UNIDO, 1991: 75).

5.9 Conclusion

The manufacture of rubber goods began in the 1920s with the production and export of abrasion-resistant mining equipment, and rubber-soled canvas shoes and slippers. Just before independence in 1957, there were approximately 30 manufacturing establishments producing industrial goods, bicycle tyres and tubes, and rubber footwear. The first modern tyre factory producing car and commercial vehicle tyres for domestic consumption was established by Dunlop in 1961 under the import-substitution industrialization policy recommended by the World Bank. The government-controlled trading company, Pernas entered into a joint venture with Goodyear in 1972 to produce automobile tyres after the introduction of the New Economic Policy. The number of companies involved in the

production of rubber goods rose from about 70 firms in 1970 to 135 businesses in 1985 at the start of the first Industrial Master Plan. Rubber products manufacturing was designated a priority sector in the first and second ten-year Industrial Master Plans and the number of rubber manufacturers expanded to 357 firms by 2005 when the second plan drew to a close. During the 20 year implementation of IMP1 and IMP2, export sales of rubber goods increased from RM215 million in 1985 to RM8 billion in 2005 when exports accounted for 80 per cent of the industry's output. The fact that in 2005 manufacturing industry utilized the equivalent of some 45 per cent of Malaysian rubber production suggests that the manufacturing sector is fully integrated with agricultural producers of natural rubber who provide the raw material inputs in a vertically integrated rubber industry as envisaged in UNIDO recommendations in the first Industrial Master Plan.

There is a dualistic structure to the industry with a large number of Malaysian-owned firms that are small to medium in size compared to a small number of large enterprises owned by foreigners or in joint ventures with local partners. The larger companies with foreign investment employ advanced industrial technology sourced from parent companies or joint venture partners overseas. On the other hand, local firms use less advanced industrial procedures typically provided by the overseas manufacturers of factory machinery. The industry has few backward linkages with Malaysian engineering firms that make industrial machinery although there is local manufacture of machinery for dipped latex goods. There is local supply of a limited number of compounding ingredients including, importantly, carbon black filler. Most rubber chemical agents are, however, imported from overseas. Rubber manufacturers export the greater part of their industrial output. The industry,

nevertheless, has strong forward linkages with manufacturers of other products. The sector supplies tyres and automotive components to Malaysian car manufacturers and assemblers of imported cars and motor cycles, and industrial parts and components to manufacturers of intermediate and consumer goods.

This historical review of the rubber manufacturing industry has revealed that, on the whole, macro-economists have taken only a passing interest in the rubber goods production sector in their studies of the development of industrialization in Malaysia, regarding the sector as being merely one among many in the secondary manufacturing industries. Other manufacturing sectors such as electronics or palm oil production have, in recent years, been regarded to be of greater importance in studies at an industry level. There is thus scant information in the literature on the status of the industry at a micro-economic level and individual firms within it. The release in August 2006 of the *Rubber Industry and Products Directory* by the Malaysian Rubber Board is the first comprehensive publication on companies manufacturing rubber goods. The directory brings together for the first time a wealth of information on the rubber manufacturing industry that may be tapped as a data base for a micro-economic study on this sector of the larger rubber production industry.

Chapter 6

Research Questions and Methodology

6.1 Introduction

The review of the rubber manufacturing sector undertaken in Chapter 5 indicates that there is a dualistic structure to the industry. There are a large number of Malaysian-owned businesses that are small to medium in size compared to a small number of large firms owned wholly by foreign capital or in joint venture with local investors. The companies with foreign involvement source advanced manufacturing technology from overseas and produce high specification goods that are sold principally into export markets. Small and medium Malaysian-owned enterprises, on the other hand, produce goods mainly for the domestic market using technologically less advanced machinery and manufacturing techniques. These statements point out that based on ownership of assets there is a difference in business behaviour in respect of size of enterprise, technology of manufacture and marketing strategy between the two sectors of the industry.

However, a criticism of the descriptions of the structure of the industry made, in the first instance, by UNIDO then followed by other commentators is that they are general in nature and describe the situation as though it applies across the entire rubber products manufacturing sector. The manufacture of rubber products is, in fact, highly differentiated into three sectors based on the technology of production as described in the Technical Appendix and each sector may be regarded as a separate industrial category in its own right.

The sectors are the manufacture of pneumatic vehicle tyres, the production of latex goods and fabrication of general rubber products. A second criticism is that none of the statements made in the literature about the dualistic structure of the industry is backed up by statistical data or information from research studies to demonstrate the veracity of the observations. There appears, therefore, to be a lacuna in the knowledge on the status of the industry in Malaysia that has not been covered by academic inquiries in past years.

This chapter puts forward the Research Questions that have been formulated for examination in the thesis, together with a statement of the objectives of the research study. There follows a discussion of the theoretical approach to the overall methodology and a description of problems of data collection encountered by foreign researchers in Malaysia. A detailed description of the questions posed and research methods undertaken in a survey of the rubber manufacturing industries draws the chapter to a close.

6.2 Research Questions and Objectives

In the introductory chapter the discussion demonstrated that over the past fifty years, Malaysia has developed from an economy based on the production and export of two primary commodities, natural rubber and tin, to a Newly Industrialized Economy producing a diverse range of manufactured goods. The over-arching topic of investigation that lies at the nub of the study is:

> What contribution has the rubber products manufacturing sector made to the industrial and economic development of Malaysia?

This is translated into the Research Question:

> In what ways has the secondary manufacture of natural rubber contributed to the Malaysia's industrialization programme and how important has this contribution been?

A secondary Research Question formulated after the literature search is:

> Whether there is structural dualism in the industry based on the ownership of assets?

The descriptions of production technology in the Technical Appendix demonstrate that the global rubber manufacturing industry is not homogeneous but differentiated into three main production sectors that make tyres, latex products and general rubber goods. Furthermore, accounts of the Malaysian rubber products industry state that there is a dualistic structure based on whether companies are locally owned and operated, or have financial and technical involvement by overseas interests. The recent publication of the Malaysian Rubber Board trade directory has enabled an applied research study to be carried out to investigate the dualistic structure of the three production sectors of the rubber manufacturing industry and to compare Malaysian companies with firms employing foreign capital. The directory, however, does not provide any information on manufacturing technology and technology transfer. This particular area of the study has therefore been examined by means of a postal questionnaire survey of the industrial products manufacturing subsector.

Two more Research Questions have, therefore, been formulated for consideration in the study in order to answer the general Research Question on industrial dualism:

1. Is there a dualistic structure in company size and difference in export sales strategy based on ownership of assets among the different production sectors in the Malaysian rubber manufacturing industry?
2. In the industrial products sector, what are the differences in business behaviour in terms of structure, export sales, manufacturing technology and linkages with the local economy between wholly Malaysian-owned companies, and those with foreign capital investment, which may be joint ventures enterprises with local partners, or companies wholly owned by overseas capital?

The investigation is in the nature of an exploratory research study because of the lack of information and absence of quantitative data on topics such as size of companies, the source of technology and export orientation of local manufacturers and enterprises with overseas capital. The objectives of the applied research undertaken in the thesis are to test the broad statements made in the literature about the dualistic nature of the industry, and to gain an insight into the structure and patterns of business behaviour in the three main production sectors making rubber goods. The outcome is descriptive in nature and paints a picture of business behaviour in locally owned firms and those with overseas capital investment either wholly foreign-owned or in joint venture with Malaysian partners.

6.3 Methodological Approach and Positive Epistemology

The study is a micro-economic examination of companies in the rubber manufacturing industries that uses empirical observations from a quantitative survey of 340 entries in two

trade directories and a smaller postal survey of 82 industrial rubber products manufacturers to compare Malaysian-owned business enterprises with joint venture and foreign-owned firms. The quantitative nature of the questions posed and the empirical methods employed lead the researcher into adopting a positivist approach when undertaking the analysis.

In the field of applied business economics but also in the study of economic theory, research workers who belong to mainstream, orthodox schools of study generally follow the positivist epistemological tradition of fact/value separation and analysis of empirical data to test theories postulated from the laws of economics. As Lipsey and Chrystal (1995: xii) state 'economic theory is meant to be about the real world. Economists seek by the use of theory, to explain, understand and predict real-world phenomena, and theory must therefore be related to, and tested by empirical observations'. However, in their discussion Lipsey and Chrystal (1995: 28) accept that there can be no totally value-free study of economics since a person's values become involved at all stages of any inquiry and that when a researcher chooses to study one topic rather than another the choice is influenced by a person's value judgements about the relative importance of various problems. In the area of development economics Knight (1991: 17) argues that personal experience of a particular country allows the research worker to identify specific research questions that may not even be thought of without a good knowledge of the economy in question. His viewpoint is that 'those questions can be much better answered, and quantitative results better interpreted, if one has a general understanding of that economy, of its institutions and of its political scenario'. Hussey and Hussey (1997: 164) state that in designing questions

for a questionnaire survey when adopting the positive approach the researcher needs to know a substantial amount about the subject in order to decide what the most appropriate questions should be. Thus the researcher's work experience and own reading in the literature search has a subjective influence on framing specific research questions.

6.4 Triangulation

The general recommendation of authorities on research methodology is not to rely on a single method of data collection but to use a combination of methods. The use of two or more research methods to collect data in the same study is known as triangulation. Where data is collected using more than one epistemological approach, for example, quantitative and qualitative methods, the technique is known as *methodological triangulation*. The term *data triangulation* describes the situation where data are gathered from a number of different sources within the same epistemological paradigm. Frankfort-Nachmias and Nachmias (1996: 206) comment that one of the main advantages of triangulating data is 'if the findings yielded by the different data collection methods are consistent, the validity of those findings is increased'.

The general case when conducting applied research in development studies is for the researcher to undertake fieldwork in the country chosen as the subject for investigation. In research into the business activities of an industrial sector similar to the current study, typically, primary data are obtained from a combination of a questionnaire survey and interviews with key personnel in the industry (see, for example, Chap. 5 in Giroud, 2003).

The use of interviews allows qualitative data to be collected to add depth and richness to the quantitative data gathered by questionnaires.

However, for reasons discussed in the following section, this methodological approach was not possible. The candidate was left with little alternative but to adopt a strictly quantitative approach and to arrange data collection in this country. In the study, two techniques have been employed to gather quantitative information on firms in the rubber products industries. Primary data have been collected on the internet from the websites of individual companies and, in the case of manufacturers of intermediate industrial goods, from a survey conducted by means of a questionnaire. Data on manufacturing companies published in the trade directories of the Malaysian Rubber Board (MRB) and the Malaysian Rubber Products Manufacturers' Association (MRPMA) are the sources of secondary data. The study uses the technique of data triangulation of secondary data in trade directories with primary data in the questionnaire to confirm that the data from the two sources are consistent, thus increasing the validity and reliability of research findings obtained from the questionnaire. The information derived from company websites is a source of qualitative data about the business activities of individual companies and, in many cases, is able to provide additional quantitative data to supplement the basic statistics contained in the directories.

6.5 The Political Dimension

The Government of Malaysia imposes rigorous restrictions on the entry and operations of foreign researchers in the country. An intending researcher has to apply officially to the nearest Malaysian Embassy or High Commission enclosing a copy of the research proposal,

together with credentials and references. The application documents are forwarded to the Economic Planning Unit (EPU) of the Prime Minister's Department for approval. Successful applicants are required to register themselves with the EPU in Kuala Lumpur before proceeding to carry out their fieldwork. On the completion of the fieldwork and before departure from Malaysia, the researcher is required to submit a preliminary report of the findings. Finally, the researcher is required to submit to the EPU ten copies of any report, thesis or book arising from the study. Failure to comply with these procedures carries penalties as the EPU (1993) baldly threaten: 'Researchers who do not submit their brief preliminary reports before leaving Malaysia or fail to submit ten copies of any of their publications resulting from their research in Malaysia, may be barred from carrying out subsequent research in the country'.

Before applying to the University of Bradford to enter the doctoral programme, the candidate sounded out, on an informal basis, a senior official in the Malaysian Rubber Board on the position of the authorities to the proposed area of study. On receiving a positive, indeed a welcoming, response and after registering as a student and completing Graduate School, a formal application was made through the university to carry out research in the country. The result was unexpectedly negative so that the candidate was forced to reconsider his field of study and whether to continue with the research project. The candidate decided, firstly, to undertake the research long-distance at the university, and secondly, to restrict the research to a purely quantitative study of the rubber products manufacturing industry as described in the previous section.

6.6 Ethical Issues

The immediate ethical dilemma the candidate had to contend with was whether to continue with the study in the face of tacit disapproval by the authorities in Malaysia of either the candidate as a person or the field of research. The situation was that it was impossible for the candidate to carry out data collection in the field as previously planned.

The dilemma of overcoming the lack of cooperation from the Malaysian authorities in an ethical manner had to be resolved. The grave limitation of carrying out the collection of data long distance from the university had to be reluctantly admitted. It was then decided to obtain the information in three ways. Many of the larger manufacturing companies have websites that describe their business operations so details of their businesses were gathered by visiting their websites. Secondly, the candidate arranged to purchase two trade directories that were on sale to members of the public in Malaysia for use as sources of secondary data on individual companies. Thirdly, it was decided to carry out a questionnaire survey by post of the industrial components manufacturing sector. Private firms were approached directly for information about their business practices, thereby by-passing any involvement with Malaysian government agencies.

Ethical questions were revisited by the candidate when preparing the questionnaire and deciding on the target group of participants in the study. Much has been written on the importance of research ethics in the study of social science and guidelines have been formulated to assist researchers in the conduct of their research. See, for example, Chapter 4 in a standard text, *Research Methods in the Social Sciences* by Frankfort-Nachmias and

Nachmias (1996). Concern over ethical issues also led the University of Bradford in 2008 to introduce a formal code of practice for ethics in research that applies to all members of the university. An examination of the codes of conduct indicates that, on the whole, they are designed to protect participants from inconsiderate and intrusive behaviour on the part of research workers. This emphasis has probably arisen because sociological research, typically, concentrates on the disadvantaged and marginal groups in society. Ethical considerations regarded as important to social scientists are coercion, invasion of privacy or diminishing an individual's self esteem. However, the research in question is a quantitative micro-economic study of the rubber manufacturing industry in Malaysia; hence these issues did not apply. In any case, members of the target group for the questionnaire were the chief executive officers of manufacturing companies who may be regarded as an elite band of decision-makers in the Malaysian business world and who could be relied on to make their own choices free of outside influences in deciding whether to participate in the survey or not.

Robson (1993: 33) has listed three common questionable practices that apply in the majority of research studies involving participation by individuals. The practices are:

a) withholding information about the true nature of the research;

b) involving people without their knowledge or consent; and

c) otherwise deceiving the participants.

Issues of deception or withholding information about the aims and objectives of the study did not enter the picture because the research was carried out in a completely open fashion. Indeed, the objectives of the research were spelt out to participants of the questionnaire at

the outset to encourage them, hopefully, to participate in the study. The participants were also given a written guarantee of confidentiality and advised that all data would be collated in a summary form, and neither companies nor individuals would be named. The statement of confidentiality was made to encourage as great a number of the target group of senior executives, as possible, to take part in the survey.

The candidate was faced with another issue with an ethical dimension when he drafted the questionnaire that was to be posted to rubber manufacturing companies. Included in the list of topics were questions relating to technology transfer and the role of the MRB as a source of manufacturing technology and technical assistance. As a matter of courtesy, the candidate sent a copy of the draft questionnaire to the Director of the Tun Abdul Razak Research Centre, Brickendonbury (with a covering letter signed by his supervisor) in order for a senior MRB official to comment on the contents. There was no response from the research institute.

6.7 Research Context

In a typical research situation the collection of primary and secondary data takes place either simultaneously or information from secondary sources is accessed first. The advantage of examining secondary data before undertaking primary data collection is to provide background information and a bedrock of knowledge from which specific research questions may be formulated to be answered by the primary research. At the time the candidate was preparing the questionnaire there were two trade directories available for consultation. These were:

Malaysian Rubber Products Manufacturers' Association (MRPMA), *Industry and Export Directory, 2002 – 2003*; and

Federation of Malaysian Manufacturers (FMM), *Malaysian Industries Directory, 2003*.

Neither directory, however, lists all companies in the rubber products manufacturing sector as only firms that are members of the two trade associations have entries in the directories. Nevertheless, the information presented on a limited number of companies on topics such as capitalization, number of employees and export sales was sufficient to assist the candidate in formulating research questions to be answered in the questionnaire prepared for the postal survey.

Given the impossibility of undertaking fieldwork in Malaysia, it was decided to carry out a study of the industrial rubber products sector within the general rubber products industry by means of a postal survey. The industrial products sector was chosen for the following reasons:

- The second Industrial Master Plan had recommended the expansion of the sector because of the advanced technology employed and the high value of products on export markets.
- The sector has a high concentration of foreign-owned firms enabling a comparison to be made between local and overseas-controlled companies.
- The technology of manufacturing operations is similar throughout the sector even though the range of products is large.

- The sector is large compared to other sectors, apart from the dipped goods industry, thus enabling a survey to be carried out and valid generalizations made about the results.

In the latter part of 2006, the MRB published their comprehensive trade directory of rubber products manufacturers covering the entire industry in the *Malaysian Rubber Industry and Products Directory: 2006 – 2007*. The candidate purchased a copy of this publication and the current edition of the MRPRA *Industry and Export Directory* through an agent in Malaysia in 2007. By this time, the survey of the industrial products sector by questionnaire had been distributed, replies received and analysis of data completed. After perusing the contents of the directory, the candidate decided that there was sufficient specific and precise information to undertake a statistical investigation to test the statements made by UNIDO and other commentators on the dualistic structure of the rubber manufacturing economy. Furthermore, it was possible to carry out a rigorous examination of the large number of entries of the companies making industrial rubber goods. Statistical analysis of the data could be used to triangulate the results of the questionnaire in order to reject or confirm the conclusions reached from analysis of primary data gathered in the postal survey.

Unusually for an academic research study, the primary data were collected and an analysis of the results carried out without reference to the principal source of secondary information. Nevertheless, the set of circumstances thus described has made possible a much more detailed investigation of the rubber products industries than originally envisaged even though it has considerably lengthened the time taken to complete the thesis.

6.8 Study Population

The study restricts its investigation to manufacturing industries producing consumer items for sale to the public and intermediate goods used as inputs by other manufacturing sectors that use, as raw material, natural *Hevea* rubber, as well as general purpose and speciality synthetic rubbers derived from petroleum feedstock. The investigation, therefore, excludes directory entries for producers of reclaimed rubber made from discarded tyres and latex gloves, as well as manufacturers using silicone rubber materials to make keyboards and control knobs for computers and audio-visual equipment. It also excludes a small number of tyre retreaders. This precisely defined set of industries comprising 340 manufacturing enterprises is the population under consideration in the present study.

6.9 Selection and Definition of Data Sets

This section gives definitions and brief explanations in order to clarify the eight data sets that are used in the study. The Technical Appendix on the technology of rubber manufacturing notes that the rubber manufacturing industries are classified into three major sectors that reflect the different manufacturing techniques and raw materials employed. These are, firstly the tyre sector that makes pneumatic tyres for motor vehicles, secondly manufacturers that produce goods using latex concentrate as the raw material, and thirdly the general rubber goods sector that manufactures a vast range of products, ranging from technologically simple consumer items such as doorstops to highly complex engineering products made to demanding technical specifications. This classification system is regarded as too wide for the purpose of a detailed analysis of the rubber manufacturing industries in

Malaysia undertaken in the current survey. Instead, a system based on eight product categories is proposed. The eight production sectors are:

Tyre industry

- pneumatic tyres
- motor cycle and bicycle tyres, inner tubes and solid tyres

Latex products industry

- latex dipped products
- latex other products

General rubber products industry

- industrial products
- low technology general products
- footwear
- compounds and retreading materials.

6.9.1 Tyre Industry:

Pneumatic tyre sector: The sector manufactures automobile tyres for all types of motor vehicle. These include tyres for passenger cars, vans and light trucks, heavy commercial vehicles and agricultural tractors.

Motor cycle/bicycle/solid tyre and inner tube sector: The products made by this sector include tyres for motor cycles and bicycles, as well as solid rubber tyres for wheelbarrows and warehouse handling equipment, and castors used on domestic furniture. Inner tubes are

manufactured for fitting to crossply tyres that dominate the market in less developed parts of the world where road surfaces are typically poor, and overloading of cars, buses and trucks is commonplace.

6.9.2 Latex Products Industry:

Latex dipped products sector: This sector manufactures dipped goods from latex concentrate to produce general consumer and specialist medical products such as gloves, condoms, catheters, balloons and swimming caps.

Latex other products sector: The items produced by the latex other products sector include extruded latex thread, foam mattress and upholstery products, medical latex sheets, dental and oral dams, latex exercise bands and tourniquet straps and latex toys.

6.9.3 General Rubber Products Industry:

Industrial products sector: The industrial products sector manufactures a large range of intermediate components for use in the automobile, motorcycle, railway, aircraft and shipping industries. It also makes parts used in the construction and building industry, and in the manufacture of engineering and other industrial products. A defining characteristic of the sector is that it produces intermediate goods used in the manufacture or construction of other manufactured products, infrastructure installations and buildings. The sector does not produce consumer items for sale to the general public.

This sector that manufactures automotive, engineering and industrial components is referred to in the text by the term 'industrial products' sector. However, there is a Custom Department class of 'industrial rubber goods' that basically comprises of transmission and conveyor belts, and industrial hoses. The Custom Department's classification excludes products such as automotive parts, seal rings, bearings, rail pads, boat and dock fenders and engineering components. It is emphasized that these high specification, intermediate goods are included in the definition of industrial rubber products in the present study.

Low technology sector: The group of companies classified as the low technology sector produce a diverse range of consumer and intermediate goods. Items include pencil erasers, bathroom, door and floor mats, elastic bands and industrial straps, sports and play balls, golf balls, tiles and floor covering, adhesives and sealants, rubber sheeting, carpet underlay, swim fins and toys.

Footwear sector: The firms in the footwear category produce rubber-soled shoes and sandals, sports shoes, industrial safety boots and waterproof boots, as well as sole and heel units used by shoe repairers and manufacturers of boots and shoes.

Compounds and retreading materials sector: Products include a range of retreading products for the tyre retreading industry such as precured tread, camelback, orbitread and cushion gum. The sector also makes carbon black masterbatches, other masterbatches, and ready-made compounds for sale to manufacturers of intermediate and consumer goods in other sectors of the rubber manufacturing industry.

6.10 Research Issues: Reliability of Data

Secondary data have been sourced mainly from entries in the MRB publication, *Malaysian Rubber Industry and Products Directory: 2006 – 2007* with additional information obtained from the *Industry and Export Directory, 2006 – 2007* published by the Malaysian Rubber Products Manufacturers' Association and websites of individual companies. A common problem when undertaking research in developing countries is the lack of detailed data and the question of whether the data are reliable or not. In the case of Malaysia, these issues are not considered a problem where there is a long established civil service operating in a stable political environment and a thriving private business sector that operates to international standards. Statistics published by official sources such as the Malaysian Rubber Board, other government agencies and private sector trade associations on the rubber industry are as reliable sources of information as any in the world. The information on individual manufacturing concerns published in the MRB and MRPMA directories are provided by the companies concerned. During the analysis cross-checks were carried out on every company that had an entry in the MRPMA trade directory with the entry in the MRB directory to establish that the statistics tallied or, at least, closely matched each other.

6.11 Secondary Data: Entire Industry Analysis

Analysis of 340 firms manufacturing rubber goods was undertaken by examination of the secondary data. The objective is to compare the production sectors in terms of control of assets, size of company and export sales by posing nine research questions as detailed in the following section. Results of the analysis are presented in Chapter 7.

6.11.1 Survey Questions: The following nine specific questions may be answered by an analysis of company entries in the MRB and MRPMA directories:

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Question 2: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Question 3: In what period of time were the companies established?

The periods are: in colonial times and early years of independence up to 1969; between 1970 and 1984 when the New Economic Policy was dominant; from 1985 to 2005 during the implementation of the First and Second Industrial Master Plans.

Question 4: What is the capitalization, in terms of the amount of paid-up capital, for companies in each sector?

Question 5: How many workers are employed by companies in each sector?

Question 6: How many firms are in the large-scale category compared to small and medium sized enterprises in each sector?

There is no consensus in Malaysia on what criteria should be applied to define small and medium enterprises (SME) as opposed to large-scale companies (Meyanathan

& Ismail Muhd Salleh, 1994: 24; Moha Asri Abdullah, 1999: 22). The Ministry of International Trade and Industry (MITI) classifies companies on the amount of net assets or paid-up share capital. Table 6.1 shows the MITI classification.

Table 6.1

MITI Classification

Size of enterprise	Net assets or shareholder equity
Small	Less than RM0.5 million
Medium	RM0.5 to RM2.5 million
Large	Over RM2.5 million

International bodies such as the World Bank, Asian Development Bank and UN agencies base their classification system on the number of employees working in a business enterprise. This is the classification followed in the UNIDO Industrial Master Plans (IMP) as demonstrated in Table 6.2.

Table 6.2

IMP Classification

Size of enterprise	Number of employees
Small	Less than 50
Medium	50 to 199
Large	Over 200

Moha Asri Abdullah (1999: 24) considers that both the value of fixed assets and the number of workers are equally important criteria in determining the size of companies. He argues that enterprises may adopt a high technology and capital-

intensive mode of production or alternatively employ a labour force of many workers. He, therefore, proposes the following definition in the Malaysian context:

> Small and medium enterprises refer to a firm that has full-time employees of less than 200 and has fixed assets of less than RM2.5 million.

This definition has been accepted in the present study with a modification in the case of large-scale companies. A large-scale enterprise is one which has over RM2.5 million paid-up capital and over 200 employees. It could also be one with either a paid-up capital of over RM2.5 million or over 200 workers, whichever is the greater. Small and medium sized enterprises have less than RM2.5 million paid-up capital and less than 200 employees. Under this classification system a highly capitalized company with, for example, RM10 million share holding but employing only 50 workers is placed in the large-scale enterprise category. Similarly, a firm employing 500 workers but with a net asset worth of only RM0.5 million capital is classified as large.

Question 7: What volume of production does each sector export?

Question 8: How many companies export to overseas markets in each sector?

Question 9: What are the markets supplied by exporting companies in each sector?

The world market has been divided into six economic/regional markets: USA/Canada; European Union/Other European countries; Japan/South Korea; Australia/New Zealand; ASEAN; and the Rest of the World. The rest of the world market includes China, island nations in the Pacific, and countries in the Indian subcontinent, central Asia, the Middle East, North Africa, sub-Saharan Africa and Latin America.

6.12 Secondary Data: Industrial Products Sector Analysis

A comparison between wholly Malaysian-owned manufacturing firms and joint venture and foreign-controlled business enterprises in the automotive, engineering and industrial sector was undertaken by an analysis of 110 company entries in the MRB and MRPMA trade directories. The results of this part of the study are given in Chapter 8. Results of a similar analysis of the secondary data for other product sectors are reported in Chapter 9.

6.12.1 Survey Questions: There are eight questions put forward for answer in the examination of secondary data in the two directories. These are:

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Question 2: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Question 3: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category compared to wholly Malaysian-owned companies?

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to those supplied by wholly Malaysian-owned companies?

6.13 Primary Data Analysis

Primary data were gathered by means of a questionnaire sent by mail to manufacturing firms making industrial rubber goods. Further data and qualitative information on business operations were obtained from the websites of individual companies. The questionnaire posted to manufacturing companies in the automotive, engineering and industrial products sector included enquiries about ownership, source of investment funds, size of enterprise and exports, similar to the research questions considered in the secondary data from the two trade directories. Additional information was sought in the questionnaire on linkages with suppliers of natural and synthetic rubbers, machinery and equipment, and rubber compounding materials. There were also questions on production technology and technical assistance in factory operations. The purpose of these enquiries was to determine the impact that industrial technology developed in MRB research centres has, compared to technology transferred from sources overseas.

6.13.1 Postal Survey Questions: The first five questions in the questionnaire are basically the same as those asked for the secondary data. Questions 6 to 14 cover topics to do with industrial linkages and technology transfer. These are:

> **Question 6:** Do foreign-owned companies and joint venture enterprises purchase less natural rubber produced in Malaysia compared to wholly Malaysian-owned companies?

Question 7: Do foreign-owned companies and joint venture enterprises purchase more synthetic rubber and other elastomers from overseas suppliers compared to wholly Malaysian-owned companies?

Question 8: Do foreign-owned companies and joint venture enterprises purchase more compounding ingredients, such as chemicals and ready-made compounds, made by overseas manufacturers compared to wholly Malaysian-owned companies?

Question 9: Do foreign-owned companies and joint venture enterprises purchase less compounding ingredients from Malaysian suppliers compared to wholly Malaysian-owned companies?

Question 10: Do foreign-owned companies and joint venture enterprises obtain more machinery and equipment from overseas manufacturers compared to wholly Malaysian-owned companies?

Question 11: Do wholly Malaysian-owned companies use the services of the Malaysian Rubber Board more as a source of manufacturing technology compared to joint venture and foreign companies?

Question 12: What are the differences between wholly Malaysian-owned companies, and joint venture and foreign-owned companies in sourcing manufacturing technology?

Question 13: Do wholly Malaysian-owned companies rely more on the services of the Malaysian Rubber Board for technical advice compared to joint venture and foreign companies?

Question 14: What are the differences between wholly Malaysian-owned companies, and joint venture and foreign-owned companies in sourcing technical assistance?

6.14 Survey by Questionnaire

One of the tried and tested methods of collecting primary data in business research is the postal survey. Data are collected by means of a questionnaire and the methods involved in administering the survey and analysing the responses are highly standardized. A questionnaire is a list of carefully structured questions, decided after testing, to elicit reliable responses from a selected sample or total population. An advantage of a postal survey is that large amounts of information can be gathered at relatively low cost in a short period of time. A drawback of the method is the data collected are limited by the number of questions in the questionnaire, unlike those gathered by qualitative methods such as in-depth, face-to-face interviews. A great deal of thought, therefore, is required in designing the questionnaire and formulating the questions to be answered by respondents.

The main considerations when using questionnaires are summarized by Hussey and Hussey (1997: 162):

- Sample size
- Type of questions, whether open or closed enquiries
- Wording of the questions to ensure that they are intelligible and unambiguous
- Design of the questionnaire, including any instructions
- Wording of accompanying letter
- Method of distribution and return of completed questionnaires
- Action to be taken when questionnaires are not returned.

6.15 Postal Survey Population

The positive paradigm in methodology holds that in survey research a large number of responses leads to a more robust validation of results compared to a survey with only few replies. The research study, therefore, wished to include as many firms as possible in the postal survey in an attempt to maximize the response rate. At the time the questionnaire was being designed the MRB trade directory had not been published. However, the Malaysian Rubber Export Promotion Council (MREPC) had a website listing rubber manufacturing companies. The database gave the name, address, e-mail address and telephone and fax numbers of each company. Importantly, the website also provided the name of the chief executive with his (or, in a few cases, her) designation, e.g. General Manager or Managing Director, and a list of the products made by each firm. There were 82 manufacturing firms that made industrial rubber goods on the MREPC website. This number was regarded as manageable when the logistics of printing and posting the

questionnaire was considered. Therefore, the total population of 82 companies was included in the survey.

6.16 Design of Postal Survey

The procedure adopted in carrying out the survey was the total design method advocated by Dillman (1978), and Frankfort-Nachmias and Nachmias (1996). Participants are said to respond positively to three incentives when answering a questionnaire:

> Reward: If completing the questionnaire is perceived as an intrinsic rewarding act, the process itself provides sufficient motivation to return the survey document.
>
> Cost: Time is the major cost experienced by respondents. It follows that a greater cost is incurred in completing a long questionnaire than a short one.
>
> Trust: The sponsorship of a known, reputable organization symbolizes trust and legitimacy in the minds of participants.

Dillman recommends the use of short, printed questionnaires on white stationery, to enclose stamped, addressed return envelopes and a promise of confidentiality as tools to increase response rates. Reporting on a questionnaire survey of the electronics sector in Malaysia, Giroud (2003: Chap. 5) emphasizes the need to establish organizational legitimacy and to address correspondence to a named person. Giroud recommends that in order to encourage responses the covering letter should stress the usefulness of the study and the importance of replies to meet study objectives, and to make an offer of access to a summary of the results.

6.17 Testing of Questionnaire

The design of the questionnaire was tested to establish: a) the questions were clear, unambiguous and easily understood; and b) the structure of the questionnaire was logical and easy to follow. A two-stage testing procedure was adopted. Firstly, the draft document was pre-tested among colleagues in the university and professional contacts locally, secondly a pilot survey of a sample of manufacturing companies in Malaysia was undertaken. The final questionnaire was prepared only after this procedure had been followed.

Even before the first draft had been written, the candidate contacted the former Chief Executive Officer of the Malaysian International Chamber of Commerce and Industry for advice based on his practical experience of conducting business surveys in the country. His reply was to keep the length of the questionnaire as short as possible and to address the covering letter to a named individual in each company. After the draft questionnaire had been prepared, it was sent for comment to the Director of the MRB research institute in the UK; the Managing Director of a local manufacturer of industrial rubber goods; and an academic researcher at the Bradford School of Management who had carried out a survey of electronic companies in Penang in 1996. There was no reply from the MRB institute. The responses, received from the local firm and the business school lecturer, were incorporated into the questionnaire.

6.18 Pilot Survey

The questionnaire was tested in the field by a pilot survey in Malaysia. It was decided to use the MRPMA directory for 2002 – 2003 that listed 35 industrial goods producers as the data base for the pilot survey. Out of 35 questionnaires, five were returned. The questionnaire was then modified with one or two questions redrafted for the sake of clarity and a final instruction added to the introductory page, requesting participants to read through the questionnaire before beginning to answer the questions. The completed questionnaires were also analysed on a statistical computer program in order to test that the coding system was robust and did not contain any coding errors.

6.19 Questionnaire

The seven page questionnaire consisted of:

Cover page with the title of the survey, and name and university address of the candidate.

Introduction page. This provided information about the aims of the study and defined a number of terms used in the questionnaire.

Questions. A total of 18 close-ended questions were asked. The layout was designed to look professional, and spacing of the questions and answer boxes was such as to make them easy to follow.

Final page. This gave instructions for the return of the questionnaire by post in the stamped addressed envelope provided, fax or e-mail. It also enquired if the respondent wished to receive a copy of a summary of the results.

The questionnaire is presented in Appendix 1. However, it should be noted that the format has been changed in order to comply with university regulations regarding font size and width of margins.

6.20 Legitimacy

The issue of legitimacy was regarded as paramount to the success of the survey. The questionnaire, it will be recalled, was to be sent to chief executive officers of manufacturing companies, persons who are used to dealing with their peer group in other business enterprises and senior government officials. The candidate, therefore, had to establish his personal and organizational credentials to this target group of business managers. The survey was to be carried out under the auspices of the Bradford Centre for International Development, a constituent department of the University of Bradford with high standing in the field of development studies. Moreover, the business school at the university has an established reputation for international management research and education that is recognized by the business community in Malaysia. A joint approach by both university departments would, it was felt, strengthen the perception of legitimacy to recipients of the questionnaire.

The Dean of the Management School was contacted by the Dean of the School of Social and International Studies with a request to prepare an introductory letter, using business school stationery to firms in the survey to explain the objectives of the study and to confirm that the candidate has long experience of the Malaysian rubber industry. To have an official letter signed by the head of an international business school would in one stroke provide a

cast iron guarantee of legitimacy to the study, particularly to expatriate personnel in foreign firms and those managers in local companies who are educated to tertiary level. The business school letter would also give the candidate 'face' in the eyes of the less well educated, predominantly Chinese businessmen who manage smaller companies.

The introductory letter invited firms to participate in the survey and stated that it was part of a collaborative research programme of business activities in the ASEAN and East Asian regions between the School of Management and the Centre for International Development. It provided details of the study objectives to evaluate linkages with other sectors of the Malaysian economy and examine technology transfer from rubber board institutes to the industrial sector. The candidate's work experience of 35 years in the field of natural rubber in Malaysia was stressed and he was referred to not as a student but as a 'research worker attached to Bradford Centre for International Development'. The letter also informed companies that the questionnaire would shortly be sent to them. The text of the introductory letter is presented in Appendix 1.

The covering letter with the questionnaire, addressed to a named individual with the correct company designation, was on University of Bradford letterhead paper in order to re-enforce the concept in the mind of recipients of their participation in a legitimate university-sponsored survey. This letter assured participants that all information collected would remain confidential and neither firms nor individuals would be named in the report. Finally, the letter thanked the addressee for their cooperation in completing the questionnaire and assisting in the research project.

6.21 Administration of Survey

6.21.1 Basic Decisions: It was decided to print and post the questionnaire in Malaysia because of the cost factor in posting the survey from the UK where mail charges are extremely high compared to Malaysia. Because the candidate was unable to administer the survey in person, it was of critical importance to appoint a Malaysian agent, in whom the candidate had absolute trust, who had proven administrative capabilities, and who could be relied on to conduct the survey in a professional manner. It was also necessary to have access to office facilities in the country in order to print the questionnaire documents to a high standard and arrange the logistics of conducting the survey by post.

6.21.2 Logistics in Bradford: The letter of introduction and the accompanying covering letter printed on official University of Bradford note paper were prepared at the university. The introductory letter was not personalized but the envelope had a personalized address printed on a white label. Each of the covering letters, however, was unique in that each letter was addressed to a named person with their official title in the company. White, self-adhesive, personalized address labels to all the companies in the survey and return address labels to the University of Bradford were also prepared in this country. The letters and labels were sent to an office in Kuala Lumpur by courier.

6.21.3 Logistics in Kuala Lumpur: The questionnaire was sent to Kuala Lumpur by e-mail where it was printed on good quality white paper. The administrator in Malaysia was responsible for coding each questionnaire, matching the coded questionnaires to the correct letter to each company, the purchase of envelopes and postage stamps, and posting all

correspondence on dates previously decided. The post-paid return envelopes addressed to the candidate at the University of Bradford had the correct value airmail stamps and blue airmail stickers attached.

6.21.4 Survey Timetable: The survey was carried out in April and May of 2006 and took five weeks to complete according to the following timetable:

Week 1:	Mailing of introductory letter in Kuala Lumpur.
Week 2:	Mailing of questionnaire and covering letter in Kuala Lumpur.
Week 3:	University of Bradford e-mails with the questionnaire attached were sent to the companies as a follow-up to the mail survey.
Weeks 4 and 5:	Approximately 150 follow-up telephone calls were made to companies in Malaysia between 07-00 and 09-00 British Summer Time (14-00 to 16-00 Malaysian Time). The languages used with persons who answered the telephone were standard English, Malaysian English and Malay. There was one female secretary who answered in Japanese but switched to English when the candidate asked (in Malay) whether there was anyone in the office who spoke either Malay or English. Unfortunately, her Japanese boss did not want to take the call.

6.22 Questionnaire Response Rate

A total of 82 questionnaires were mailed and 26 were returned. The response rate of 32 per cent is considered high for surveys carried out in Malaysia. The experience of the International Chamber of Commerce and Industry in their surveys of member companies is for a response rate of only ten per cent. Hussey and Hussey (1997: 163) also state that response rates of ten per cent or less are not uncommon in postal surveys.

Table 6.3

Questionnaire Responses

	Number of questionnaires
Number of companies in survey	82
Number returned	26
Response rate	31.7 %
Responses posted to BCID	21
Responses faxed	3
Responses e-mailed	2
Reject	1
Valid responses	25

One questionnaire from a Taiwanese/Malaysian joint venture company was rejected because of numerous non-valid answers and one page of questions left blank. There were, therefore, 25 questionnaires available for analysis which is equivalent to 30 per cent of the number sent out. Table 6.3 gives details of the responses received.

6.23 Coding for Computer Analysis

The computer software program used to analyse the data was the Statistical Package for the Social Sciences (SPSS). A codebook was prepared following the examples given in an

instruction manual for the SPSS program (Pallant, 2001). The codebook a) defined and labelled each of the variables; and b) assigned numbers to each of the possible responses.

Each of the 82 companies in the postal survey was give an identification number that was printed on the top right hand margin of the questionnaire. In addition, the answers to each question were pre-coded on the questionnaire as shown in the example of the first question regarding ownership. This was done in order to assist in entering the data into the software program.

Question 1: Ownership of company

Wholly Malaysian-owned ☐ 1

Joint venture: majority Malaysian-owned ☐ 2

50:50 joint venture ☐ 3

Joint venture: minority Malaysian-owned ☐ 4

Wholly foreign-owned subsidiary ☐ 5

6.24 Statistical Techniques

Hussey and Hussey (1997: 187) distinguish between *exploratory data analysis* or *descriptive statistics* used to summarize quantitative data and *confirmatory data analysis* or *inferential statistics* that involves the examination of quantitative data collected from a sample to draw conclusions about a complete population or to compare one group with

another. The descriptive techniques of exploratory data analysis are useful for summarizing and presenting data in frequency distribution tables. Inspection of frequency tables enables patterns and relationships to be established that are not apparent from observations of a mass of raw data (Hussey & Hussey, 1997: 189). Inferential statistical techniques used when conducting confirmatory data analysis are the procedures adopted when measuring differences between groups (Hussey & Hussey, 1997: 221).

Different statistical procedures are required for variables that are categorical and continuous:

- categorical variables, also referred to as nominal level data, are data classified into named categories. Thus companies may be classified according to size as either large-scale or small/medium-sized enterprises.
- continuous variables, also referred to as interval level data, are data that may take any value within a given range. Thus, companies may be classified according to the amount of paid-up capital invested in each company. The capitalization of a sample of 100 companies, for example, may range from only one *ringgit* to ten million *ringgit* (RM1 to RM10 million).

All variables have been classified into categorical (nominal) level data apart from the data for paid-up capital and the number of workers employed in the analysis of secondary data in the trade directories. These latter two variables are examples of interval or continuous data. The procedures followed in the statistical analysis are those described in the handbook by Pallant (2001) that provides detailed instructions on the

use of the SPSS computer program. Four statistical methods have been employed in the study:

Exploratory data analysis

Categorical data	Frequency distribution tables
Continuous data	Location and dispersion measurement
	Mean and standard deviation

Confirmatory data analysis

Categorical data	Measurement of difference
	Chi squared test
Continuous data	Measurement of difference
	Independent samples t-test

The standard procedure for measuring differences using the non-parametric Chi squared test for bivariate categorical data or the parametric independent samples t-test for bivariate continuous data involves the setting up of two hypotheses. The null hypothesis (Ho) states that the two variables are independent of one another whereas the alternate hypothesis (H_1) states that they are associated with one another. The null hypothesis is always stated first. The Chi squared test establishes whether there are any statistically significant differences between the observed frequencies and the hypothesized frequencies (Hussey & Hussey, 1997: 232). The independent samples t-test similarly indicates whether there is statistically significant difference between one group and another based on a rejection of the null

hypothesis (Hussey & Hussey, 1997: 236). There follows an example of the null hypothesis and the alternate hypothesis for the research question:

> Are joint venture and foreign-owned companies more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Ho There is no relationship between ownership and size of company.

H_1 There is a relationship between ownership and size of company.

6.25 Issues in Statistical Analysis: There are issues surrounding the breakdown of the rubber manufacturing industry into eight product sectors and the ability to analyse each sector using statistical techniques because of the limited number of firms and limited foreign investment in some sectors. In statistical analysis, a sample size below 25 cases confounds the analysis because the power of a test is very dependent on the number of cases. Problems in analysis can also occur where the number of cases in each group is dissimilar so that the assumptions for the statistical test for equality are violated. Out of the eight product sectors, five have less than 25 companies. In each of these five sectors there are only one, two or three companies with foreign involvement. It is clearly impossible to use statistical methods such as the Chi-square test for categorical data and independent samples t-test for continuous data with such small populations, especially when some essential figures such as the amount of paid-up capital or numbers in the workforce are missing. However, trends may be observed and some tentative general conclusions are

drawn by an examination of frequencies of distribution where it is not possible to carry out more rigorous statistical techniques.

The independent samples t-test used to analyse continuous data (paid-up capital and employee numbers in the study) rests on the assumption that the population data are normally distributed in a Bell-shaped curve. The distribution of values for capitalization and number of workers, however, is not normal. The scores for both variables are extremely positively skewed, with figures clustered at low values to the left of histograms showing distribution of data. There are a small number of outlier cases for capital and employees with values well above the majority of other cases.

The t-test is sensitive to outliers because to include such scores distorts statistics such as the mean figure and, therefore, the results obtained from an analysis of the comparison of means. The study has adopted a pragmatic approach to dealing with outliers. Where there are only one or two outliers in a population these have been removed from the data file. For example, in the dipped goods sector, two glove manufacturers are extreme outliers with a mean capitalization of RM380 million compared to an industry mean of RM17 million paid-up shares. Both companies have been removed when carrying out the t-test analysis to compare capitalization of local firms with businesses with foreign involvement. However, in the case of outliers that form a cluster such as public listed, dipped products companies these companies have been treated as a separate group within the analysis of comparison of means. In the calculations for the entire industry, automobile tyre producers and those cases classified as outliers in the other product sectors have been removed in order not to distort the results.

6.26 Weaknesses in Research Method

The postal survey method was used in the research study because of bureaucratic, financial and distance constraints. The use of a mail survey enabled the study to be conducted at arm's length without the physical presence of the candidate in Malaysia. Questionnaires posted to 82 companies ensured that all industrial products manufacturers on the MREPC data base were contacted. Printing and posting the questionnaire in Kuala Lumpur kept costs down to a minimum compared to using the Royal Mail airmail service. A major advantage of adopting the questionnaire survey technique is that procedures are well documented, well understood and straight forward for researchers to design and conduct a survey by themselves, or, in the case of this study, with the assistance of an administrator in Kuala Lumpur.

Three major disadvantages of the questionnaire survey technique are:

a) questionnaires do not allow researchers to elicit additional information;

b) the research worker cannot control who actually completes the questionnaire;

c) response rates tend to be low.

A recurrent topic of debate in research methodology is that research workers who use questionnaire surveys are not able to ask additional questions to provide more information, or to clarify and probe the answers to questions in the written questionnaire. The literature on survey methods typically recommends the use of face-to-face interviews to collect in-depth qualitative data to supplement the data obtained by the questionnaire. However, this particular research method was not available to the candidate for reasons already discussed.

An alternative method would be to carry out telephone interviews with selected respondents. Such action was considered and rejected on the grounds that executives in business concerns lead busy lives in doing their job and would regard an unsolicited telephone call lasting maybe half an hour or as highly intrusive and unwelcome.

The point of who actually filled in the questionnaire is regarded as unimportant in this particular study so long as a competent individual in the organization was given the task. Although each and every questionnaire was addressed to the company's chief executive it was irrelevant who answered the questions. From the follow-up telephone calls, it was discovered that, in some cases, the named manager had answered the questions including the Managing Director of one of the largest Malaysian-owned firms; in some family-owned businesses the questionnaire had been given to a junior but well educated family member; in Japanese companies the Japanese senior executive had passed the survey document on to a Malaysian subordinate.

The response rate was maximized to a rate of over 30 per cent by designing a clear, concise and well structured document that focused on easily answered questions, many of a technical nature. It would be apparent to all respondents that the questionnaire had been prepared by someone who had a good knowledge of the technology of rubber manufacture and the Malaysian business environment. The issue of sponsorship by the University of Bradford and the emphasis that the survey was part of a legitimate business research study has been covered earlier in the chapter.

The major limitation of the study is that it has not adopted methodological triangulation where quantitative and qualitative methods of data collection are used. Nevertheless, the study is not one dimensional because quantitative information has been gathered using two methods in the technique of data triangulation in order to add to the reliability of the data. Data has been collected from secondary sources from information published in trade directories, and in addition primary sources were used in a postal survey of the industrial products sector.

6.27 Conclusion

The chapter has attempted to provide a detailed account of the research procedures and underlying theoretical assumptions of the methodology adopted in the study. In an ideal world, the candidate would have been able to undertake fieldwork and conduct the research in Malaysia, either under the direct auspices or, at least, with the full cooperation of the Malaysian Rubber Board. However, this was not to be despite earlier indications that this course of action would be possible. Necessity has had to be the mother of invention when undertaking the study and the candidate is of the opinion that as much as possible has been achieved in difficult circumstances.

Chapter 7

Overview of Rubber Manufacturing Industries

7.1 Introduction

The current chapter provides an overview of the entire rubber products manufacturing industry while a more detailed analysis of eight production sectors is given in the following two chapters. The analysis of secondary data published in the 2006 – 2007 trade directories of the Malaysian Rubber Board (MRB) and Malaysian Rubber Products Manufacturers' Association (MRPMA) has been undertaken by means of the Statistical Package for the Social Sciences (SPSS) software program. A more general description of the economy of the rubber manufacturing industries in 2005 is taken from statistics published on the MRB website in 2008.

7.2 Location of Rubber Industry Factories

The production facilities of rubber goods manufacturing companies in Peninsular Malaysia are located almost exclusively in the well populated, west coast states where there is a developed industrial infrastructure and an extensive road and rail network with easy access to major seaports. A map of Peninsular Malaysia showing the major towns and states is on page xvi. Table 7.1 shows the location by state of entries in the MRB directory.

Table 7.1

Location of Rubber Manufacturing Factories

State	No. of Companies
Johore	36
Malacca	14
Negri Sembilan	13
Selangor	148
Kuala Lumpur	13
Perak	55
Penang	33
Kedah	29
Perlis	2
Kelantan	2
Pahang	1
Total	346

Source: MRB Directory

Selangor and the adjoining Federal Territory of Kuala Lumpur have the largest concentration of 161 companies compared with other west coast states with large industrial estates, such as Perak with 55, Penang with 33 and Johore with 36 rubber products manufacturers. The state of Kedah bordering the rubber producing provinces of southern Thailand has 29 rubber manufacturers and is a major producer of rubber gloves and medical products such as catheters using imports of Thai latex as a factory input.

7.3 Classification of Rubber Industries

7.3.1 Malaysian Rubber Board and Study Classification Systems: The point has been made in the introductory chapter that rubber manufacturing industries are classified into three major sectors that reflect the manufacturing operations and raw materials employed. These are the tyre industry; latex goods manufacturers and producers of general rubber

goods. In Chapter 6, Section 6.9 on the selection of data sets in the study, the candidate has proposed dividing the Malaysian manufacturing industries into eight product sectors. The sectors are:

Tyre industry

- pneumatic tyres
- motor cycle and bicycle tyres, inner tubes and solid tyres

Latex products industry

- latex dipped products
- latex other products

General rubber products industry

- industrial products
- low technology general products
- footwear
- compounds and retreading materials.

Table 7.2 shows the number of firms in each of the eight product sectors. All in all, a total of 340 companies are recorded in the two trade directories under the eight categories described above. It should be noted that in the analysis each company has been allocated to a specific sector. However, a fair number of businesses produce more than one type of product so that a calculated judgement had to be made as to which class to place each firm. This has been done in order to avoid double counting in the survey.

Table 7.2

Study: Manufacturers by Production Sector

Product Sector	No. of Companies	
Tyre Industry		
Pneumatic tyres	3	
Motor cycle/bicycle/solid tyres and inner tubes	13	
Industry total		16
Latex Products Industry		
Latex dipped products	111	
Latex other products	16	
Industry total		127
General Rubber Products Industry		
Industrial products	110	
Low tech general products	47	
Footwear	19	
Compounds and retread materials	21	
Industry total		197
Total		340

When the second Industrial Master Plan ended in 2005, there were, according to the MRB, 357 manufacturing concerns producing rubber goods. These companies have been classified into the three major production sectors as shown in Table 7.3. In this classification system, tyre makers producing motor cycle, bicycle, solid tyres and inner tubes are included in the industrial and general goods category, as are manufacturers of master batches, specialist compounds and tyre retreading materials. Nevertheless, there is, on the whole, a good fit with the classification system of 340 manufacturers adopted in the study. When the 13 inner tube, motor cycle and solid tyre makers are included in the general rubber products sector, the total is 210 firms: the same as the Rubber Board classification. The figures, therefore, tally for the pneumatic tyre, general and latex other products sectors. There is a discrepancy in the number of companies in the latex dipped

goods sector, with the MRB recording 128 and the study 111 firms. The explanation is that the study has classed companies with the same owner but registered under different names as a single company. Thus, the Australian multinational, Ansell that produces medical, household and industrial gloves has five companies with factories in Kedah, Malacca and Selangor. The study regards Ansell as a single, foreign-owned enterprise whereas the official statistics show five companies.

Table 7.3

Malaysian Rubber Board: Manufacturers by Production Sector: 2005

Product Sector	No. of Companies	
Tyre Industry		
Pneumatic tyres	3	
Industry total		3
Latex Products Industry		
Latex dipped products	128	
Latex other products	16	
Industry total		144
General Rubber Products Industry		
Industrial and general products	196	
Footwear	14	
Industry total		210
Total		357

Source: MRB

7.4 Profile of Rubber Manufacturing Industries

In 2005, the 357 firms (as recorded by the MRB) in the rubber products industry employed 63,000 workers accounting for 6.1 per cent of the employment figure in the national employment sector. The value of the total production of the industry was RM10 billion,

which is 2.1 per cent of the output value of Malaysia's manufacturing sector. Exports of rubber manufactures were 80 per cent of output by value and the export revenue of RM8 billion contributed 1.5 per cent to overall exports. In contrast, raw rubber exports of 1.13 million metric tons were valued at RM5.8 billion or 1.08 per cent of total exports. When the revenues of export sales of natural rubber, rubber goods and *Hevea* timber products are added up, the combined contribution to overseas sales from the entire rubber industry was 3.95 per cent of exports valued at RM21 billion.

Table 7.4 shows the value of Malaysia's exports of rubber manufactures by product sector in 2005. The most important sector by far is the latex products industry that contributed over 75 per cent to export sales, followed by the industrial and general rubber goods sector at 11.4 per cent, then pneumatic tyres and inner tubes for all classes of vehicle at 7.1 per cent, with footwear bringing up the rear with 5.7 per cent of total exports. Malaysian rubber products are exported to more than 160 countries in the world. The four most important markets for rubber goods are the industrialized economies of the USA, European Union and Japan, and China that account for approximately 65 per cent by value of exports.

Table 7.4

Value of Exports by Production Sector: 2005

	Tyres/ Inner tubes	Latex products	Industrial/ General products	Footwear
RM m	578.62	6,159.67	927.48	459.66
Per cent	7.12	75.81	11.41	5.66

Source: MRB

Malaysia is the sixth largest consumer of natural rubber in the world, after China, Japan and India in Asia, and the EU and USA in the West. It is the largest consumer of latex concentrate in global terms. In 2005, the total amount of natural rubber used as raw material input by the rubber manufacturing industries was 482,889 metric tons. The largest consuming sector was the latex products industry that used 71 per cent of raw rubber in the form of latex concentrate produced in Malaysia and Thailand. The largest user of solid Technically Specified Rubber (TSR) was the tyre sector that consumed 15 per cent, with the industrial and general products sector using 13 per cent of natural rubber. The smallest consumer was the footwear sector that used less than one per cent of the total. Table 7.5 shows the figures for rubber consumption by the four production sectors in 2005.

Table 7.5

Consumption by Production Sector: 2005

	Tyres	Latex products	Industrial/ General products	Footwear	Total
Metric tons	74,470	342,699	64,703	1,017	482,889
Per cent	15.42	70.97	13.40	0.21	100

Source: MRB

7.5 Results of Analysis

In the survey, nine questions were formulated in order to examine the ownership, size of enterprise and export sales in the eight production sectors that make up the rubber manufacturing industries. Details of the survey questions are given in Chapter 6 on research methodology.

7.5.1 Question 1: Ownership: Table 7.6 gives a breakdown by ownership of the 340 manufacturing companies in the survey. The directory entries do not provide this information although the websites of many companies, both those with foreign direct investment and Malaysian-owned, do. However, foreign ownership can be discerned, in many cases, by the name of the business enterprise, for example, Gummi Metall Technik or Nippon Wiper Blade, and by the names of the Chief Executive Officer and other key technical personnel. Typically, companies that are subsidiaries of companies based overseas employ expatriate staff in their Malaysian operations. Japanese manufacturers, in particular, employ Japanese nationals in a number of managerial positions whereas other foreign firms tend to have fewer expatriate personnel. In the survey of secondary data, it has not proved possible to divide the companies into two separate categories of wholly owned foreign firms and joint venture enterprises.

Table 7.6

Ownership of Companies

Sector	Malaysian		Foreign/joint venture	
	No.	%	No.	%
Pneumatic tyres	1	33.3	2	76.7
Motor cycle tyres/inner tubes	12	92.3	1	7.7
Dipped products	88	79.3	23	20.7
Latex other products	13	81.3	3	18.7
Industrial products	78	70.9	32	29.1
Low tech products	38	80.9	9	19.1
Footwear	17	89.5	2	10.5
Compounds/retread materials	20	95.2	1	4.8
Total	267	78.5	73	21.5

The figures reveal that the rubber manufacturing sector is mainly Malaysian-owned and operated, accounting for approximately 80 per cent of the sector. However, putting to one

side the special case of the pneumatic automobile tyre sector, there are differences among the other seven classes of company. Foreign investment is greater in the industrial products (29 per cent), dipped goods (21 per cent), low technology products (19 per cent) and latex other products (19 per cent) sectors. Local firms account for 90 per cent or more of companies in the footwear, compound/retread materials, and motor cycle tyre/ inner tube classes of company.

In the Malaysian-owned sector an analysis was carried out to determine the number of privately owned businesses in the hands of different ethnic groups. Out of 267 local companies it was established that 218 or 81 per cent are controlled by private Chinese interests. Only 12 firms are owned by private Malay investors and seven firms are controlled by ethnic Indians. The other category of ownership are corporate enterprises including companies listed on the Malaysian stock exchange, wholly owned subsidiaries of large public listed companies and firms established by quasi-government bodies. Table 7.7 shows the breakdown by ownership of local companies.

Table 7.7

Ownership of Local Companies

Control of capital	No of companies
Private Chinese	218
Private Malay	12
Private Indian	7
Corporate enterprises	30
Total	267

7.5.2 Question 2: Source of Direct Foreign Investment:

Table 7.8

Source of Foreign Investment

Sector	Investment				
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	Singapore/ Taiwan
Pneumatic tyres	1	1	0	0	0
Motor cycle tyres/inner tubes	0	0	1	0	0
Dipped products	7	8	6	2	0
Latex other products	1	2	0	0	0
Industrial products	1	4	22	1	4
Low tech products	0	2	6	0	1
Footwear	1	1	0	0	0
Compounds/retread materials	0	0	1	0	0
Total	11	18	36	3	5

Overseas financial investments are typically made by multinational corporations and international manufacturing companies in wholly owned subsidiaries and joint venture enterprises, and this is the case for the rubber manufacturing industry. There is, however, one exception where a Malaysian-controlled producer of latex gloves has direct investment by American and British private equity companies. Japan and South Korea are by far the most important investors, accounting for half of all foreign investment in the rubber manufacturing industry as detailed in Table 7.8. Investments by Japanese and Korean companies are concentrated in the industrial components sector which reflects the success of the 'Look East' policy adopted when Malaysia was encouraging the establishment of heavy industry in the 1980s. Capital investment from the European Union is in 18 companies across six out of eight sectors with the exception of motor cycle tyres and compounding materials. Financial involvement by European and North America manufacturers is found mainly in the latex dipped goods sector, with capital invested in 15

companies. In the footwear sector, investment in a joint venture company by a Norwegian manufacturer of safety boots has been included under the EU heading purely as a matter of convenience. There is also investment in five companies by investors in the Newly Industrialized Economies of Taiwan and Singapore.

7.5.3 Question 3: Date of Establishment:

Table 7.9

Period of Establishment

Sector	Before 1970	1970 – 1984	1985 – 2005	No record
Pneumatic tyres	1	1	1	0
Motor cycle tyres/inner tubes	2	5	6	0
Dipped products	0	14	86	11
Latex other products	2	4	9	1
Industrial products	5	30	68	7
Low tech products	1	12	25	9
Footwear	2	6	7	4
Compounds/retread materials	4	3	10	4
Total	17	75	212	36

As shown in Table 7.9, the majority of companies, over 60 per cent in total, have been incorporated since 1985 after the formulation by UNIDO of a strategy for the development of industrialization in the country. The figures demonstrate the success of the policies adopted by Malaysia in attracting direct foreign investment into rubber manufacturing industries as recommended in the First Industrial Master Plan. The dramatic expansion of 86 new businesses in the dipped products sector after 1985 was a result of the massive increase in demand for medical examination gloves caused by the worsening AIDS crisis in the 1980s.

7.5.4 Question 4: Capitalization: Table 7.10 shows the amount of paid-up capital for the eight classes of company. As discussed in the Technical Appendix on manufacturing technology, pneumatic tyre production is undertaken in large, capital-intensive factories where economies of scale operate. The three firms in this sector are, as may be expected, very heavily capitalized in comparison with other sectors. The mean paid-up capital for the pneumatic tyre manufacturing companies is almost RM150 million, whereas among the other classes of manufacturer the mean capitalization is less than RM20 million at the highest. The latex dipped goods and latex other products sectors are the next in importance to the tyre sector, with a mean capitalization of RM17 million each. The remaining manufacturing sectors all have a mean paid-up investment of less than RM10 million.

Table 7.10

Capitalization (RM million)

Sector	N	Minium	Maxium	Mean
Pneumatic tyres	3	10.8	231.5	147.5
Motor cycle tyres/inner tubes	12	0.1	30.0	6.3
Dipped products	92	0.2	385.0	17.1
Latex other products	11	0.4	84.0	17.3
Industrial products	81	0.1	51.7	4.1
Low tech products	28	0.1	22.5	2.7
Footwear	6	0.6	8.0	3.6
Compounds/retread materials	18	0.1	13.0	4.2

7.5.5 Question 5: Workers Employed: The automobile tyre manufacturing sector operates in large-scale production facilities employing a substantial labour force. As shown in Table 7.11, the pneumatic tyre sector is the largest class of employer with a mean employment figure of 1608 workers per company. The mean employment figure for firms making latex

dipped products is 490 workers, and for those making other products from latex is 173 workers per company. Manufacturing concerns making motor cycle tyres and inner tubes, intermediate products for the automotive, engineering and industrial sectors, footwear, and compounding and retreading products employ, on average, more than 100 workers. Only the low technology general goods sector has a mean workforce figure of less than 100 employees.

Table 7.11

Number of Workers

Sector	N	Minium	Maxium	Mean
Pneumatic tyres	3	730	3054	1608
Motor cycle tyres/inner tubes	13	35	550	133
Dipped products	102	20	6500	490
Latex other products	14	16	650	173
Industrial products	90	10	1160	135
Low tech products	38	10	450	86
Footwear	14	15	510	136
Compounds/retread materials	18	12	400	110

7.5.6 Question 6: Large and Small/Medium enterprises: The classification system used to differentiate companies into large and small/medium-scale enterprises is based on a combination of the amount of capital investment and number of employees. 172 firms are classified as small to medium-scale enterprises compared to 137 companies in the large-scale class. However, Table 7.12 demonstrates substantial differences among the eight categories of company. The majority of businesses in the motor cycle and inner tube, low technology goods, industrial intermediate products and footwear sectors are classified as small and medium sized. Only the pneumatic automobile tyre and dipped latex product

sectors have a majority of large companies. The three tyre makers are all large-scale companies and 64 firms in the dipped goods sector are classed as large. The figures for the sectors making latex other products, and compounds and retreading materials are inconclusive with almost equal numbers in each class.

Table 7.12

Large and Small/Medium-scale Enterprises

Sector	Large-scale		Small/Medium-scale		No record	
	No.	%	No.	%	No.	%
Pneumatic tyres	3	100.0	0		0	
Motor cycle tyres/inner tubes	4	30.8	9	69.2	0	
Dipped products	64	57.7	42	37.8	5	4.5
Latex other products	7	43.8	8	50.0	1	6.3
Industrial products	36	32.7	62	56.4	12	10.9
Low tech products	10	21.3	31	66.0	6	12.8
Footwear	4	21.1	10	52.6	5	26.3
Compounds/retread materials	9	42.9	10	47.6	2	9.5
Total	137	40.3	172	50.6	31	9.1

7.5.7 Question 7: Volume of Export Sales: A relatively large number of companies provide no information on the volume of factory production they sell into export markets. This makes interpretation of the data in Table 7.12 somewhat problematic. A small number of firms record that they have no export sales but produce to supply the domestic market. On the other hand, 156 companies provide no details of the amount of production they export. As may be observed when the next survey question is addressed, many of these enterprises do in fact sell into overseas markets. However, it seem reasonable to assume

that at least a proportion of firms in the 'no record' category produce solely for the market in Malaysia.

Table 7.13

Exports as Percentage of Production
Number of Companies

Sector	Over 50%	Less than 50%	No exports	No record
Pneumatic tyres	0	2	0	1
Motor cycle tyres/inner tubes	1	4	3	5
Dipped products	77	0	0	34
Latex other products	5	2	0	9
Industrial products	31	23	3	53
Low tech products	14	3	1	29
Footwear	1	4	0	14
Compounds/retread materials	5	5	0	11
Total	134	43	7	156

Given the reservations expressed in the previous paragraph, an examination of Table 7.13 suggests clear differences among the eight sectors in respect of export sales as a proportion of total production. All the 77 firms that provide data in the latex dipped products sector export more than half of factory output, indicating that this class of manufacturer produces almost exclusively for the export market. A majority of business concerns in the industrial intermediate products, low technology general goods and other latex products classes also sell more than 50 per cent of production overseas. Those sectors that produce mainly for the domestic market are pneumatic tyres, motor cycle and inner tubes, and footwear while the result is inconclusive for manufacturers of compounding and retreading materials. When taken as a whole the rubber manufacturing industry is strongly export-oriented with 134 companies (73 per cent) out of the 184 that provide information selling more than half of their total production into markets in foreign countries.

7.5.8 Question 8: Number of Export Companies: Out of 340 companies in the survey, 273 firms (80 per cent) give information on their export markets in different parts of the world whereas 67 firms do not publish any data on export sales. The figures in Table 7.14 show that from 60 per cent to 100 per cent of companies in each sector undertake sales in markets overseas. The data strongly support the conclusion to Question 7 that the rubber manufacturing industry is export-oriented.

Table 7.14

Number of Exporting Companies

Sector	No. companies	%	No record	%
Pneumatic tyres	3	100.0	0	
Motor cycle tyres/inner tubes	9	69.2	4	30.8
Dipped products	105	94.6	6	5.4
Latex other products	12	75.0	4	25.0
Industrial products	86	78.2	24	21.8
Low tech products	31	66.0	16	34.0
Footwear	12	63.2	7	36.8
Compounds/retread materials	15	71.4	6	28.6
Total	273	80.3	67	19.7

7.5.9 Question 9: Export Markets: The data in Tables 7.14, 7.15 and 7.16 reveal that there are differences in export sales strategy among individual sectors of the rubber products industry. Although the pneumatic tyre sector exports less than 50 per cent of production (see Section 7.5.7) the figures in Table 7.15 show that two manufacturers export into all six markets and the other firm sells tyres in five markets. The most important market for the dipped goods class of producer is the European Union with 99 out of 105 exporters selling into this market. ASEAN is the most significant overseas market for the

industrial products sector making automotive and engineering components. Out of 86 firms that report export sales, 73 businesses supply nearby markets in the regional grouping of South East Asian nations. Markets in the less developed regions of the world are of greater importance to the other five production sectors. All 15 exporters of compounding and retreading products sell into the rest of the world as do the majority of exporting firms in other sectors. The markets in Australia and New Zealand, and developing economies are of equal importance to producers of latex goods other than items made by the dipped line process.

Table 7.15

Export Markets/ Number of Exporting Companies

Sector	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	Asean	Rest of world
Pneumatic tyres	2	3	3	3	3	3
Motor cycle tyres/inner tubes	1	6	2	6	7	8
Dipped products	89	99	74	52	50	83
Latex other products	9	11	11	12	10	12
Industrial products	38	41	41	41	73	57
Low tech products	17	21	21	16	19	24
Footwear	2	5	4	6	6	10
Compounds/retread materials	5	7	11	10	10	15
Total	163	193	167	146	178	212

Examination of the data demonstrates that Malaysian-based manufacturers sell into markets across the globe and that the rubber manufacturing industry, when taken as a whole, is not reliant on any one export market. More Malaysian-based exporters, 212 in total, supply manufactured goods to other newly industrializing and developing countries in the 'rest of the world' than to markets in the industrialized Far East and West. The next two important markets, in terms of the number of companies that undertake export activities, are the EU

and ASEAN. A marginally smaller number of exporters sell into the North American, Japanese/South Korean and Australian/New Zealand markets. The overall conclusion is that export sales are widely based and that South/South trade is important to Malaysia.

Table 7.16

Export Markets/ Percentage of Exporting Companies

Sector	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	Asean	Rest of world
Pneumatic tyres	66.7	100.0	100.0	100.0	100.0	100.0
Motor cycle tyres/inner tubes	11.1	66.7	22.2	66.7	77.8	88.9
Dipped products	84.8	94.3	70.5	49.5	47.6	79.0
Latex other products	75.0	91.7	91.7	100.0	83.3	100.0
Industrial products	44.2	47.7	47.7	47.7	84.9	66.3
Low tech products	54.8	67.7	67.7	51.6	61.3	77.4
Footwear	16.7	41.7	33.3	50.0	50.0	83.3
Compounds/retread materials	33.3	46.7	73.3	66.7	66.7	100.0

8.6 Conclusion

Analysis of data recorded by 340 manufacturing firms in the eight production sectors in the survey shows that the rubber products manufacturing industry is highly differentiated in term of ownership, size of enterprise and export sales. However, when the industry is taken in the round some common trends may be discerned. Some 80 per cent of firms are Malaysian-owned and operated. The majority of local companies (approximately 80 per cent) are owned by ethnic Chinese private investors with only a small number of enterprises owned by private Malay and Indian interests, or controlled by public listed companies. Companies with overseas capital involvement, either as wholly owned subsidiaries of foreign companies or in joint venture with Malaysian interests, account for 20 per cent of the industry. The Far Eastern industrialized economies of Japan and South Korea are jointly the most important source of foreign investment, followed by countries of the European

Union. Direct foreign investment is greatest in the automotive, engineering and industrial sector with almost 30 per cent of companies having overseas involvement.

Most companies were established after 1985 when the First Industrial Master Plan formulated by UNIDO became operational, although a small number of manufacturing concerns can trace their roots to colonial times and the early years of independence.

The majority of businesses are classified as small to medium-sized enterprises although there are differences among the production sectors. The three automobile tyre makers are substantial businesses by any standards and large companies are in the majority in the latex dipped products sector.

The industry is strongly export-oriented. The majority of firms, 134 in total export, more than 50 per cent of factory production, compared to 43 firms that sell less than half of their output overseas. Only seven companies report that they produce solely for the domestic market. Information on export markets is provided by 273 enterprises, or 80 per cent of companies in the analysis. Export sales are widely based and the industry is not overly dependent on any single market. The most significant export market is not in the industrialized countries but in the developing economies of the 'rest of the world' and neighbouring countries in ASEAN. The evidence is that South/South trade is important to Malaysian exporters. A greater number of firms export to the EU than other developed economies in USA/Canada, Japan/South Korea and Australia/New Zealand. However, these figures do not reflect the value of exports that are sold into each market although the

Malaysian Rubber Export Promotion Council indicates that the two largest markets in terms of export revenues are the USA and European Union.

The following two chapters extend the analysis in depth by examining each sector in more detail and making a comparison between wholly owned Malaysian companies on the one hand, and foreign and joint venture business enterprises on the other. Chapter 8 considers the case of manufacturers of automotive, engineering and industrial intermediate products in the industrial products sector and Chapter 9 has an analysis of companies in the other seven production sectors.

Chapter 8

Industrial Products Sector: Results and Analysis

8.1 Introduction: Chapter 8 undertakes an in-depth examination of manufacturing companies producing intermediate components for automotive, engineering and other manufacturing industries. It analyses secondary data published in the *Malaysian Rubber Board Directory: 2006 – 2007* and *Malaysian Rubber Products Manufacturers' Association Directory: 2006 – 2007*, and primary data collected by means of a questionnaire survey in 2006. The focus of the analysis is on a comparison between manufacturers with direct foreign investment and those wholly owned by Malaysian business interests. There are eight questions put forward for answer in the investigation of secondary information and 14 questions posed in the questionnaire. Details of the questions are presented in Chapter 6 on research methodology. The results of the analysis of secondary data are presented in Appendix 2, Tables A1.1 to A1.8b.The questionnaire is to be found in Appendix 1.

The sector is large, with 110 firms making industrial components and intermediate products for supply to manufacturing companies in the automotive, mining, civil construction, engineering and other production industries. Tables 8.1 and 8.2 show the range of products manufactured by companies in the sector. It should be noted that most firms manufacture a range of products, whereas a number specialize in the production of a particular product.

Table 8.1

Automotive Components

Products	No. of Companies
Automobile bushings	28
Automobile seals	24
Bumpers	5
Car mats	17
Engine mountings	13
Radiator hoses	5
Steering, driveshaft boots	7
Weatherstrip	7
Wiper blades	3
Motorcycle parts	8
Railway components	8

Table 8.2

Engineering and Industrial Components

Products	No. of Companies
Rubber to metal bonded parts	29
High precision products	5
Construction/civil engineering products	19
Electrical/electronic components	55
Mining industry parts	13
Anti-vibration mounts	10
Belting	4
Bridge bearings	9
Dock fenders	8
Hoses	19
Insulated cables	2
Seals and gaskets	36
Rollers, industrial	12
Rollers, printing	11
Tank lining	10
Water stops	5

8.2 Secondary Data

8.2.1 Question 1: Ownership: There is a strong overseas presence, with 32 business enterprises (29 per cent) being either fully foreign-owned or in joint venture with Malaysian interests, compared to 78 locally owned companies (71 per cent) out of the total of 110 manufacturing concerns. The industrial components sector has a greater degree of foreign participation compared to the other production sectors.

8.2.2 Question 2: Source of Foreign Investment: The most significant source of overseas capital is Japan by far. It has investments in 22 businesses, with other countries being of lesser importance, as shown in Table 8.3.

Table 8.3

Source of Foreign Investment

Source of Investment	Number of Companies
Japan	22
European Union	4
USA	1
Australia	1
Singapore	2
Taiwan	2

It is significant that Malaysia has attracted inward investment from two Newly Industrialized Economies, Singapore and Taiwan. Four EU countries have investments in the industrial components sector, namely Denmark, Germany, Italy and the United Kingdom. Details of these companies are provided in Table 8.4 as an example of the types of specialist products manufactured by the foreign and joint venture sub-sector. Alfagomma-Mardec and Pong Codan are joint venture enterprises between Malaysian interests and the Italian transnational, Alfagomma and the Danish Codan Gummi company

respectively. Gummi Metall Technik and Linatex are wholly owned subsidiaries of German- and British-based international manufacturers.

Table 8.4

European Union Investments

Company	Source of foreign investment	Main Products
Alfagomma-Mardec	Italy	Hydraulic hoses
Gummi Metall Technik	Germany	Anti-vibration rubber to metal bonded products
Linatex Rubber Products	UK	Abrasion and corrosion resistant lining and sheeting, Mine slurry pumps
Pong Codan	Denmark	Moulded automotive components Extruded weatherstrip, hoses

8.2.3 Question 3: Date of Establishment:

Table 8.5

Year of Incorporation

Ownership	Year	Frequency	Per cent
Malaysian	before 1970	4	5.1
	1970 – 1984	28	35.9
	1985 – 2005	39	50.0
	no record	7	9.0
Foreign/ joint venture	before 1970	1	3.1
	1970 – 1984	2	6.3
	1985 – 2005	29	90.6

Two firms, the Malaysian-owned Shum Yip Leong Rubber Works and the British controlled Linatex Rubber Products, were established in the 1920s with another three local firms, Kinta Rubber Works, Swan Rubber Products and Universal Cable founded before 1970. Between 1970 and 1984, under the New Economic Policy 28 Malaysian businesses

began operations, compared to only two firms with overseas financial involvement, the German-owned, Gummi Metall Technik and Kee Fatt Industries, a Malaysian-Japanese joint venture with majority investment by the local firm. As indicated in Table 8.5, the majority of the companies were incorporated after the implementation of the Industrial Master Plan in 1986. Of these 39 (50 per cent) are Malaysian and 29 (90 per cent) are firms with overseas interests, including 21 firms with finance from Japanese investors.

8.2.4 Question 4: Capitalization: A single company, Kossan Rubber Industries is quoted on the main board of *Bursa Malaysia*, the Malaysian Stock Exchange. This firm, incorporated in 1979, has RM51.7 million paid-up shares and employs 390 workers. It produces moulded and extruded intermediate goods for automotive, engineering, industrial, construction, mining and marine applications. The company has two subsidiary associate companies. Kossan Japan Rollers is a joint venture with a Japanese partner that manufactures rollers for office equipment. The wholly Malaysian-owned Kossan Latex Industries makes examination gloves for the medical and healthcare professions.

The publicly listed Kossan Rubber Industries with over RM50 million paid-up share capital is, as may be expected, much more heavily capitalized than companies that do not raise investment finance on the stock exchange. The next largest Malaysian enterprise in term of capitalization is the Jebco Group with an investment of RM20 million less, than half the amount of paid-up capital compared to Kossan Rubber Industries. Therefore, Kossan has been removed from the analysis of a comparison of capital investment in Malaysian-owned firms and those companies with foreign capital involvement. Table 8.6 shows the figures for paid-up capital in each class of company. The independent samples t-test analysis

indicates that local businesses with a mean figure of RM 2.2 million have significantly less investment than foreign and joint venture enterprises with a mean of RM6.1 million paid-up share capital.

Table 8.6

Capitalization (RM million)

	N	Minimum	Maximum	Mean
Malaysian	53	0.1	20.0	2.2
Foreign/joint venture	27	0.3	26.0	6.1

Note: Kossan Rubber Industries removed

When an examination of the ten most heavily capitalized firms, defined as those enterprises with a capitalization of RM10 million or more, is made, the results show that four local businesses fall into this classification compared to six companies with investment from overseas. Of the four local companies Seginiaga Rubber Industries, a manufacturer of weather strip and window seals, and the Jebco Group, a producer of moulded components and bonded rubber to metal parts, are private companies. The other local companies raise capital on the stock exchange, directly in the case of Kossan Rubber Industries and indirectly in the case of Mardec Polymers. The latter company was established in 2001 as a downstream manufacturing subsidiary of the publicly listed Mardec to make consumer and industrial products. The principal business of Mardec, a former government agency, is to process smallholder rubber in a chain of factories located in the rubber growing areas of the country.

Table 8.7

Heavily Capitalized Firms
RM10.0 million and more Paid-up Capital

Company	Paid-up capital	Source of investment
Malaysian firms		
Seginiaga Rubber Industries	12.5	Private
Mardec Polymers	13.7	Stock market via Mardec
Jebco Group	20.0	Private
Kossan Rubber Industries	51.7	Stock market
Foreign/joint venture firms		
Alfagomma-Mardec	10.0	Italy/Malaysia
Marutech Elastomer	10.0	Japan/Malaysia
Kozato Kizai	11.2	Japan
Technomeiji	12.5	Japan/Malaysia
Linatex Rubber Products	15.9	UK
Nichias FGS	26.0	Japan

Mardec is also the local partner with an Italian manufacturer in a joint venture enterprise, Alfagomma-Mardec that produces hydraulic hoses. Capital from Japan is invested in two joint venture companies, Marutech Elastomer and Technomeiji, with a Malaysian manufacturing group to supply automotive components to local car manufacturing industries. Kozato Kizai and Nichias FGS are wholly owned subsidiaries of Japan-based companies. They make components for the electrical/electronic sector in the case of Kozato Kisai, and gaskets for the petroleum extractive and automotive industries in the case of Nichias. Linatex, as has been noted previously, is a British rubber manufacturer that specializes in the production of abrasion and corrosion resistant products. Table 8.7 shows the details.

8.2.5 Question 5: Workers Employed:

Table 8.8

Number of Workers

	N	Minimum	Maximum	Mean
Malaysian	61	10	520	88
Foreign/joint venture	29	30	1160	234

A statistical analysis of the size of the workforce employed in local firms, and foreign and joint venture companies reveals a picture similar to the degree of capitalization in the two sectors. Malaysian companies are smaller in size than companies with foreign involvement. Companies with overseas capital employ a significantly greater number of workers than local enterprises. The mean figure for Malaysian-owned businesses is 88 employees, compared to 234 workers in joint venture and foreign firms. Table 8.8 has the figures.

Table 8.9

Large Employers
Over 500 Workers

Company	Workforce	Products
Universal Cable	520	Insulated cables
Inoac FKR	650	Office equipment rollers
Nichias FGS	720	Industrial gaskets
Nippon Wiper Blade	800	Automobile wiper blades
Yamauchi Malaysia	1160	Electrical/electronic parts

As shown in Table 8.9 a total of five companies employ a labour force of 500 or more workers; one Malaysian business and four firms with Japanese share holders. The insulated cable and wire manufacturer, Universal Cable, formerly quoted on the Kuala Lumpur stock exchange but now delisted, has a workforce of 520. Inoac FKR is a joint venture between

the Inoac Corporation of Japan and motorcycle tyre maker Fung Keong Rubber Manufactory. Nippon Wiper Blade is an offshore production facility of the eponymous company in Japan. The Malaysian subsidiary of Yamauchi Corporation makes components for the electrical and electronics manufacturing sector and is the largest employer of labour. However, the largest company in terms of the amount of capital and size of the labour force is the Japanese controlled, Nichias FGS, with RM26 million paid-up capital and 720 workers.

8.2.6 Question 6: Large and Small/Medium Enterprises:

Table 8.10

Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	12	15.4
	small/medium-scale	55	70.5
	no record	11	13.1
Foreign/ joint venture	large-scale	24	75.0
	small/medium-scale	7	21.9
	no record	1	3.1

The result of the Chi-square test to compare the number of large and small/medium-scale enterprises in each sector indicates that companies that employ capital from overseas are significantly larger in size (over RM2.5 million and/or over 200 workers) than business enterprises wholly owned by Malaysian investors. Table 8.10 shows, 75 per cent of foreign and joint venture companies fall under the large-scale category compared to a mere 15 per cent of locally owned firms, whereas 70 per cent of local businesses are classified as small and medium sized enterprises.

8.2.7 Question 7: Volume of Export Sales:

Table 8.11

Exports as Percentage of Production

Ownership	Exports	Frequency	Per cent	Valid per cent
Malaysian	95 – 100%	2	2.6	5.4
	75 – 94%	5	6.4	13.5
	50 - 74%	6	7.7	16.2
	25 – 49%	13	16.7	35.1
	less than 25%	8	10.3	21.6
	no exports	3	3.8	8.1
	total	37	47.4	100.0
	no record	41	52.6	
Foreign/ joint venture	95 – 100%	2	6.3	9.5
	75 – 94%	12	37.5	57.1
	50 – 74%	5	16.1	25.0
	25 – 49%	1	3.1	4.8
	less than 25%	1	3.1	4.8
	total	21	65.6	100.0
	no record	11	34.4	

The directories provide data on the volume of production exported to overseas markets for 34 local businesses and 21 firms employing foreign investment capital. In percentage terms these figures translate as 44 per cent of Malaysian companies and 65 per cent of joint venture and foreign-owned enterprises which give details on export sales as a percentage of factory output. Examination of the figures reveals that foreign and joint venture companies export a larger volume of production than local businesses. Thus, of those companies that undertake overseas sales, 90 per cent of firms with foreign share capital export between half and 100 per cent of their factory production, whereas the figure for Malaysian firms is 38 per cent of the total. Three local businesses report that they have no export sales and 21 firms export less than 50 per cent of total output. The conclusion to be drawn from the breakdown of export sales, detailed in Table 8.11, is that, on the whole, locally owned firms

concentrate on the supply of industrial components to manufacturing industries based in Malaysia whereas firms with foreign capital are typically more export-oriented.

8.2.8 Question 8: Export Markets:

Table 8.12

Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	28	32	24	30	50	39
Foreign/joint venture	10	9	17	11	23	18

Information on sales into individual export markets is provided by 58 local manufacturers (74 per cent) and 28 companies (87 per cent) employing overseas capital. No figures are given by 20 local and four foreign and joint venture enterprises. As has been noted above, three companies owned by Malaysian interests sell exclusively into the domestic market. The most important market for the supply of made-in-Malaysia industrial parts and components is the ASEAN market. Over 80 per cent of the companies, both local and foreign, export to the region. Second in terms of sales is the rest of the world with two-thirds of all manufacturing companies selling into newly industrializing and developing countries. The predominance of Japanese direct foreign investment in the sector is reflected in the figure for sales into the Japanese and South Korean market, with 60 per cent of foreign and joint venture companies supplying these two countries. Malaysian exporters are in a stronger position than companies with foreign finance for sales of products into the other industrial markets of the European Union, Australia and New Zealand and North America. Tables 8.12 and 8.13 provide details of export markets supplied by the sector.

Table 8.13

Export Markets: Per Cent

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	48.3	55.2	41.4	51.7	86.2	67.2
Foreign/joint venture	35.7	32.1	60.7	39.3	82.1	64.3

8.3 Primary Data

8.3.1 Question 1: Ownership: Out of the 25 manufacturing companies producing industrial rubber goods that submitted valid questionnaires, a total of 17 firms (68 per cent) are wholly owned by Malaysian interests, and eight firms are either joint ventures or wholly foreign-owned. There are two joint venture companies with a majority Malaysian and minority foreign financial stake; and three joint ventures with majority foreign and minority Malaysian ownership. Three foreign-owned businesses are wholly owned subsidiaries of overseas manufacturers.

8.3.2 Source of Foreign Investment: The companies with overseas involvement appear to be representative of the sector as a whole. Answers to the questionnaire show that out of the eight businesses employing foreign capital, two have investments from Japan whereas capital from the USA, EU, Australia, Taiwan and Singapore is invested in one company each. The source of foreign investment and the type of company in the joint venture and foreign-owned companies is shown in Table 8.14.

Table 8.14

Postal Survey: Source of Foreign Investment and Type of Enterprise

Type of company	No. of companies	Source of foreign investment
Joint venture: majority Malaysian-owned	1 1	Japan USA
Joint venture: majority foreign-owned	1 1 1	European Union Singapore Taiwan
Foreign-owned companies	2 1	Japan Australia

8.3.3 Question 3: Large and Small/Medium Enterprises:

Table 8.15

Postal Survey: Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	6	35.3
	small/medium-scale	11	64.7
Foreign/ joint venture	large-scale	5	62.5
	small/medium-scale	3	37.5

Table 8.15 demonstrates that 62.5 per cent of joint venture and foreign-owned enterprises are in the large-scale industry category, compared to 35 per cent of Malaysian companies. The situation is reversed when observing small and medium scale manufacturing firms: 65 per cent are Malaysian-owned and 38 per cent have foreign involvement. The result supports the conclusion of the analysis of the secondary data that companies with direct foreign investment, either as wholly owned or joint venture business enterprises are likely to be larger than companies employing only Malaysian capital.

8.3.4 Question 4: Volume of Export Sales: Examination of the questionnaires reveals that three companies are in Free Trade Zones. Free Trade Zones are tax-free enclaves that provide incentives for foreign-owned, export-oriented companies to locate their production facilities. One company is a capital-intensive, majority foreign/ minority Malaysian joint venture with investment by a major, European-based, multinational manufacturer. The other two companies are wholly owned subsidiaries of Japanese manufacturers with production facilities in Selangor. Looking at the volume of exports from the three companies located in Free Trade Zones, two manufacturers, namely the joint venture company and one of the Japanese firms, export up to 100 per cent of production whereas the other Japanese company exports between 50 and 74 per cent of its output.

Table 8.16

Postal Survey: Exports as Percentage of Production

Ownership	Exports	Frequency	Per cent
Malaysian	75 – 100%	1	5.9
	50 – 74%	5	29.5
	25 – 49%	3	17.6
	less than 25%	7	41.2
	no exports	1	5.9
Foreign/ joint venture	75 – 100%	4	50.0
	50 – 74%	2	25.0
	25 – 49%	1	12.5
	less than 25%	1	12.5

Of the joint venture and foreign-owned manufacturers, 75 per cent sell over half of their production in overseas markets, in contrast to 35 per cent of Malaysian industrial concerns. On the other hand, almost 60 per cent of Malaysian companies export less than 50 per cent of production and a single company owned by Malaysians sells only into the home market.

These figures clearly demonstrate that, of the companies in the survey, there is a relationship between ownership of manufacturing companies and the amount of production that is exported. Businesses that are foreign-owned, or have part of the capital owned by foreign investors export a greater volume of their production compared to their Malaysian counterparts. Once again, the results of the postal survey given in Table 8.16 support the conclusion reached in the examination of the secondary data.

8.3.5 Question 5: Export Markets:

Table 8.17

Postal Survey: Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	8	11	8	11	12	4
Foreign/joint venture	3	3	4	2	7	2

The figures in Table 8.17 throw up some interesting comparisons between the two categories of manufacturers of intermediate industrial goods. Firstly, despite the small size of the sample, both Malaysian producers, and foreign and joint venture industries sell into all six markets. The member countries of the ASEAN community are the most important export market for each category of producer, as is the case for the automotive, engineering and industrial sector taken as a whole. On the other hand, Malaysian companies sell proportionately more into the industrialized countries of North America and Europe, and Australian/ New Zealand markets compared to companies with foreign investment. The proportion of exports sold into the Japanese/South Korean market, and the rest of the world are the same for both classes of manufacturer. The smallest export market for

manufacturers of industrial rubber goods based in Malaysia is the rest of the world, which is not the case for the entire rubber manufacturing industry.

8.9.6 Question 6: Source of Natural Rubber:

Table 8.18

Postal Survey: Procurement of Natural Rubber: Malaysia

Ownership	Rubber purchases	Frequency	Per cent
Malaysian	100%	9	52.9
	75 – 99%	5	29.8
	50 –74%	2	11.8
	25 – 49%	1	5.8
	less than 25%	0	
Foreign/joint venture	100%	5	62.5
	75 – 99%	2	25.0
	50 – 74%	0	
	25 – 49%	0	
	less than 25%	1	12.5

Table 8.18 indicates that most Malaysian as well as foreign and joint venture producers of industrial goods use as raw material only natural rubber produced in Malaysia. There appears to be very little difference between the two categories, with five or 62.5 per cent of companies with overseas investment and nine or 53 per cent of Malaysian companies purchasing 100 per cent of Malaysian-produced natural rubber as a manufacturing input. Non-Malaysian sources of natural rubber are: Thailand that supplies raw material to eight companies; Indonesian rubber is an input for two firms; other ASEAN countries, such as Vietnam or Cambodia, supply five enterprises; and two manufacturers use natural rubber from non-ASEAN countries. One joint venture company that sources less than 25 per cent of its raw material from Malaysia purchases its natural rubber from Thailand and other

ASEAN countries. The Malaysian firm that buys most of its rubber from overseas indicates that it purchases its raw material from both ASEAN and non-ASEAN sources.

8.9.7 Question 7: Source of Synthetic Rubber: Examination of Table 8.19 indicates that 16 Malaysian producers of intermediate industrial products use synthetic rubbers in the manufacturing process, and one small manufacturer, that produces mainly low technology general goods uses, only natural rubber. On the other hand, all the foreign and joint venture companies include synthetic rubber inputs in manufacturing operations.

Table 8.19

Postal Survey: Procurement of Synthetic Rubbers

Ownership	Synthetic suppliers	Frequency	Per cent
Malaysian	100% Malaysian	9	52.9
	75 – 99%	4	23.5
	50 –74%	0	
	25 – 49%	1	5.8
	less than 25%	0	
	100% overseas	2	11.8
	no SR	1	5.9
Foreign/ joint venture	100% Malaysian	0	
	75 – 99%	1	12.5
	50 – 74%	1	12.5
	25 – 49%	1	12.5
	less than 25%	2	25.0
	100% overseas	3	37.5

Among the Malaysian companies, 13 of them, presenting slightly over 80 per cent of users of synthetic materials, purchase 75 per cent or more of their synthetic rubbers and other elastomers from suppliers based in Malaysia, compared to three firms that buy most of

these factory materials from overseas suppliers. In contrast, three-quarters of manufacturers with foreign involvement purchase 50 per cent or more of their synthetic materials from suppliers based in overseas countries, with three companies out of eight buying all of their synthetic supplies outside Malaysia. The figures demonstrate that there is a difference in purchasing behaviour between Malaysian firms on the one hand, and foreign and joint venture firms on the other. Joint venture and foreign-owned manufacturers buy most of their synthetic inputs from suppliers in overseas countries compared to their Malaysian counterparts who purchase the majority of their inputs from companies based in Malaysia.

8.3.8 Question 8: Source of Compounding Ingredients:

Table 8.20

Postal Survey: Source of Manufacture of Compounding Ingredients

Ownership	Source of manufacture	Frequency	Per cent
Malaysian	100% Malaysia	5	29.4
	75 – 99%	3	17.6
	50 –74%	3	17.6
	25 – 49%	3	17.6
	less than 25%	3	17.6
	100% overseas	0	
Foreign/ joint venture	100% Malaysia	0	
	75 – 99%	0	
	50 – 74%	1	12.5
	25 – 49%	2	25.0
	less than 25%	4	50.0
	100% overseas	1	12.5

There is generally a difference in the use and procurement of compounds between larger manufacturing concerns and smaller business enterprises, as described the Technical Appendix on manufacturing technology. Firms that operate on a large scale normally

manufacture their own masterbatches and other compounds on site with their own factory facilities. These large manufacturers typically purchase compounding ingredients in order to make custom-made compounds tailored to their own specifications. Smaller companies, on the other hand, purchase masterbatch and compounding materials from specialist manufacturers of these products and typically would include other ingredients such as fillers and accelerators in the manufacturing process.

However, bearing this caveat in mind, there is a clear difference in procurement policy between production companies employing overseas capital and those wholly owned by Malaysian capital. Among Malaysian firms, 65 per cent source over half of the compounding materials from producers of compounds and compounding ingredients based in the country. Five firms source their compounding ingredients, such as masterbatch, only from manufacturers with factories located in Malaysia. On the other hand, not a single company with foreign investment uses compounding ingredients made only by Malaysian factories. In contrast to the Malaysian-owned companies, seven out of the eight manufacturers owned by foreign and joint venture interests use as production inputs compounding ingredients made mainly in overseas countries. One firm uses compounding materials purchased exclusively from overseas sources in its factory operations.

When an examination is undertaken to compare the procurement policies between large companies owned by Malaysians and those with overseas involvement, the figures suggest that there is a difference in purchasing behaviour between the two classes of company. Three locally owned companies but only one firm with foreign participation source the greater part of their requirements for compounding ingredients from manufacturers based in

Malaysia. By way of contrast, the remaining three Malaysian firms and four out of five joint venture and foreign companies use more compounding materials produced by manufacturers in countries overseas. The results indicate that difference observed in the purchase of compounding materials is dependent on the ownership of assets rather than size of company. Tables 8.20 and 8.21 have the survey results.

Table 8.21

Postal Survey: Source of Manufacture of Compounding Ingredients
Large Companies

Ownership	Source of manufacture	Frequency	Per cent
Malaysian	100% Malaysia	0	
	75 – 99%	1	16.7
	50 –74%	2	33.3
	25 – 49%	2	33.3
	less than 25%	1	16.7
	100% overseas	0	
Foreign/ joint venture	100% Malaysia	0	
	75 – 99%	0	
	50 – 74%	1	20.0
	25 – 49%	1	25.0
	less than 25%	2	40.0
	100% overseas	1	20.0

8.3.9 Question 9: Suppliers of Compounding Ingredients: Malaysian-owned factories purchase the greater proportion of their supplies of compounding ingredients, such as masterbatch and manufacturing chemicals, from firms based in Malaysia, in contrast to foreign and joint venture manufacturers who source these materials mainly from suppliers outside Malaysia. Among the Malaysian companies 14 out of 17 buy between 75 to 100 per cent of their compounding inputs from suppliers in the country, whereas six out of eight

joint venture and foreign manufacturers buy 50 per cent or more of their compounding supplies from overseas. Table 8.22 has the details.

Table 8.22

Postal Survey: Procurement of Compounding Ingredients

Ownership	Supplier	Frequency	Per cent
Malaysian	100% Malaysia	11	64.7
	75 – 99%	3	17.6
	50 –74%	0	
	25 – 49%	2	11.8
	less than25%	1	5.9
	100% overseas	0	
Foreign/	100% Malaysia	0	
joint venture	75 – 99%	1	12.5
	50 – 74%	1	12.5
	25 – 49%	2	25.0
	less than 25%	3	37.5
	100% overseas	1	12.5

8.3.10 Question 10: Source of Machinery and Equipment: The figures in Table 8.23 show that there is no difference between the two categories of company in their purchases of manufacturing machinery. The figures reflect the fact that Malaysia lacks a sophisticated machine tool and engineering manufacturing industry that is able to supply inputs of capital machinery to other manufacturing sectors. Almost all of the manufacturing equipment used by respondents in the survey is imported from overseas manufacturers of industrial machinery, with only a small percentage being made in Malaysia.

Table 8.23

Postal Survey: Source of Manufacture of Machinery

Ownership	Source of machinery	Frequency	Per cent
Malaysian	100% overseas	13	76.5
	75 – 99% overseas	4	23.5
Foreign/ joint venture	100% overseas	6	75.0
	75 – 99% overseas	2	25.0

8.3.11 Question 11: Malaysian Rubber Board Technology: The figures in Table 8.24 clearly demonstrate that Malaysian-owned companies rely on the Malaysian Rubber Board as their source of manufacturing technology compared to firms that have foreign investment. A total of 14 out of 17 Malaysian-owned industrial concerns indicate that they use manufacturing technology developed by the Malaysian Rubber Board. A joint venture firm with majority control from Singapore uses MRB technology in contrast to the other companies with foreign participation.

Table 8.24

Postal Survey: MRB Technology

Ownership	MRB	Frequency	Per cent
Malaysian	yes	14	82.4
	no	3	17.6
Foreign/ joint venture	yes	1	12.5
	no	7	87.5

8.3.12 Question 12: Sources of Technology: The importance of the MRB as a source of manufacturing technology for Malaysian manufacturers has been highlighted in the previous paragraph. However, examination of Table 8.25 shows that this class of company

also has a heavy dependency on other sources of technology. Firstly, on manufacturing methods developed in-house on the factory floor; secondly, technology that is common knowledge throughout the industry; and thirdly, in laboratories attached to the production facilities. Technology transfer agreements with overseas manufacturers are important to only three Malaysian companies. As might be expected, the majority of joint venture and foreign-owned firms source their manufacturing technology from parent companies based overseas, although for three manufacturers in-house laboratories are important in developing production technology. Rather surprisingly, one joint venture firm indicated on the questionnaire that it uses the Standards and Industrial Research Institute of Malaysia (SIRIM) as a source of manufacturing technology.

Table 8.25

Postal Survey: Source of Technology

	Source of technology		
Ownership	Source of technology	Frequency	Per cent
Malaysian	public domain	11	64.7
	factory floor	15	88.2
	in-house lab	9	52.9
	mrb	14	82.4
	sirim	0	
	technology transfer agreement	3	17.6
Foreign/ joint venture	public domain	1	12.5
	factory floor	2	25.0
	in-house lab	3	37.5
	mrb	1	12.5
	sirim	1	12.5
	technology transfer agreement	1	12.5
	parent company overseas	5	62.5

8.3.13 Question 13: Malaysian Rubber Board Technical Advice: The response of manufacturers of industrial rubber products in each category of ownership to the question on the source of technical advice is shown in Table 8.26 and mirrors that on production technology. A total of 13 Malaysian companies use the services of the MRB for technical assistance in manufacturing operations and upgrading manufacturing technology. The same joint venture that uses MRB technology contacts the Board for advice on problem-solving in factory process procedures.

Table 8.26

Postal Survey: MRB Technical Assistance

Ownership	MRB	Frequency	Per cent
Malaysian	yes	13	76.5
	no	4	23.5
Foreign/ joint venture	yes	1	12.5
	no	7	87.5

8.3.14 Question 14: Sources of Technical Advice: Both classes of manufacturer use company-owned laboratories as a source of technical advice for problems that arise in the manufacturing process. In-house laboratory facilities are regarded as important to 70 per cent of Malaysian producers, compared to 50 per cent of foreign and joint venture companies. The internet is used for problem-solving in factory operations by both categories of producer. Six companies with foreign investment use advisory services provided by their overseas investors or through a technology licence. In contrast, only three Malaysian companies use a technology agreement licence with an overseas manufacturer for technical assistance. The responses are given in Table 8.27. As the answer to the

previous research question has shown, Malaysian manufacturers depend heavily on the technical advisory services of the MRB for help in manufacturing operations.

Table 8.27

Postal Survey: Source of Technical Assistance

Ownership	Source of technical assistance	Frequency	Per cent
Malaysian	in-house lab	12	70.6
	mrb	13	76.5
	internet	5	29.4
	technology licence	3	17.6
Foreign/ joint venture	in-house lab	4	50.0
	mrb	1	12.5
	internet	2	25.0
	technology licence	1	12.5
	parent company overseas	5	62.5

8.4 Conclusions: The automotive, engineering and industrial production sector is large and has a greater degree of direct foreign investment compared to other sectors of the rubber products manufacturing industry. There are 110 firms making intermediate products and components used in construction, mining, transport and other manufacturing industries. Companies owned by Malaysian interests comprise 78 business enterprises and overseas capital is invested in 32 manufacturing concerns. Japan is the most important source of foreign investment. The first firms were established in the 1920s. The majority of companies have been incorporated in the recent twenty-year period, 1985 – 2005.

The analysis of primary and secondary data clearly demonstrates differences in business behaviour between Malaysian-owned companies on the one hand, and joint ventures and

foreign companies on the other. There are, however, similarities in the two classes of company in three business areas: purchase of natural rubber inputs; the source of factory machinery; and export sales. Natural rubber produced in Malaysia is purchased by the majority of companies whereas manufacturing equipment and industrial machinery are sourced from overseas manufacturers. The most significant export market for industrial rubber products in terms of the number of exporting firms that supply each market is the ASEAN region.

The dissimilarities between manufacturing enterprises controlled solely by Malaysian capital and industrial concerns with investment by stakeholders in foreign countries are summarized in the concluding statements:

- Capitalization: Foreign and joint venture enterprises are significantly more heavily capitalized than local firms except for the case of the publicly listed Kossan Rubber Industries.
- Employment: Companies with overseas investment employ a significantly larger workforce than Malaysian manufacturers.
- Size of company: Joint ventures and foreign-owned companies are significantly larger in size, measured by the amount of paid-up capital and number of workers, compared to Malaysian producers.
- Volume of exports: Firms employing foreign capital export a greater proportion of production than Malaysian companies.
- Synthetic rubber suppliers: The majority of manufacturers with foreign investment buy over half of their inputs of synthetic rubbers from overseas suppliers, whereas

the majority of Malaysian producers purchase almost all their synthetics from suppliers based in the country.

- Manufacturers of compounding ingredients: Producers of rubber goods owned by foreign and joint venture companies source most of their compounding ingredients from overseas manufacturers. Most Malaysian firms purchase a greater proportion of compounding materials from manufacturers with factories located in Malaysia.
- Suppliers of compounding ingredients: The majority of Malaysian rubber product manufacturers obtain a greater proportion of their compounding materials from suppliers based in the country. Joint venture and foreign-owned manufacturers source most of their compounding inputs from overseas suppliers.
- Malaysian Rubber Board technology: Eighty per cent of Malaysian manufacturers use production technology developed by the Malaysian Rubber Board compared to a single joint venture enterprise.
- Other sources of manufacturing technology: Foreign and joint venture manufacturers typically source manufacturing technology from their overseas partners or parent companies.
- Malaysian Rubber Board technical assistance: Malaysian-owned manufacturers of industrial rubber goods rely heavily on the advisory services of the Malaysian Rubber Board in solving problems that arise during manufacturing operations and for advice on upgrading production technology.
- Other sources of technical assistance: Most manufacturers with foreign participation obtain technical assistance from their overseas parent company or joint venture partner. Technical advice provided by company-owned laboratories situated on site

is important to 70 per cent of Malaysian and 50 per cent of joint venture and foreign-owned companies.

Chapter 9

Other Manufacturing Sectors: Results and Analysis

9.1 Introduction

This chapter is more descriptive in nature than the previous one and the analysis is less rigorous than that for the industrial products sector. The analysis considers such questions as ownership, capitalization, size of workforce and exports for the remaining seven sectors. The product sectors are examined in the following order:

- pneumatic tyres
- motor cycle and bicycle tyres, inner tubes and solid tyres
- latex dipped products
- latex other products
- low technology general products
- footwear
- compounds and retreading materials.

The results of the statistical analysis for the eight survey questions covering secondary data and detailed in Chapter 6 on methodology are given in Appendix 2, Tables A2.1 to A7.8b.

9.2 Pneumatic Tyre Sector

The companies that manufacture pneumatic tyres are Continental Sime Tyres, a joint venture between the German tyre maker, Continental AG and the Malaysian conglomerate Sime Darby; Goodyear Malaysia, a subsidiary of the American tyre multinational,

Goodyear Tire and Rubber Company; and Silverstone, a wholly owned subsidiary company of the public listed Lion Group of Malaysia. Continental Sime was incorporated in 2003 when Sime Darby that had a controlling interest in the long established Dunlop Malaysia, entered into partnership with the German multinational company. The Dunlop tyre factory began operations in 1961 as a result of recommendations made by the IBRD economic mission in 1955. Goodyear Malaysia was founded in 1972 as a joint venture with the government trading arm, Pernas. It is now wholly owned by the American parent company. The local manufacturer, Silverstone was established in 1988 after the Industrial Master Plan had recommended the expansion of the tyre making sector in the country.

All three manufacturers produce radial and crossply tyres for passenger and commercial vehicles, and tyres for farm tractors that are sold in Malaysia and overseas export markets. In addition, Continental Sime makes massive earthmover tyres for heavy equipment used in the construction and mineral excavation industries, whereas Silverstone concentrates on the production of tyres for four-wheel-drive vehicles, and has facilities to produce high performance motor racing and rally tyres.

Table 9.1

Pneumatic Tyre Companies

Company	Ownership	Year Established	Paid-up Capital (RM million)	No. of Employees
Continental/ Sime	Germany/ Malaysia	1961 (2003)	231.5	3054
Goodyear	USA	1972	10.5	730
Silverstone	Malaysia	1988	200.3	1040

Tyre manufacture is a capital-intensive enterprise undertaken in large automated factories employing hundreds of workers, as illustrated in Table 9.1. Both Continental Sime and Silverstone are highly capitalized with paid-up investments of over RM200 million (US$50 million) each. On the other hand, Goodyear Malaysia has RM10.5 million (less than US$3 million) invested as paid-up capital, which perhaps is a reflection of the desire to keep executive and financial control firmly in the hands of the US parent company. The largest company in terms of investment and employment is the German/Malaysian joint venture that operates on two production sites, compared to the other two firms that each has a single factory. The technology of tyre fabrication is supplied by the German and American parent companies in the case of the two companies with overseas equity, whereas it is reported that Silverstone has a technology agreement with the British specialist tyre manufacturer, Avon.

Besides supplying original equipment tyres to local automobile manufacturers and assemblers, and selling replacement tyres in the domestic market, the Malaysian tyre sector is a major exporter, with sales to countries across the globe from Australia and islands in the Pacific to Zambia and Zimbabwe in Africa. Two companies, Silverstone and Continental Sime indicate that they export 40 per cent of production; however, no details of volume of exports are provided by Goodyear Malaysia. The entry for Goodyear in the MRB directory shows that the company exports to 20 countries in five continents, whereas Continental Sime and Silverstone state that their export market is worldwide but provide no further details. Fuller information is provided in the Federation of Malaysian Manufacturers trade directory for 2003. This publication provides a list of the individual countries that

import tyres from Silverstone and Dunlop which at the time was listed on the Kuala Lumpur stock exchange. Table 9.2 summarizes the number of export markets and countries from the two directories, and a more detailed breakdown is given in Table 9.3.

Table 9.2

Pneumatic Tyre Sector: Export Markets and Countries

Company	Export Markets	Countries
Dunlop a)	11	78
Goodyear b)	8	20
Silverstone a)	11	49

Source: a) FMM Directory 2003; b) MRB Directory 2006

The analysis has divided the world into 11 geographical regional markets and recorded the number of importing countries in each region. The figures indicate that Goodyear is not as strong in export markets, both in terms of the number of markets and number of countries within each market, as the wholly owned Malaysian firms. However, this situation is hardly surprising given that the US-controlled Goodyear is part of a multinational company with subsidiaries and production facilities in the majority of markets for tyres. Even within ASEAN, for example, Goodyear has long established subsidiary companies and tyre factories in Indonesia, Thailand and the Philippines. Goodyear Malaysia does, in fact, export to other countries in South East Asia but obviously is constrained in the type and volume of tyres it is able to export to these ASEAN neighbours. Dunlop Malaysia and Silverstone, on the other hand, have been free to pursue an expansionary export strategy and have built up strong international market share, particularly in Europe, the Middle East and sub-Saharan Africa. The performance of Dunlop in exporting made-in-Malaysia tyres to 78 countries in all parts of the world is remarkable. So too are the export sales of

Table 9.3

Pneumatic Tyre Sector: Export Markets: Detailed Breakdown

Company	Export Market/Number of Countries										
	ASEAN	China/ Far East	Australia/ Pacific	Indian sub-continent	Middle East	Russia/ Central Asia	North Africa	Sub-Saharan Africa	Europe	North America	South America
Dunlop a)	9	5	5	6	13	2	3	12	16	1	6
Goodyear b)	3	4	3	4	1	0	0	1	2	0	2
Silverstone a)	4	4	3	3	8	1	4	10	9	1	2

Source: a) FMM Directory 2003
b) MRB Directory 2006

Silverstone in building up a world wide market for a new brand of tyre only 20 years since the company began operations.

9.3 Motor cycle/Bicycle/Solid Tyre and Inner Tube Sector

Out of the 13 firms in this sector, 12 are wholly Malaysian-owned and one manufacturer of castors is a wholly owned subsidiary of Nansin Company of Japan. The tyre and tube maker, Fung Keong and the inner tube producer, Sun Yuen were established in 1939 and 1956 respectively; five local firms were incorporated between 1970 and 1984 when the New Economic Policy was in force; and the remaining six businesses after 1985 when the first Industrial Master Plan was implemented.

The Japanese company and three Malaysian companies are classified as large-scale businesses whereas nine locally owned firms are small/medium enterprises in terms of paid-up capital and number of workers. Fung Keong is the largest local company in terms of paid-up capital with an investment of RM20 million but it employs only 60 workers, compared to RM30 million paid-up capital and 190 employees for the Japanese-owned company. The largest employer by far is Everthrough Rubber Products, a manufacturer of inner tubes that has 550 workers on the payroll and paid-up capital of RM10 million.

Table 9.4

Motor cycle/Bicycle/Solid tyre/Inner tube Sector: Export Markets
Malaysian Companies

USA/ Canada	European Union	Japan S Korea	Australia/ N Zealand	Asean	Rest of world
1	6	1	6	7	8

There is a domestic motor cycle manufacturing industry that provides a market for original equipment tyres and there is a substantial market for replacement tyres within Malaysia. Three local businesses sell all of their factory output into the domestic market. In terms of exports, the inner tube maker, Everthrough Rubber Products sells 60 per cent of its production overseas, and three companies export between 20 and 40 per cent of production. The Japanese NSG company makes castor wheels that it exports solely to Japan. Malaysian exporters, on the other hand, export to the USA, European Union, Australia/New Zealand, ASEAN countries and the rest of the world, including countries in the Middle East and sub-Saharan Africa as well as Pakistan, Brazil and South Africa. Table 9.4 shows the overseas markets supplied by Malaysian companies and the number of firms that sell into each export market.

9.4 Dipped Goods Sector

There are a total of 111 companies in the dipped goods sector. Table 9.5 shows the range of products made by the dipped latex line process. Some companies are manufacturers of a range of dipped goods whereas others are business enterprises making only one product. Latex gloves are used extensively in the medical, dental and healthcare sectors, and in manufacturing industries requiring a sterile or hygienic environment, such as food preparation and the manufacture and assembly of electronic equipment.

Table 9.5

Latex Dipped Goods

Products	Number of Companies
Medical examination and surgical gloves	60
Household gloves	23
Industrial gloves	29
Clean room gloves, finger cots	21
Catheters and surgical tubes	7
Condoms	15
Feeding teats and babies' dummies	3
Toy balloons	6
Swimming caps and pool socks	3

The breakdown in terms of ownership is 88 Malaysian-owned firms (four publicly listed and the rest privately owned), and 23 enterprises with foreign capital investment either as wholly owned subsidiary companies or in joint venture with Malaysian partners. The directory entries show that the majority of companies were established after 1985 because of the explosion in demand for medical examination gloves and condoms as a result of the spread of AIDS and HIV infection detected first in the USA then in other countries across the globe. A total of 86 businesses were set up after 1985, of which 70 were local companies and 16 were foreign or joint venture enterprises. A total of 14 firms, seven local and seven with overseas participation, were founded between 1970 and 1984 but no company making dipped goods began operations before 1970.

Table 9.6

Dipped Goods Sector: Foreign and Joint Venture Companies

Company	Source of investment	Products
Ansell	Australia	Medical, household and industrial gloves
Skellerup	New Zealand	Toy balloons, swimming caps, pool socks
Bard	USA	Catheters, urological tray kits
Bonric	USA	Medical and clean room gloves
Cardinal Health	USA	Medical and clean room gloves
Flexitech	USA	Medical and clean room gloves
Interworld Technology	USA	Clean room gloves, finger cots
Rusch Manufacturing.	USA	Catheters, endotracheal tubes, nasal canulae
Everts	Germany	Toy balloons
Medical-Latex	Germany	Condoms
Richter Rubber	Germany	Condoms
Mapa Gloves	France	Household and industrial gloves
Marigold Industrial	France	Household and industrial gloves
Unomedical	Denmark	Catheters, endotracheal tubes, tracheostomy tubes
Regent Hospital Products	Sweden	Medical gloves
Dongkuk Techno Rubber	South Korea	Medical and food industry gloves
Sagami Manufacturers	Japan	Condoms
Sanchem Corporation	Japan	Medical and industrial gloves
Shorubber	Japan	Industrial gloves
Sumirubber	Japan	Household and industrial gloves
Suzuki Latex	Japan	Clean room finger cots
WRP Asia Pacific	Private investors (USA/UK)	Medical and industrial gloves
WRP Sinetimed	Private investors (USA/UK)	Clean room gloves, finger cots

Table 9.6 shows the products manufactured by joint venture and foreign-owned companies. Investment from overseas sources is more or less evenly distributed among the United States (6 firms), the European Union (7 firms) and Japan/South Korea (6 firms) with two companies with investment from Australia/New Zealand and another two businesses owned by international private investors including Malaysian interests. The breakdown in

companies controlled by foreign investors is for the year 2005 as published in the MRB directory.

Table 9.7

Dipped Goods Sector: Malaysian Companies

Number of companies	Products
55	Examination, surgical and clean room gloves
11	Household and heavy duty industrial gloves
11	Condoms
3	Catheters
3	Toy balloons
2	Baby teats
2	Swimming caps, pool socks
1	Medical breathing bags

In contrast, Malaysian-owned businesses are mainly concerned with the production of examination and surgical gloves for the medical and dental professions, and clean room gloves and finger cots used by workers in industries processing food and the manufacture and assembly of electrical and electronic products. Table 9.7 shows the range of latex products manufactured by local companies.

Two companies are in statistical terms 'extreme outliers' when examined from the viewpoint of capitalization. APL Industries (formerly Asia Pacific Latex) is a public listed company on the main board of the Malaysian Stock Exchange. The company produces latex examination gloves for the medical, dental and healthcare industries in three factories in Malaysia. Its paid-up capital totals RM374.6 million and it employs 1500 workers. WRP Asia Pacific, previously known as Wembley Rubber Products, is a multinational company

owned by Malaysian private investors, and international private equity and investment funds including American and British fund management companies. The business is a leading manufacturer of medical and industrial contamination control glove products for glove suppliers selling under their own brand name. WRP Asia Pacific has RM385 million paid-up capital investment and 2500 employees. The firm produces latex gloves on three sites in Malaysia and has regional sales offices in Europe, USA and Latin America. Both APL Industries and WRP Asia Pacific have manufacturing facilities in other ASEAN countries. APL Industries has a factory in Vietnam, and WPR Asia Pacific produces gloves in Indonesia, as well as southern China. These two companies have been removed from the data base when undertaking the t-test statistical analysis for capitalization because of their very large amount of investment capital compared to other companies in the dipped latex products sector. This is because to include these two 'outlier' businesses would distort the results of the analysis.

In addition to the publicly listed APL Industries, there are another four latex glove companies that are quoted on the Malaysian Stock Exchange. These companies are larger in terms of capitalization and the number of workers they employ than other locally owned firms therefore they have been placed into a separate category for purposes of analysis. Details of the listed companies are given in Table 9.8. The largest firm is Top Glove Corporation that employs 6500 workers, and has seven factories in Malaysia as well as manufacturing facilities in Thailand and southern China.

Table 9.8

Dipped Goods Sector: Public Listed Companies

Company	Paid-up capital RM m	Number of workers	Number of factories Malaysia	Number of factories overseas
APL Industries	374.6	1500	3	1
Rubberex	nr	1000	1	0
Seal Polymer	70.5	2000	2	0
Supermax	89.8	nr	6	0
Top Glove	94.2	6500	7	3

nr = no record

Table 9.9

Dipped Goods Sector: Capitalization (RM million)

	N	Minimum	Maximum	Mean
Public listed	3	70.5	94.3	84.9
Foreign/joint venture	19	0.5	120.0	19.7
Non-public listed	68	0.2	28.0	3.1

The results of the statistical analysis (independent-samples t-test) show that companies with a stock market quotation have greater amounts of capital investment than foreign and joint venture enterprises. On the other hand, when a comparison is made between Malaysian companies that are not listed on the stock market and foreign and joint venture firms then the position is reversed. In this case, companies with investment from overseas sources are more heavily capitalized than local businesses. Table 9.9 shows the figures.

Table 9.10

Dipped Goods Sector: Number of Workers

	N	Minimum	Maximum	Mean
Public listed	4	1000	6500	2750
Foreign/joint venture	21	80	3055	820
Non-public listed	77	20	1200	283

A similar exercise was undertaken to compare the number of workers employed by public listed Malaysian companies, local firms owned by private capital, and joint venture and foreign-owned enterprises. Table 9.10 indicates that there are substantial differences among the three classes of company. Firms quoted on the Kuala Lumpur stock market typically employ more workers than joint venture and foreign-owned businesses, which in turn, generally have a larger workforce than privately owned firms. However, only the difference between private local firms and those with foreign capital are statistically significant. There is no statistically significant difference between the mean figure of 2750 for the four public listed companies and the mean of 820 workers employed by joint venture and foreign firms.

Table 9.11

Dipped Goods Sector: Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	45	51.6
	small/medium-scale	39	44.3
	no record	4	4.5
Foreign/ joint venture	large-scale	19	82.4
	small/medium-scale	3	13.0
	no record	1	4.3

Table 9.12

Dipped Goods Sector: Exports as Percentage of Production

		Frequency	Per cent	Valid per cent
Malaysian	95 – 100%	43	48.9	74.1
	75 – 94%	13	14.8	22.4
	50 - 74%	2	2.3	3.4
	total	58	65.9	100.0
	no record	30	34.1	
Foreign/	95 – 100%	13	56.5	68.4
joint venture	75 – 94%	5	21.7	26.3
	50 – 74%	1	4.3	5.3
	total	19	82.6	100.0
	no record	4	17.4	

When a comparison is made between the number of large-scale and small/medium-scale enterprises (over RM2.5 million paid-up capital and/or over 200 employees) for the 88 Malaysian (public and private) and 23 foreign and joint venture firms, the results show that companies with overseas capital are significantly larger in size than their Malaysian counterparts. Table 9.11 shows the frequency of results. The result of the Chi-square test for independence is statistically significant.

There appears to be no difference in the amount of factory production sold into overseas markets between the two categories of business as shown in Table 9.12. Two-thirds of Malaysian companies and over 80 per cent of firms with foreign capital provide figures on the percentage of production as export sales. All companies export more than half of their output and the great majority of cases (95 per cent) export between 75 and 100 per cent of production. These figures indicate that the latex dipped goods sector is an example of an

export-orientated industry with almost all production from the sector being sold into foreign countries.

Table 9.13

Dipped Goods Sector: Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	71	77	55	40	35	64
Foreign/joint venture	18	22	19	12	15	19

Table 9.14
Dipped Goods Sector: Export Markets: Per Cent

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	80.7	87.5	62.5	45.5	39.8	72.7
Foreign/joint venture	78.3	95.7	82.6	52.2	65.2	82.6

The conclusion that the dipped goods sector is heavily export-oriented is borne out by the data on the export markets recorded by individual companies. Out of a total of 88 Malaysian enterprises, 82 of them (93 per cent) and all 23 companies with overseas involvement report on export sales. An examination of the number of export markets and the number of local, and joint venture and foreign firms that sell into each market are made in Tables 9.13 and 9.14.

The figures indicate that each category of company sells products into markets across the world. The largest market for both local, and joint venture and foreign businesses is the European Union followed in importance by USA/Canada and the rest of the world. For

companies with overseas involvement, the Japanese and South Korean market is significant compared to locally owned firms. The figures are probably a reflection of the fact that five enterprises are offshore subsidiaries of Japanese companies. The ASEAN regional market also is of greater importance to joint venture and foreign companies compared to local firms. However, Thailand and Indonesia are major producers and exporters of dipped goods in their own right and three large Malaysian companies operate dipped goods factories in other ASEAN countries.

9.5 Latex Other Products Sector

The 16 firms in this sector are divided into 13 locally owned businesses and three companies that are either wholly owned subsidiaries of foreign firms or joint venture enterprises. The breakdown in terms of type of product and ownership is shown in Table 9.15. A small number of producers of dipped goods supplying the hospital and health care market also manufacture medical items such as latex sheets and dental dams. Two Malaysian manufacturers of foam products were incorporated before 1970, four firms were established between 1970 and 1984, the majority of companies, a total of nine firms, h6wever, began operations after the implementation of the Industrial Master Plan, 1985. One firm did not provide information regarding its date of establishment.

Table 9.15

Latex Other Products Sector: Production and Ownership

Products	Malaysian companies	Foreign/ joint venture	Source of foreign investment
Extruded latex thread	4	0	
Foam mattresses and upholstery	4	1	Netherlands
Mattresses and car seats made from rubberized coconut coir	3	0	
Latex rubber sheets, dental dams medical straps, exercise bands	2	1	USA
Latex toys	0	1	Germany

The largest firms are those that manufacture extruded latex thread used in industries making garments such as underclothes and other apparel, elasticated surgical and sports supports, and elastic netting for wrapping fresh and cooked meat products. Details of the four manufacturers of latex thread are given in Table 9.16.

Table 9.16

Extruded Latex Thread Companies

Company	Year Established	Paid-up Capital RM million	Number of employees
Filati Lastex	1988	48	90
Heveafil	1973	84	550
Rubber Thread	1990	14	140
Rubberflex	1986	22	650

Another large manufacturer is the American HCM-Hygenic Corporation, a producer of dental dams and tourniquet straps that employs 335 workers although the company does not disclose its capital investment. The Malaysian-owned company, Aerofoam that makes foam mattresses, pillows, cushions and upholstery is a substantial business with RM10.5 million

paid-up investment and 160 employees. However, the majority of the local enterprises are small and medium-scale in size with less than RM2.5 million paid-up capital and less than 200 employees, as demonstrated in Table 9.17.

Table 9.17

Latex Other Products Sector: Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	5	38.5
	small/medium-scale	8	72.7
Foreign/ joint venture	large-scale	2	66.7
	no record	1	33.3

Three elastic thread companies, Filati Lastex, Heveafil and Rubberflex record that they export basically all (95 – 100 per cent) of their factory output. The other company, Rubber Thread does not provide figures on the volume of production that is exported. However, all the manufacturers report that they export thread on a world wide scale. Rubberflex, for example, exports to over 100 countries, and Heveafil sells into North and South America, Europe, African and Asian countries, the Middle East, and Australia and New Zealand. The fully US-controlled firm, HCM-Hygenic Corporation has no directory entry for exports as a volume of factory production but the company exports to Australia, Belgium, Germany, Japan, South Korea and the USA. Overall, the figures indicate that the latex other products sector is strongly export-oriented. Those firms that provide information on export markets show that they sell into a number of markets across the world as shown in Table 9.18.

Table 9.18

Latex Other Products Sector: Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	7	9	9	10	10	10
Foreign/joint venture	2	2	2	2	0	2

9.6 Low Technology General Goods Sector

There are 38 Malaysian companies and nine firms with overseas investment that produce a range of low tech products, from pencil erasers to door stops and protective tips for furniture. Other items made by this sector include rubber bands and straps, audiovisual equipment surrounds, carpet underlay, flooring tiles, safety tiles for sports arenas and playgrounds, mats for use in bathrooms, kitchens and automobiles, swimming accessories such as swim fins and goggles, toys for children and dogs, sports balls, sealants and adhesive products. Other products made by the low tech sector include soling sheets for footwear manufacture, sole and heel units, solid tyres and compounding materials.

Out of the nine joint venture and foreign-owned businesses, seven have investment from the Far East, including five firms with share capital from Japan, and one each from South Korea and Taiwan. The other two companies are offshore operations of German companies. A subsidiary company of the Japanese tyre multinational, Bridgestone Sporting Goods produces golf balls for export to the home market in Japan. Another Japanese firm is Central Elastic Corporation, a major exporter of rubber bands and packaging straps to Europe, north America and Australia as well as Japan. Gaskets and stoppers for medical syringes and pharmaceutical containers are made by the Korean company, and the

Taiwanese firm produces loudspeaker surrounds for audiovisual systems. The pencil manufacturer, Faber-Castell of Germany concentrates its production of pencil erasers in Malaysia where it has a factory employing 450 workers that is the largest facility of its kind in the world. Adhesive tapes are produced by the German company, Tesa Tape and three local firms, Central Industrial Corporation, Loytape Industries and Sweet Tape Enterprise.

One firm Yap Hoi Kong Rubber Goods Manufacturers was established in 1962, ten Malaysian enterprises were founded between 1970 and 1984, compared to two companies with overseas involvement. However, most firms were incorporated when the Industrial Master Plans came into operation, with 19 local and six foreign and joint venture companies established after 1985.

Tables 9.19, 9.20 and 9.21 detail the size of the businesses in the sector in terms of the amount of capital investment and number of employees. The largest Malaysian business in terms of capital is a manufacturer of floor tiles, and car and door mats, LBR Industries with RM 22.5 paid-up capital, whereas the largest local employer is Loytape with 250 workers. The results of independent-samples t-tests carried out to compare the level of capitalization and number of workers in the two categories of company indicate that there is no statistically significant difference between foreign and joint venture enterprises, and local firms. The mean figure for paid-up capital in domestic companies is RM 2.6 million, compared to a mean of RM3.3 for firms with foreign capital. The mean number of workers is 70 in Malaysian businesses and 148 in foreign and joint venture enterprises.

Table 9.19

Low Tech Sector: Capitalization (RM million)

	N	Minimum	Maximum	Mean
Malaysian	22	0.1	22.5	2.6
Foreign/joint venture	6	0.4	5.0	3.3

Only 10 to 14 workers are employed in the smallest firms whereas the two largest employers, Loytape and Faber-Castell have 250 and 450 employees respectively. However, examination of Table 10.21 suggests that firms with overseas capital tend, on the whole, to be larger in size than Malaysian-owned businesses, with only five out of 32 local firms classified as large-scale compared to five out of nine for firms with overseas involvement.

Table 9.20

Low Tech Sector: Number of Workers

	N	Minimum	Maximum	Mean
Malaysian	30	14	250	70
Foreign/joint venture	8	10	450	148

Table 9.21

Low Tech Sector: Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	5	13.2
	small/medium-scale	27	71.1
	no record	6	15.8
Foreign/joint venture	large-scale	5	55.6
	small/medium-scale	4	44.4

Seven local and five joint venture and foreign companies record that they export from 75 to 100 per cent of production. Details of export sales are provided by 24 Malaysian and seven

firms with an overseas interest. Malaysian exporters are represented in all export markets from north America through Europe, the Middle East, Pakistan to China, Japan and South Korea, in the Far East. The most important markets for foreign and joint venture enterprises are Japan and South Korea which presumably is a reflection of investment by these countries in the sector. This class of business enterprise also has a strong presence in Third World and ASEAN markets. Table 9.22 provides details of the number of companies that sell into six export markets.

Table 9.22

Low Tech Sector: Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	14	18	14	13	15	18
Foreign/joint venture	3	3	7	3	4	6

9.7 Footwear Sector

There are 19 companies manufacturing a range of footwear from rubber-soled sports shoes and trainers to specialist safety boots, as well as companies making sole and heel components for manufacturers and repairers of boots and shoes. Two companies, the long established manufacturer of shoes, sandals and slippers, Bata founded in 1937 and Harvik, a safety boot manufacturer, incorporated in 1973, have investment by overseas capital. Bata was originally a Czech-owned business but now has its international headquarters in Toronto, Canada, whereas Harvik was established as a joint venture between the former British plantation group, Harrisons and Crosfield, and Norwegian interests. Of the 17 Malaysian companies, the military boot manufacturer, Kulitkraf was founded in 1968 to

supply boots to the Malaysian armed forces; five firms began operations between 1970 and 1984; and a further seven businesses were established after 1985 when the Industrial Master Plan came into force.

A full analysis of the footwear sector is hindered by the scant information on business activities provided by a number of Malaysian companies in the directory. For example, five firms give no details of either paid-up capital or their workforce, another eight do not disclose figures for capital investment although they do show the number of employees, and seven enterprises give no details of export sales. Four of the seven firms that provide no information on exports also do not give any details about their investment capital and workers. The other three companies record that they employ 15, 20 and 80 workers respectively. The conclusion to be inferred from the lack of data is that these locally owned firms are small in size and they produce footwear mainly for domestic sales in Malaysia.

Examination of the size of the workforce in Table 9.23 demonstrates that Malaysian manufacturing enterprises employ fewer workers than the two firms with foreign involvement. The mean number of workers in Malaysian companies is 92, compared to 300 workers employed by Harvik and 510 by Bata.

Table 9.23

Footwear Sector: Number of Workers

	N	Minimum	Maximum	Mean
Malaysian	12	15	171	92
Harvik/Bata	2	300	510	

Table 9.24

Footwear Sector: Large and Small/Medium-scale Enterprises

Ownership	Size	Frequency	Per cent
Malaysian	large-scale	2	11.8
	small/medium-scale	10	58.8
	no record	5	29.4
Harvik/Bata	large-scale	2	100.0

Table 9.24 also shows that most local firms are classified as small and medium sized enterprises (less than RM 2.5 million capital and/or less than 200 worker). Table 10.25 compares the two large-scale, locally owned companies, Kulitkraf, and International Footwear with Bata and Harvik.

Table 9.25

Footwear Sector: Large Firms

Company	Source of Foreign Investment	Year Established	Paid-up Capital RM million	Number of employees
Bata	Canada	1937	1.5	510
Harvik	Norway	1973	8.0	300
Internl. Footwear		1971	3.0	168
Kulitkraf		1968	7.2	170

The directory entries that show the number of businesses reporting the volume of export sales as a percentage of factory output are limited although there is more information on export markets. Harvik, the Malaysian-Norwegian joint venture is an export-oriented company that sells 97 per cent of its industrial safety boots, made for personnel in fire and rescue services, and logging and mining companies into markets, in all four corners of the world. Bata is unique in that not only is the company a manufacturer of footwear but it

owns and operates consumer retail outlets under the Bata brand in Malaysia and Singapore. The company has over 200 shops in small Malaysian towns as well as stores in shopping malls in Malaysia and Singapore that sell shoes and sandals direct to the general public. Eighty per cent of production is sold in the domestic market and the remaining 20 per cent across the causeway in the Republic of Singapore. Kulitkraf and Sepatu Timur, two manufacturers of boots for police and military forces, export ten per cent and five per cent of production respectively into ASEAN, Middle Eastern and Pacific Island countries.

Ten local companies are exporters of footwear, or sole and heel components. The most important markets for made-in-Malaysia shoes, sandals and other footwear are those countries classified as the rest of the world including China, Hong Kong and Taiwan, countries in the Middle East and island states in the Pacific Ocean; other major markets are nearby ASEAN countries, and Australia and New Zealand. Table 9.26 shows the number of manufacturers including Harvik and Bata that supply products to world markets.

Table 9.26

Footwear Sector: Export Markets

	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
All companies	2	5	4	6	6	10

9.8 Compounding and Retreading Materials Sector

There are altogether 21 firms in the sector, with 20 wholly owned by Malaysians and one joint venture with Japanese investors. There are 11 businesses which produce both retreading materials (precured treads, sidewall veneers and cushion gum) for sale to the tyre

retreading industry, and compounds and masterbatches used as factory inputs by other manufacturing companies. Seven firms are specialist compounders that restrict production to carbon black masterbatch, other masterbatches and a range of compounding materials. Three firms make products solely for tyre retreaders. Other products made by a small number of companies in the sector include solid tyres, inner tubes, tyre flaps, sports balls and moulded rubber items.

The compounder, Lam Seng Tokyo Zairyo Zeon, established in 1994, is a medium-sized, joint venture company with RM 2.45 million paid-up capital and 150 employees. It was formed by a local rubber processing company in partnership with three shareholders from Japan. Lam Seng supplies natural rubber from its SMR plant and the Japanese companies provide synthetic rubbers and compounding ingredients for the manufacture of masterbatches and compounds. The company concentrates on the production of compounding inputs for local manufacturers of tyres and tubes, and domestic firms making automotive, engineering and industrial rubber products, such as conveyor belts, hoses, weatherstrip and engine mountings.

Four of the Malaysian businesses are long established, being founded before 1970, including Nam Bee Rubber Works established in 1938. Three firms began operations between 1970 and 1985, and nine companies were incorporated during the time of the Industrial Master Plans. The level of investment ranges from RM100 thousand to RM13 million with the mean figure of RM4.3 million. The smallest firm, TKSS Masterbatch, a producer of custom-made coloured compounds, employs only 12 workers, compared to 400

in Goodway Rubber Industries, a major manufacturer and exporter of tyre retread materials. Table 9.27 shows that half of the wholly Malaysian-owned companies are classified as large in size and half are small and medium-scale enterprises.

Table 9.27

Compounding and Retreading Materials Sector:
Large and Small/Medium Enterprises Malaysian Companies

	Frequency	Per cent
Large-scale	9	45.0
Small/medium-scale	9	45.0

When the figures for overseas sales as a percentage of factory output are examined, two local manufacturers of retreading products, Goodway Rubber Industries and Tread Rubber Industries export 75 and 90 per cent of production respectively. Three firms export between 50 and 74 per cent of output, and five companies sell between a quarter and half of production into foreign markets. Fifteen enterprises undertake export sales whereas five firms provide no information on their sales to foreign buyers. All 15 firms sell into the market designated as the rest of the world. Other major markets are South Korea and Japan, Australia and New Zealand, and ASEAN, with the north American and European markets being of lesser importance as shown in Table 9.28.

Table 9.28

Compounding and Retreading Materials Sector: Export Markets

Ownership	Markets					
	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	ASEAN	Rest of world
Malaysian	5	7	11	10	10	15

9.9 Conclusion

The comparison made in this chapter between foreign and joint venture companies with firms owned by Malaysian interests indicates that generally business enterprises with overseas investment are more heavily capitalized and employ more workers than locally owned businesses. In the special case of the small number of dipped goods manufacturers quoted on the stock exchange, these publicly listed Malaysian firms are larger in size in terms of paid-up capital and number of employees than joint ventures and foreign-owned companies. Both Malaysian companies and firms with foreign involvement are strongly export-oriented and it is not possible to discern any overall difference in export sales policies even though there are differences in each of the seven sectors.

Chapter 10

Summary of Findings

10.1 Introduction

The general research question posed in the introductory chapter and repeated in Chapter 6, is on the part that the rubber manufacturing industry has played in the development of the Malaysian economy. Within this context two more specific research questions have been formulated for an investigation into the structure of the industry. The first question examines the industry taken as a whole to ascertain if there is industrial dualism between local companies and those with foreign capital investment on the basis of company size and sales to export markets. The second question relates to the automotive, engineering and industrial components sector. It is a more detailed and in-depth investigation exploring this sector's sources of technology and its linkage effects with other sectors of the economy. In addition, the question of dualism is also examined. The questions on industrial structure are

1. Is there a dualistic structure in company size and difference in export sales strategy among the product sectors of the industry based on ownership of assets?
2. In the industrial products sector, what are the differences in business behaviour in terms of structure, export sales, manufacturing technology and linkages with the local economy between wholly Malaysian-owned

companies, and those with foreign capital investment, both joint venture enterprises and companies wholly owned by overseas capital?

Chapters 7 to 9 have considered these questions in some detail and demonstrated that the industry is highly differentiated according to product sector. The purpose of the current chapter is to summarize the results obtained in the previous three chapters in order that conclusions may be drawn for the entire rubber manufacturing sector. The statistical calculations for Chapter 10 are to be found in Appendix 2, Tables A8.1 to A8.7b.

10.2 Structure

The section considers whether there is a difference in company size measured by the degree of capitalization and number of employees by comparing wholly owned Malaysian firms with foreign-owned and joint venture enterprises in order to draw a general conclusion about dualism in the rubber manufacturing industry. The mean figures for paid-up capital and the number of employees by product sector in the two categories of ownership are detailed in Tables 10.1 and 10.2.

The pneumatic car and truck tyre industry is a special case because there are only three tyre makers and the firms have a significantly larger capital investment and workforce compared to the other manufacturing sectors. Generalizations about industrial structure are hard to make because of the unique circumstances of each company in terms of control of assets and responsibility for strategic business decisions. The smallest company is the American-owned Goodyear: it employs fewer workers and is much less heavily capitalized

than the other companies. Goodyear's operations are constrained because business strategy is decided by the US parent company that has tyre manufacturing facilities across the globe. On the other hand, the Continental/Sime Darby joint venture is the largest company and employs more workers and has greater paid-up investment than the other two tyre makers. The locally owned tyre manufacturer, Silverstone employs fewer workers relative to capital investment than the two companies with foreign involvement.

In Table 10.1, under the latex industry the dipped goods companies are subdivided into privately owned and public listed companies, and the privately owned extruded thread producers have been extracted from the other products sector to occupy a separate sub-division. This is to show that the small number of enterprises listed on the Malaysian stock market in the dipped goods and industrial component sectors, and the extruded thread producers are generally more heavily capitalized and employ larger numbers of workers than companies in all the other sectors which are financed by private capital, whether Malaysian or from overseas. Two international companies, the publicly listed Malaysian, APL Industries and WRP Asia Pacific owned by international private equity are shown separately in the table on capitalization because they are extreme statistical outliers in terms of paid-up capital.

An independent samples t-test was calculated from the data presented in Table 10.1 for the whole industry as shown in Appendix 2, Table A8.2. The calculation includes the statistical outliers: pneumatic tyre sector, Malaysian public listed, dipped products companies and WRP Asia Pacific, extruded thread firms and Kossan Rubber Industries. The total number

of companies in the analysis comprises 251 cases of which 191 are Malaysian and 60 foreign and joint venture manufacturing concerns. There is no significant difference between the paid-up capital for Malaysian (mean = RM8.1 million, SD = 31.4), and foreign and joint venture companies (mean = RM20.5 million, SD = 58.5). The conclusion is that in the rubber manufacturing industries, joint venture and foreign businesses are no more heavily capitalized than enterprises owned by Malaysian investors.

Table 10.1

Rubber Manufacturing Industry
Capitalization (RM m)

	Malaysian		Foreign/Joint Venture	
	mean	n	mean	n
Tyre industry				
Pneumatic tyres	200.3	1	121.0	2
Motor cycle/solid/tubes	4.1	11	30.0	1
Latex industry				
Dipped products a)	3.15	68	19.7	19
Dipped products b)	84.9	3	19.7	19
Other products c)	2.65	6	5.4	1
Extruded thread	42.0	4		0
General products industry				
Industrial products a)	2.2	53	6.1	27
Kossan b)	51.7	1	6.1	27
Low tech products	2.6	22	3.3	6
Footwear	3.1	4	4.7	2
Compounds/retreads	4.3	17	2.4	1
Outlier companies	374.6	1	385.0	1
Total industry 251 companies	8.1	191	20.5	60

a) = Malaysian private companies
b) = Malaysian public listed companies
c) = extruded thread companies excluded

However, when the outlier cases are removed from the calculation to test for statistical independence a very different result is obtained. There are 238 companies after excluding outlier companies of which 181 are controlled by local capital and 57 have a foreign capital involvement. In this analysis there is a significant difference between paid-up capital for Malaysian (mean = RM2.9 million, SD = 4.3) and joint venture and wholly foreign-owned companies (mean = RM10.6 million, SD = 18.4). The results demonstrate that after removing the 13 outlier companies the conclusion may be drawn that joint venture and foreign enterprises have more capital investment compared to business concerns owned by Malaysian investors. The different conclusions reached in the two calculations, depending on whether statistical outliers are included in or excluded from the analysis, confirm the relevance of the discussion in Chapter 6 on research methodology. In Chapter 6, Section 6.25 that deals with issues in statistical analysis the statement is made that the t-test for independence is sensitive to outliers and the inclusion of outliers (in the analysis only 13 cases) can distort the results and so lead to an erroneous conclusion being reached.

There are 292 companies that provide information on the number of employees, including the outlier pneumatic tyre, listed dipped products, WRP Asia Pacific and extruded thread manufacturers. Analysis of these companies using the independent samples t-test shows that foreign and joint venture companies employ a statistically significant greater number of workers than local firms. There are 66 businesses with foreign capital employing a mean figure of 462 workers, compared to 226 enterprises controlled by domestic interests that have a mean labour force of 211 employees. The results of the analysis are given in Appendix 2, Table A8.3.

Table 10.2

Rubber Manufacturing Industry
Number of Workers

	Malaysian		Foreign/Joint Venture	
	mean	n	mean	n
Tyre industry				
Pneumatic tyres	1040	1	1892	2
Motor cycle/solid/tubes	128	12	190	1
Latex industry				
Dipped products a)	283	77	820	21
Dipped products b)	2750	4	820	21
Other products c)	78	8	188	2
Extruded thread	358	4		0
General products industry				
Industrial products d)	88	61	234	29
Low tech products	70	30	148	8
Footwear	92	12	405	2
Compounds/retreads	108	17	150	1
Total industry 292 companies	211	226	462	66

a) = Malaysian private companies
b) = Malaysian public listed companies
c) = extruded thread companies excluded
d) = public listed Kossan included

An axiom in the study of industrial economics is that in the production process the firm uses capital and labour, depending on the relative cost of each factor, in a bid to maximize profits or minimize costs. Thus a manufacturing enterprise may adopt a high technology, capital-intensive mode of production and employ relatively few workers. Alternatively a manufacturer may employ a large workforce and rely on a less capital-intensive factory operations in situations where the cost of wage labour is relatively cheap compared to capital. It is possible to use the mean figures for capital and labour in Tables 10.1 and 10.2 to calculate the amount of capital employed per worker as an approximation of capital/labour ratio for the rubber manufacturing industry as a whole. The mean figures for

Malaysian businesses are RM8.1 million paid-up capital and 211 workers. For foreign and joint venture companies the figures are RM20.5 million and 462 employees. Calculation of the capital/labour ratio shows that for local firms each unit of labour employs RM38.4 thousand paid-up capital whereas for firms with overseas investment the ratio is one worker per RM44.4 thousand capital investment. The conclusion is that although joint venture and foreign-owned firms employ more workers than Malaysian companies they invest a greater amount of capital per worker than local firms. These figures, therefore, suggest that the labour productivity of foreign and joint venture enterprises is higher compared to Malaysian-owned manufacturing concerns.

Table 10.3

Large and Small/Medium-scale Enterprises

	Malaysian		Foreign/Joint Venture	
	Large	SME	Large	SME
Tyre industry				
Pneumatic tyres	1	0	2	0
Motor cycle/solid/tubes	3	9	1	0
Latex industry				
Dipped products	45	39	19	3
Other products	5	8	2	0
General products industry				
Industrial products	12	55	24	7
Low tech products	5	27	5	4
Footwear	2	10	2	0
Compounds/retreads	9	9	0	1
Total (Per cent)	82 (34)	157 (66)	55 (79)	15 (21)

In Table 10.3, 309 firms out of the total survey population of 340 companies in all product sectors have been placed into two categories of large-scale enterprises and small/medium-

scale enterprises. The figures demonstrate that 79 per cent of foreign companies and joint ventures are classed as large, compared to 34 per cent of Malaysian firms. Statistical analysis using the Chi-square test for independence (Appendix 2, Table A8.4) indicates a significant difference in size between the two classes of company. The conclusion is that the proportion of large-scale foreign and joint venture companies is significantly higher than the proportion of large-scale Malaysian companies.

The conclusion to be drawn is that the analysis has confirmed the assertions made by UNIDO and the MRB that there is a dual structure in the rubber manufacturing sector with firms employing overseas capital being larger in size than Malaysian companies. Foreign and joint venture companies are more heavily capitalized and employ a greater number of workers than wholly Malaysian-owned business enterprises. The statement is supported by the results of statistical analysis using the parametric t-test for independence and non-parametric Chi-square test.

10.3 Export Sales

The most important export sector is the latex products industry that accounts for 75 per cent by value of total exports. Latex products are sold mainly into the American and European markets. Companies that manufacture general rubber products account for 17 per cent of the value of exports whereas the tyre and inner tube sector accounts for seven per cent of export revenues. Data on the volume of factory production sold into export markets are provided by 178 manufacturers in all product sectors. The breakdown is 129 local concerns and 49 joint venture and foreign companies. When a comparison is made between the

categories, a clear difference in business strategy is observed. In the case of companies employing foreign capital, 90 per cent of firms export 50 per cent or more of production, compared to 70 per cent of businesses owned by Malaysians as shown in Table 10.4. The conclusion is that foreign and joint venture enterprises export a greater volume of factory output than local firms, even though more than two-thirds of Malaysian firms export more than half of total production. This, however, is not the case for manufacturers of dipped goods and extruded thread in the latex industry. The Malaysian-owned thread companies export basically all of their production, as do foreign-owned and local producers of latex gloves and medical items such as condoms and catheters.

Table 10.4

Exports as Percentage of Production

Exports	Malaysian		Foreign/joint venture	
Over 50%	91	70%	44	90%
Less than 50%	38	30%	5	10%
Total	129		49	

There are 208 Malaysian and 65 joint venture and foreign companies that provide data on the markets in which they make export sales. The frequency of the companies that sell into each market is shown in Table 10.5 and these data expressed as a percentage figure for the six export markets are given in Table 10.6.

Table 10.5

Export Markets/ Number of Exporting Companies

Sector	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	Asean	Rest of world
Malaysian	128	154	118	115	133	164
Foreign/joint venture	35	39	49	31	45	48

Table 10.6

Export Markets/ Percentage of Exporting Companies

Sector	USA/ Canada	European Union	Japan/ S Korea	Australia/ N Zealand	Asean	Rest of world
Malaysian	61.5	73.7	56.7	55.3	63.9	78.8
Foreign/joint venture	53.8	60.0	75.4	47.7	69.2	73.8

The figures indicate that for all markets, except the Japanese and South Korean market, there is little difference between the two groups. The figure of 75 per cent of foreign and joint venture enterprises that sell into the Far Eastern industrialized market compared to 57 per cent of Malaysian exporters is a reflection of the propensity of Japanese-owned companies to produce for their home market. Overall the statistics show that both local firms and those with foreign investment are strongly export-oriented and are not reliant on any one market.

Made-in-Malaysia products are sold across the world. An unexpected finding is the importance of South-South trade to rubber manufacturers in Malaysia. Over 70 per cent of each category of company report export sales into Newly Industrializing Economies and less developed countries in other parts of Asia, the Middle East, Latin America and sub-Saharan Africa. The more detailed examination of exports of the three automobile tyre manufacturers indicates a strong market presence in developing countries, with significant sales in sub-Saharan Africa and the Middle East.

10.4 Industrial Products Sector

10.4.1 Structure: There are 110 companies producing intermediate, industrial components of which 32 are either wholly owned subsidiaries of foreign companies or have overseas

investment in joint venture enterprises with local companies. Results from the questionnaire show that joint venture companies, in some cases, have majority Malaysian financial control whereas other joint ventures are controlled by overseas investors. Of the 78 manufacturers owned by Malaysian interests only, one, Kossan Rubber Industries, is listed on the Kuala Lumpur stock exchange. Finance from Japan is the most important source of foreign capital. There are 22 firms with Japanese involvement compared to 10 firms with investments from other countries. The majority of companies were incorporated after 1985 although a small number can trace their roots to the laissez faire economic regime under British rule and early independence, and the years after 1970 when the social engineering programme of the New Economic Policy, biased towards the ethnic Malay community, was introduced.

The significance of these findings for the development of industry in Malaysia is two-fold. Firstly, they illustrate the success of the strategy recommended in the first Industrial Master Plan for the encouragement of direct foreign investment as a means of technology transfer in the industrialization process, The second point is they demonstrate the efficacy of the 'Look East' policy during the late 1980s of sourcing manufacturing expertise from large industrial conglomerates in South Korea and Japan rather than Western multinational corporations. Twenty nine manufacturers with foreign involvement, including 21 firms with Japanese finance, were established between 1985 and 2005 during the implementation of the first and second Industrial Master Plans.

Data from the questionnaire and statistical analysis of secondary data confirm that foreign and joint venture enterprises are larger in size than wholly owned Malaysian companies. The mean capitalization of Malaysian firms is RM2.2 million compared, to a figure of RM6.1 million for businesses with overseas capital. The mean number of workers employed by the two categories of company is 88 for local and 234 for joint venture and foreign firms.

10.4.2 Exports: Examination of data from primary and secondary sources recording the volume of production sold into export markets demonstrates that manufacturers with overseas investment export more than local businesses. Firms with foreign involvement that export more than half of factory output register 75 per cent in the questionnaire and 90 per cent in the trade directories. The comparative figures for Malaysian-owned companies are 35 and 38 per cent respectively. The majority of locally owned firms concentrate on sales of industrial products to other Malaysian-based manufacturers. On the other hand, joint venture and foreign business enterprises are more export-oriented, producing items for sale to overseas markets. Export sales are made into all six markets overseas. The most important market for each category of producer is ASEAN as recorded by the number firms selling into this market. When the industrial products sector is taken as a whole, Malaysian exporters have a stronger presence in the industrialized economy markets compared to foreign and joint venture firms. The exception is the Far Eastern industrial countries of Japan and South Korea where the foreign and joint venture firms export more than Malaysian companies. Analysis of secondary data indicates that sales to developing countries are significant to both classes of company. However, results from the

questionnaire show that the 25 manufacturing companies in the survey have only a limited presence in this market.

10.4.3 Linkage Effects: One of the objectives of the study is to examine the linkages the industrial products sector has with other sectors of the Malaysian economy. Forward linkage effects are measured by an examination of the figures of the volume of factory production sold into downstream industries located in Malaysia. Backward linkages are observed by examining the source of manufacturing inputs, such as natural and synthetic rubbers, compounding materials, and factory machinery and equipment.

There is a clear difference in the volume of production sold into the local industrial market by Malaysian, and foreign and joint venture manufacturing firms. Analysis of sales figures indicates that over 60 per cent of local companies sell in excess of 50 per cent of their production to other Malaysian-based enterprises. On the other hand, analysis of trade directory data and answers to the questionnaire shows that only 10 and 25 per cent of firms with foreign involvement supply more than half of output into Malaysian downstream industries. Table 10.7 has the details. The conclusion may be drawn that Malaysian manufacturers have stronger forward linkages with the local economy than firms with overseas financial interests.

Table 10.7

Domestic Sales
Companies selling over 50 per cent of output locally

Company	Secondary data	Questionnaire
	Per cent	
Malaysian	62	65
Foreign/joint venture	10	25

Out of the 25 companies that took part in the survey, 14 firms use only rubber produced in Malaysia. Of the remaining 11 firms, nine use more Malaysian rubber in manufacturing operations than imported rubber. Only two manufacturers use more imported rubber than locally produced rubber. The 11 manufacturers that source *Hevea* rubber from outside the country obtain most of their supplies from rubber producers in ASEAN, in particular Thailand. Two businesses buy rubber from non-ASEAN sources although the producing countries are not identified. However, because the largest international market for natural rubber is in Singapore it is relatively easy for Malaysian-based companies to purchase rubber from countries other than Malaysia. The questionnaire results indicate that there is no difference in procurement policy for natural rubber between the two categories of company by ownership.

Although Malaysia has a substantial manufacturing sector, the country does not have a well developed, high technology engineering and machine tool industry. Capital equipment for manufacturing operations in most industries is, therefore, procured largely from the industrialized world, in particular Japan, USA and the European Union. This is the case with the industrial rubber products sector. All companies whether locally controlled or

foreign-owned purchase over three-quarters, and in many instances 100 per cent, of their factory machinery and equipment from overseas manufacturers. The industrial components production sector, in common with the other manufacturing sectors, does not have strong linkages with Malaysian manufacturers of factory machinery.

Synthetic rubber is not made in Malaysia, nor are synthetic materials manufactured in Singapore, which is a major petroleum refining centre, so that supplies of synthetic elastomers have to be shipped in from producers outside the region. There are, however, a number of importers of synthetic rubbers that hold stock and sell into the rubber manufacturing industries. Some 80 per cent of Malaysian rubber manufacturers buy 75 per cent or more of their requirements for synthetic rubbers from local suppliers. This is in contrast to 75 per cent of foreign and joint venture concerns that purchase most of their synthetic inputs from suppliers in overseas countries. The conclusion is that, in the case of purchases of synthetic rubbers, Malaysian companies are more firmly linked to local suppliers than companies with foreign investments.

The study has identified a number of firms making a range of masterbatches and other compounding materials that sell their products to other manufacturers, especially small and medium-sized companies. In addition, there are a number of specialist suppliers of imported processing agents based in the country and there is domestic production of a limited range of chemicals including carbon black. There is, therefore, an established network of Malaysian-based firms that supply locally produced and imported compounding inputs to the rubber manufacturing industry.

The questionnaire looks at two aspects of procurement policy of compounding material:

a) are the products manufactured in Malaysia or overseas, and

b) are the suppliers of these materials based in the country or outside it?

On the issue of the source of manufacture, the survey results indicate a difference in procurement policy between the two categories of manufacturer. The majority of Malaysian-owned firms use mainly locally produced compounds and compounding agents in their manufacturing operations. On the other hand, most joint venture and foreign-owned companies utilize more compounding materials made in foreign countries. A similar picture emerges when the location of suppliers of these products is examined. Malaysian-owned manufacturers buy a greater volume of their inputs from local suppliers whereas companies with overseas involvement purchase their compounding products from suppliers based outside the country. The backward linkage effects for compounding materials are, therefore, greater for Malaysian firms compared to those with financial interests from overseas.

The linkage effects of the industrial products manufacturing sector may be summarized as follows. In terms of forward links, there are strong linkage effects between Malaysian producers of industrial components and local manufacturing industries, in particular the automobile and motor cycle manufacturing and assembly sectors, and exporters of electronic and electrical equipment. By way of contrast, as foreign-owned and joint venture enterprises concentrate more on sales to overseas markets they tend to have weaker links with other manufacturers in the Malaysian economy. All manufacturing companies have strong backward links with the local natural rubber production industry that supplies the bulk of raw material to the industrial sector. On the other hand, there are only weak

linkages with Malaysian manufacturers of factory machinery and equipment, with almost all of the required machinery being made overseas and imported into Malaysia. There are differences in linkage effects between the two classes of company by ownership with regard to synthetic elastomers and compound materials. Malaysian firms have strong backward linkages with domestic producers and suppliers of compounds and compounding ingredients as well as locally based suppliers of imported synthetic rubbers and specialist chemicals. Joint venture and foreign-owned businesses, on the other hand, exhibit only weak linkages with Malaysian-based companies that supply synthetic rubbers and compounding inputs, and local producers of compound materials.

10.4.4 Technology Transfer: The development programme in the UNIDO industrial master plans recommended strengthening the industrial capability of research organizations servicing the natural rubber industry. There was to be a concentration on R&D in rubber technology and emphasis on providing technical assistance to manufacturers based in Malaysia. The study, therefore, examined the impact of the government-controlled MRB research institutes on the local rubber manufacturing industry by including questions on the transfer of technology and provision of technical assistance in the postal survey.

The survey results are that almost all Malaysian-owned firms and a Singapore-controlled joint venture use the MRB to source their manufacturing technology and obtain technical advice on problem solving in factory operations. On the other hand, the majority of joint venture and foreign-owned enterprises obtain factory technology and technical assistance from overseas partners or parent companies. Other important sources of industrial know-

how for both classes of company are techniques developed internally in company-owned laboratories and on the factory floor. The MRB, therefore, has been successful in developing strong technical links with domestic manufacturers for the supply of industrial technology and the provision of technical consultancy services. Foreign and joint venture companies, in contrast, have little contact with the Board for either basic factory technology or technical advice.

Thus, Malaysian companies have heavy reliance on the MRB for manufacturing technology and technical assistance, whereas firms with foreign involvement typically source technology and advice on operational problems from their overseas associates. Foreign-controlled firms generally employ expatriate staff in key management positions and have access to R&D laboratories in their home countries so there is a transfer of technology from overseas to Malaysian subsidiaries. Malaysian-owned manufacturers, on the other hand, employ local managers who are able to call on the R&D services of MRB research institutes in the UK and locally in Malaysia. The MRB laboratory in England has an international reputation for research into rubber science and technology, and has long established contacts with manufacturers in the industrialized world as well as Malaysia. The encouragement given to overseas companies to set up operations in Malaysia, and the government funding of internationally recognized rubber research centres, therefore, strengthens the technical base of the industry as a whole and enables it to make high specification products for local industry and export markets.

10 .5 General Conclusions

The chapter has brought together the results of the analysis of the business behaviour for each production sector and amalgamated the data into an analysis for the entire rubber manufacturing industry. In the literature there is a limited number of general assertions first recorded by UNIDO that there is a dual structure to the industry (UNIDO, 1991: 75; Taylor & Ward, 1994b: 153-5; Tham & Mahani, 1999: 65; Abdul Hamid Sawal, 2001: 110). These authorities state that there are a small number of large firms controlled by transnational companies and a large number of small and medium-sized enterprises owned by Malaysian business interests. Foreign-owned firms and joint ventures employ more advanced technology than local companies and are stronger in export markets. However, there are no data or other hard evidence presented in the literature to support these assertions that are brief and of a general nature. One of the objectives of the present study is to test these statements by analysing data published for the first time in the MRB directory and by a questionnaire survey.

The results are that the foreign and joint venture sector cannot be described as small as it accounts for 20 per cent of the entire rubber products industry. There are 73 enterprises with overseas capital investment compared to 267 Malaysian-owned industrial concerns. However, foreign investment is not evenly distributed among the different production sectors. It is concentrated in the automobile tyre and the industrial components industries where there is direct foreign investment in 30 per cent of the total number of companies. The latex dipped goods, latex other products and low technology sectors account for 20 per

cent of firms with foreign involvement. There is low foreign participation in the motor cycle/inner tube, compound/retreading materials and footwear sectors.

When the industry is taken as a whole, the results of statistical analysis to compare the degree of capitalization and number of employees in each category of ownership show conclusively that joint venture and foreign firms are more heavily capitalized and employ more workers than local companies. When companies are classified into large-scale enterprises and small/medium-sized enterprises, the statistical calculations demonstrate that firms with foreign capital are larger in size than Malaysian businesses. The results are that 79 per cent of foreign and joint venture companies are classified as large whereas 34 per cent of local enterprises are in the large category.

There are differences in the importance of export sales policy between the two ownership groups even though the industry as a whole is strongly export-oriented. Apart from the latex industry, foreign and joint venture businesses export a greater proportion of production than Malaysian companies. In the latex products sector there is no difference in the volume of export sales between the two classes of company. The industry is not dependent on any single market and firms sell their products across the globe although the American and European markets are the most important in terms of export revenue.

The study has investigated the rubber manufacturing industries using data from secondary and primary sources and where possible carried out a statistical examination of the quantitative data. The industry is mainly controlled by local Malaysian investors but the

foreign and joint venture sector is substantial, accounting for one-fifth of all manufacturing companies. There are clear differences in structure between the two groups of company based on ownership. Joint venture and wholly foreign-owned firms are typically larger in size and export a greater proportion of production than Malaysian companies. Locally owned businesses typically are classified as small/medium enterprises and have stronger linkages with other sectors of the domestic economy than have firms with overseas investments. The study, therefore, confirms the conclusion made in the report produced by UNIDO that the rubber manufacturing industry has a dualistic structure and that there are differences in business behaviour based on ownership of assets.

Chapter 11

Discussion and Conclusions

11.1 Introduction

The study examines the rubber manufacturing industry in Malaysia. Its primary objective is to assess the contribution the sector has made to industrialization and the development of the country from a primary commodity producer to a newly industrialized economy. A secondary goal is to investigate whether there is a dualistic structure in the industry by comparing differences in business behaviour between companies with overseas investment and wholly owned Malaysian firms. The overall approach is from the standpoint of economic history so the development of the rubber manufacturing sector has been traced in Chapters 3 – 5 from the establishment of *Hevea* tree crop agriculture at the beginning of the twentieth century to the present day.

The investigation to compare locally owned companies and those with foreign capital involvement has been undertaken through an examination of data published in directories produced by the Malaysian Rubber Board and a trade association representing rubber manufacturers. In addition, a postal survey of companies manufacturing industrial rubber products has provided more in-depth information on business behaviour than that provided in the directories. The results of these findings are presented in Chapters 7 – 10.

The key research questions, as stated in Chapter 1, are:

1. In what ways has the secondary manufacture of natural rubber produced in Malaysia contributed to the industrialization process and how important has this contribution been?
2. Whether there is structural dualism in the industry based on the ownership of assets?

The objective of this chapter is to draw the findings of the study into a coherent whole and to place the answers to the primary research question in the context of contemporary theories in development economics, presented in Chapter 2 in the discussion on the theoretical background to the study.

11.2 Political Economy Context

A widely held viewpoint of academics working in the field of development studies is that the political economy of a country plays a critical role in the development process (Chap. 2: 2.1.1). These social, cultural and political factors greatly influence the part that governments play in promoting policies that may enhance or hinder economic progress (Chap. 2: 2.4.10). An examination of the political economy of Malaysia since independence in 1957 demonstrates the pragmatism of decision-makers in establishing policies to promote industrialization within the framework of a socio-economic development programme designed to advance the position of the Malay community. This pragmatic approach has, it is suggested, been heavily influenced by the fact that historically and in contemporary times the country is an open economy fully integrated in the world trading

system. In the past, Malaysia imported capital and consumer goods financed by the export of tin and rubber; today imports are paid for by commodity exports, especially palm oil and petroleum, and increasingly overseas sales of manufactured goods, including rubber products.

Among developing countries, Malaysia is unusual because it has rejected the consensus of academic development theorists and international institutions at certain times in its history. Thus at the time of independence it embarked on a period of agricultural expansion in plantation crops and rice production rather than encouraging an urban, industrialization programme protected by high tariff barriers. The orthodox opinion of development economists under the structural school is that agriculture and peasant farmers are an economic 'milch cow' to supply unlimited numbers of workers to highly protected infant industries while providing the rapidly growing urban population with cheap food. Foreign exchange revenues from exports of commodities together with taxes raised from the rural population are to be used to develop the industrialized sector (Chap. 2: 2.2.5, 2.2.7). The realities of Malaysian politics encouraged the government to follow a heterodox approach and use export earnings from rubber and tin to invest heavily in rural development projects (Chap. 3: 3.8). These favoured politically influential rural Malay voters over the predominantly Chinese and Indian populations in the towns.

During the Asian currency crisis in 1997, unlike its neighbours, the country did not accept the advice of the IMF to let the *ringgit* devalue. Instead it imposed strict currency controls and fixed the exchange rate of RM3.80 to the US dollar in order to stabilize the economy.

The evidence suggests, that contrary to the views of international financial bankers at the time, Malaysia recovered rapidly from the crisis and direct foreign investment in industry increased because of monetary stability with a fixed exchange rate. (Chap. 3: 3.11).

On the other hand, the authorities closely followed the recommendations of the World Bank in 1955 to diversify out of natural rubber into oil palm, and establish a relatively small manufacturing base to supply goods for the domestic market (Chap. 4: 4.2). Similarly in 1985, after the failure of the politically driven, heavy industrialization policy, the government embraced the advice of UNIDO in the Industrial Master Plan to expand industries using natural resources produced in Malaysia and in which the country has a comparative advantage (Chap. 4: 4.4, 4.5).

11.3 Development Policy Issues

11.3.1 International Trade Theory: One of the planks of international trade theory is that developing countries are able to increase exports by following policies to exploit their comparative advantage. At the early stages of development, tropical countries grow agricultural crops adapted to the local climatic and ecological environment to enter international trade in commodities. Primary crop producers, at a later stage, have the opportunity to move up the ladder of comparative advantage by developing a secondary manufacturing industrial base that utilizes the crop as raw material. Transforming the agricultural commodity into manufactured products that are sold into export markets adds value to the commodity and increases foreign exchange revenues that may be used to finance national development projects (Chap. 2: 2.4.1, 2.4.2). Theorists belonging to the

contemporary neo-classical school argue that an export-oriented industrialization programme allows a country to develop more rapidly than when protectionist policies are adopted to support domestic manufacturing through an import-substitution programme (Chap. 2: 2.4.8). Governments have an important role to play in the formulation of foreign trade and industrial policy, establishing an industrial investment policy to attract direct foreign investment and to strengthen technological expertise (Chap. 2: 2.4.10). Contemporary trade theory advances the argument that governments can promote rapid economic development by implementing policies to build on the comparative advantage of abundant natural resources to create groups of competing industries to manufacture technologically complex products from basic resources (Chap. 2: 2.4.3).

11.3.2 Porter Model of Trade and Industrialization: The new trade and industrial theory formulated by Porter relies heavily on endogenous growth theory for its epistemological assumptions. Growth theory states that investments in knowledge-based agencies that promote research and development, together with education and training in human resources are the principal factors in stimulating long-term economic growth (Chap. 2: 2.3.3). Porter's theory classifies production factors into two categories: basic and advanced. A country's basic factors are the inherent advantages of geography and demography that require only modest investment to become productive. These include natural resources, climate and geographical location, and a population of sufficient size to provide a source of unskilled labour. Those factors classified as advanced are knowledge and skill based, such as good infrastructure, an established technological base, modern communications, a well educated labour force and high investment in human resources and

research institutions. Porter's thesis is that clusters of business enterprises producing similar products leads to rigorous competition for market share which fuels economic growth, both domestic and international (Chap. 2: 2.4.3).

British Malaya in the early years of the twentieth century demonstrates that the country had the attributes of the basic production factors of Porter's model to allow the development of a commodity crop economy that produced and exported natural rubber. The equatorial climate of the land abundant but sparsely populated Malay peninsula was ideal for the establishment of large-scale rubber plantation agriculture. Capital raised mainly on the London Stock Exchange was invested in plantation companies that were alienated land by the British colonial administration which also allowed entry of South Indian and Chinese labour to work the estates. Rubber, an essential raw material for the production of motor vehicle tyres, was transported from the deep water ports of Penang and Singapore, situated on the shipping lane between East and West, to tyre manufacturers that supplied the rapidly expanding automobile industries in the USA, Europe and Japan (Chap. 3: 3.2, 3.3; Chap. 5: 5.2).

At independence in 1957, Malaysia had a number of Porter's advanced production factors in place. The country was the largest natural rubber producer that exported rubber through an established international commodity marketing system. Rubber production on plantations was heavily capitalized and employed a professional managerial class of expatriates, a local staff of supervisors, clerks and skilled artisans, and a disciplined, wage-earning labour force. There was a basic infrastructure of roads and railways that linked the

hinterland to Penang in the north and Singapore in the south of the peninsula (Chap. 4: 4.1). The Technical Appendix describes how the development of the rubber manufacturing industry was highly dependent on technological discoveries on the use of rubber as an industrial raw material. In Malaysia, the Rubber Research Institute that investigates the agricultural botany of rubber growing and the technology of crop processing was established in 1925. The UK-based British Rubber Producers' Research Association (now the Tun Abdul Razak Research Centre) was founded in 1938 to carry out fundamental scientific research into the properties of natural rubber and applied studies in rubber technology. Natural rubber production and the manufacture of rubber goods in the 1950s therefore had a solid scientific foundation on which to build in more recent years.

The UNIDO development strategy recommended in the industrial master plans draws heavily on the neo-classical economic paradigm, endogenous growth theory and the Porter model of industrial development. Specific policies for the rubber manufacturing sector include:

- resource-based industrialization using natural rubber in which Malaysia has a comparative advantage;
- export-oriented trade in manufactured goods produced by the rubber-based industries;
- investment in technology and R&D activities to support the rubber manufacturing industrial sector;
- encouragement of direct foreign investment by international rubber products companies to gain access to advanced manufacturing

technology and export markets, and

- development of human resources and training for the industry.

Importantly, the programme adopts the Porter development model for clusters of related industries to stimulate manufacturing companies within the group to compete in developing high-value, technologically advanced products (Chap. 4: 4.5, 4.6; Chap. 5: 5.8).

11.3.3 Balanced Growth Model: The industrial master plans recommend the simultaneous development of a range of industries, both resource and non-resource-based, in a policy similar to the balanced growth model of investment in a number of industrial sectors that was current in the 1950s (Chap 2: 2.2.2). Natural resource-based industries are regarded as naturally evolving enterprises utilizing Malaysia's resource availability and comparative advantage. The manufacture of products made from rubber, palm oil and timber are highly dependent on local factors including raw material inputs, domestic capital investment and local technology. The multinational electronic component and electrical appliance businesses in Free Trade Zones, and the automobile and steel industries created by government policy under the heavy industries programme, on the other hand, are highly dependent on foreign technology (Chap 4: 4.3, 4.4, 4.5, 4.6; Chap 5: 5.5, 5.6, 5.7). It may be argued that this multi-industry development strategy adopted by Malaysia builds on the strengths of the different industrial sectors and each sector may be regarded as a complementary component within the overall politico-industrialization programme for the country to achieve fully developed economic status by 2020.

11.3.4 Direct Foreign Investment: The political ideology followed by governments is crucial in deciding the policies to be adopted towards multinational companies and direct foreign investment (Chap. 2: 2.4.10). The authorities in Malaysia from colonial rule to the present day have been welcoming to investment by foreign companies as a source of manufacturing technology and management expertise in the process of industrialization. Immediately after independence, the government passed the Pioneer Industries Ordinance that allowed exemption from corporation tax and tariff protection for newly established industries (Chap. 4: 4.2). With the promulgation of the New Economic Policy in 1970, transnational investment in industry was encouraged to counter the economic dominance of the Chinese business sector. The government established Free Trade Zones for light industries where multinational corporations assembled electrical and electronic products using imported components for export. Foreign companies were exempt from custom duties on imported parts and received fiscal incentives to encourage then to establish production facilities in the export zones (Chap. 4: 4.3). Investment in joint ventures by South Korean and Japanese conglomerates in heavy industry was a feature of the Look East Policy between 1980 and 1985 (Chap. 4: 4.4). When the first Industrial Master Plan became operational in 1986, the Promotion of Investment Act was passed to provide incentives for investment by overseas companies. The legislation allows majority foreign control for firms that export at least 50 per cent of factory output while foreign manufacturers can set up wholly owned subsidiaries if more than 80 per cent of production is sold into export markets (Chap. 4: 4.5). The success of the policies to encourage direct foreign investment can be judged by the fact that 20 per cent of companies in the rubber manufacturing industries are either joint ventures with Malaysian investors or wholly foreign-owned. In

the export-oriented industrial products sector that makes high specification intermediate components for other industries, the figure for foreign participation rises to 29 per cent of all firms (Chap. 7: 7.5.1).

11.3.5 Globalization: The forces of globalization that have impacted on the world economy in recent decades have also influenced the ownership and structure of the rubber manufacturing industries (Chap. 2: 2.4.9). The story of Continental Sime, for example, encapsulates within a single enterprise how the process of globalization has occurred in the automobile tyre sector. The company was founded in 1961 as a subsidiary of the British tyre maker, Dunlop to produce car and lorry tyres to supply the domestic market as recommended in the 1955 IBRD development report. In 1984 when Dunlop sold its European and American interests to Sumitomo of Japan, the Malaysian factory was acquired by Sime Darby, a diversified plantation, industrial and trading group. Sime Darby already had a wholly owned tyre company, Sime Tyres International, established in 1979 that it continued to operate as a separate enterprise with the then publicly listed Dunlop Malaysian Industries. In 2003 the two firms were amalgamated when Sime Darby entered into a joint venture with the Hanover-based Continental AG in which Continental owns 51 per cent of the equity. The partnership has enabled the German tyre manufacturer to enter the ASEAN and Australasian markets where it previously had only a limited presence and Sime Darby has access to advanced tyre making technology of an established European multinational corporation (Chap. 9: 9.2).

There have also been mergers and disposals of companies in the latex goods industry. The London Rubber Company established production facilities to produce its Durex brand sheath contraceptives, Marigold industrial and household gloves, and Regent surgical gloves in Malaysia. After a series of mergers in the UK healthcare industry, the successor company in 2003/2004 moved the Durex condom manufacturing operations to southern Thailand and sold off its glove factories to French and Swedish interests that continue to produce latex gloves under the Marigold and Regent trade names. The American medical supply company, Baxter also set up a number of dipped product factories in the 1980s that it subsequently disposed of to other US-based manufacturers (Chap. 9: 9.4). In the extruded thread sector, the four companies are wholly Malaysian-owned although Heveafil and Filati Lastex were initially established as joint venture enterprises between the government-controlled PNB and Mardec, and Italian thread manufacturers. All producers, however, rely on Italian technology for extrusion manufacturing operations and use factory machinery imported from Italy (Chap. 9: 9.5).

11.4 Policy Implications

11.4.1 The Political Imperative: Malaysia is a resource-rich country endowed with abundant supplies of natural rubber, palm oil, petroleum, natural gas and tropical timber. The discussion in Chapters 3 to 5 has demonstrated that such a wealth of natural resources (including tin in former years) made possible rapid economic growth on the basis of primary production, and, it may be argued, weakened the imperative to industrialize, compared to resource-poor countries in Asia such as South Korea. The policy dilemma facing developing countries with an abundance of mineral and agricultural resources is

whether to go down the route of resource-based industrialization or concentrate on the production of primary commodities for export in their endeavour for economic development. It is suggested that this basic decision on trade and industry policy is unique to each and every sovereign nation state, and will differ depending on the level of political and economic development of individual countries. However, for countries deciding to turn their resource base into manufactured goods the experience of Malaysia over past years may point to some lessons to be learnt. What is important is that strong political commitment is essential for a successful industrialization policy to be implemented.

Exports of primary commodities have been crucial for the financial viability of Malaysia since colonial days. The revenues from these exports have been prudently invested so that when the decision was made to diversify into industrialization there was an existing institutional framework and country-wide infrastructure. Resource rents in the form of export duties imposed by successive governments have been invested in physical infrastructure of electricity generating plants, industrial estates, ports, roads and railways crucial to capital accumulation. Export revenues have also been used to finance education and other essential social services, and build capacity in the civil service for effective governance of the country. Malaysia was thus able to successfully diversify from dependence on rubber (and other commodities) into the more recently developed downstream activities of manufacture of rubber goods, to increase value-added.

The active role of government has been crucial in achieving this structural transformation and degree of industrialization. State intervention in industrial policy was especially

pronounced from 1970 up to 1985 under the New Economic Policy when the authorities gave priority to interethnic redistribution of wealth in favour of the Malays. In the case of the heavy industrialization programme in the early and mid-1980s, the policy was driven by politicians with little input by economists or technocrats. The programme used multinational conglomerates from South Korea and Japan to provide technical expertise and manufacturing inputs in new industries such as motor car manufacturing and steel plants. However, the internal pricing policies of the foreign companies and intense competition on world markets resulted in a lack of international competiveness for the products of the new industries. The government was quick to rectify the failures in the heavy industry development strategy by seeking advice and recommendations from outside expertise. It was not until the two 10-year industrial master plans of 1986 and 1996 formulated by UNIDO that industrial policy interventions were conceived and implemented on a more rational basis.

In common with many developing countries, Malaysia has a small domestic market so that internal demand for manufactured goods is easily satisfied. The Chinese entrepreneurial community which controls much of the commercial and industrial activity has only limited technological capability and managerial expertise, and is weak in international marketing networks. Compared to other ASEAN nations, the Malaysian workforce is relatively well paid so that the country is at a competitive disadvantage against low-wage countries. The policy the Malaysian government has adopted to overcome these constraints is to encourage the establishment of export-oriented industries that manufacture medium to high-value products. The strategy has been to actively attract foreign transnational companies to invest

in new manufacturing concerns, particularly in the resource-based sector. The priority accorded to the inflow of foreign investment is based on the assumption that manufacturers from overseas will stimulate technological up-grading of manufacturing operations, introduce modern management practices and encourage export-led growth. This emphasis on the process of resource-based industrialization is to enhance the natural comparative advantage of the existing resource base. The outcome is for well managed, technically advanced factories to produce high value-added manufactured goods that are able to compete successfully on the world market. One other feature of Malaysia's approach to overseas involvement in industry is that the authorities have welcomed investment from transnational firms from varied sources in eastern and western industrialized nations. This policy, it is argued, may have increased the country's leverage and bargaining power in negotiating the entry of foreign capital.

The foregoing discussion argues that Malaysia's natural resource endowments have been used as part of an overall development strategy to diversify the economy away from primary commodity exports into value-added manufactures. The development of resource-based manufacturing industries means that the country will increasingly supply the international market with rubber goods instead of raw rubber, high value palm oil products and processed wood articles from sawn timber in a fully industrialized economy. The policy of encouraging foreign investments in selected industries that maximize gains for the national economy results in the ability of new companies to increase profitability because of higher productivity compared to firms in the less technologically advanced domestic sector. It may be argued, therefore, that the country has progressed beyond Porter's basic

comparative advantages derived from natural resource endowments to develop industrial capacity in a range of manufacturing industries.

11.4.2 Policy towards Foreign Investment: The Malaysian authorities in past years and during present times have been welcoming to overseas investment from a variety of countries. There has, therefore, been no strong movement against foreign direct investment in manufacturing industry on political or ideological grounds by the ruling establishment in the country. On the contrary, it may be argued that, besides the accompanying expertise they bring, the entry of overseas firms has been encouraged by decision-makers as a countervailing economic force against the dominant ethnic Chinese-owned business sector and to strengthen the position of the main Malay political party within the complex inter-ethnic political discourse of Malaysia. This situation is not paralleled in many other developing countries where fervent nationalist sentiments dominate the political debate and there may be a reluctance to admit foreign capital because of a fear of neo-colonial interference in domestic affairs. The policy implications for the implementation of industrialization strategies in developing countries, therefore, seem to be clear. Governments wishing to allow transnational enterprises to operate need to decide on an ideological commitment to accept some degree of foreign participation in the economy then lay down firm ground rules enacted through legislation that govern the entry and economic activities of overseas investment in the host country.

11.4.3 Utilization of International Agencies: The government of Malaysia has utilized the resources of international development agencies to assist in the formulation of policies to

promote industrialization. As far back as 1955, the colonial authorities appointed the World Bank to prepare proposals for industrial development and the report became the policy guidelines for the newly independent Federation of Malaya. The industrial strategy recommended the establishment of a limited number of manufacturing industries to satisfy the domestic market for consumer and industrial goods including motor vehicle tyres. (Chap3: 3.5; Chap 4: 4.2; Chap 5: 5.5). After the failure of the heavy industrialization programme in the 1980s, the authorities commissioned UNIDO to undertake a root and branch review of the country's industrialization policy. The recommendations contained in the first ten-year Industrial Master Plan provided a detailed development strategy for the rubber manufacturing sector that was included in a cluster of seven resource-based industries. The success of the industrialization strategy recommended in the report led to a second UNIDO plan for the period 1996 – 2005 in which the rubber manufacturing industries were again identified as a priority sector in the group of natural resource-based industries (Chap 4: 4.6; Chap 5: 5.5). An examination of the implementation of the recommendations for the rubber sector contained in the two industrial master plans forms the backbone of the present study as described in Chapters 7 – 10 of the thesis. The experience of Malaysia over a fifty year period suggests that governments of developing countries can benefit from the wealth of knowledge and technical expertise of international development agencies such as UNIDO to identify and prepare feasibility studies on industrial development strategies tailored to each country's economic circumstances.

11.5 Limitations of the Study

11.5.1 Government Policy towards Foreign Researchers: The Government of Malaysia imposes strict rules on the entry of research workers from foreign countries and their conduct in Malaysia when they are undertaking their fieldwork. The candidate was aware of the political sensitivities of the government to research undertaken by non-Malaysian nationals at the outset of applying for a place at the University of Bradford. The need to obtain approval from the Malaysian authorities was raised by the candidate with members of the academic staff at his interview for admission to the doctoral programme. The issue was raised once more when the candidate submitted his Research Proposal in the Diploma in Research Methods taught by the Graduate School. When the candidate formally approached the Economic Development Unit (EPU) in Malaysia to carry out field work in the country the result was a diplomatic silence. He then decided to undertake the study as described in the thesis.

The implications for foreign researchers wishing to work in Malaysia are that there are a number of bureaucratic obstacles to overcome to gain entry to the country. In the candidate's case, he had excellent professional and personal contacts with personnel in senior positions in the government and rubber research organizations. Despite initial encouragement, once the formal application had entered official channels the outcome was decided by civil service procedures and government policy. The lesson to be learnt from this experience is that non-Malaysian nationals may find it difficult to undertake research in the country unless it is in a field that Malaysian academics are willing to become

counterpart officers. Most importantly, however, the authorities as represented by the EPU have to regard the topic of research as non-controversial and in the national interest.

11.5.2: Capital/Labour Ratio: The capital to labour ratio (K/L ratio) for the two classes of firm by ownership have been calculated in Chapter 10 using published figures for the amount of paid-up investment and number of employees per enterprise. The results indicate that manufacturers with overseas investment employ more capital per worker than wholly Malaysian-owned manufacturing enterprises. However, there are a number of issues surrounding the use of these two factors to obtain the K/L ratio as discussed in economic theory. In the first place issued share capital is not all spent on the machinery and equipment used to manufacture goods. It includes capital items such as the acquisition of land and the construction of office and factory buildings. The assumption, therefore, has been made that every company has the same percentage of issued paid-up capital used for the purchase of machinery. Another consideration is that the issued share capital of different firms would have been paid-up in different years. The published data do not provide this information so that it has not been possible to discount the figures to a base year nor to take into account inflation rates over time. On the labour side, the data provide the number of workers per firm. The assumption in the analysis is that labour hours per unit time are equal for all enterprises. Thus a reasonable estimation is that workers are employed for 250 days a year for 8 hours per day in all firms across all product sectors.

11.6 Further Research

11.6.1 Additional Work on Capital/Labour Ratios: The previous section has raised a number of issues regarding the use of issued capital and number of workers per firm as proxies for capital (K) and labour (L) in the calculation of capital/labour ratios. When embarking on the research study, the candidate did not consider comparing the ratio between labour and capital for Malaysian and foreign and joint venture firms. However, in the course of the analysis, it became apparent that this topic was worthy of consideration. It is suggested that further studies be done on K/L ratios on the lines discussed in Section 11.5.2. An additional area of interest could be to investigate ratios of capital and labour in a time series to indicate if changes over time are a reflection of firms upgrading their technology hence their productivity.

11.6.2 Additional Analysis of Data: The study has compared wholly Malaysian-owned firms with foreign-owned subsidiary companies and joint venture enterprises in order to establish whether there is a dualistic structure to the industry. The findings are that business enterprises that employ foreign capital are more heavily capitalized and have a larger workforce than their local counterparts. A researcher with a fine grasp of statistical techniques would doubtless be able to discern other relationships and correlations between different sets of data that are outside the ken of the candidate. One possible avenue to be explored is to compare differences in capital and size of work force between Japanese-owned companies and those with investment from the USA and European Union.

11.6.3 Industrial Products Sector: The present study has, by force of circumstance, only collected and analysed quantitative data in the industrial components production sector. The advantages of adopting the methodological triangulation technique using a combination of qualitative and quantitative data have been touched on previously in the discussion. It is considered to be advantageous if further research could be undertaken by way of face-to-face interviews with executive personnel in the industry and rubber organizations. This would allow the research to probe into reasons why firms adopt their procurement and sales policies, and the advantages and disadvantages in sourcing technology locally or from abroad. The interviews could also expand on the answers to the questions in the postal survey on the ranking of the effectiveness of the various sources of industrial technology and technical assistance. (These questions, No. 15 – 18 in the questionnaire, have not been addressed in the current study). However, a study of this type is likely to be restricted to research workers employed by Malaysian institutions such as the MRB or local universities for reasons covered in section 11.5.1.

11.6.4 Latex Products Industry: The production of goods made from latex concentrate is the most important production sector in two respects. The sector is the largest user of natural rubber, using 70 per cent of total rubber consumption. It also is the largest exporter of rubber products, accounting for 75 per cent of export revenues. There are 127 firms producing dipped goods and other products such as extruded latex thread, divided between 101 Malaysian and 26 manufacturers with overseas capital. A detailed survey would enable a comparison to be made of differences in business behaviour between local and foreign-controlled enterprises. Research on the lines of the present study of the industrial products

sector as discussed in Chapter 8 would answer questions on issues such as linkage effects and the transfer of technology to the latex industry.

11.6.5 Research into Export Markets: The study has made a significant finding with regard to export sales. The analysis has identified South-South trade to be important to the rubber manufacturing industry although the extent of this trade has not been established. It is known from MRB records that the greatest export revenues are generated by sales to industrialized markets in the USA, EU and Japan and that the most important export sector is the latex goods manufacturing industry. An investigation of sales into international markets by each product sector would seem to merit attention. A study could, for example, establish the value of export revenues and the relative importance of individual export markets to each production sector, and identify those markets with potential for further sales.

11.6.6 Comparative Studies: Comparative research studies are useful for a better understanding of the development of resource-based industrialization in different countries. Thailand and Indonesia, the two largest producers and exporters of natural rubber, also have significant rubber manufacturing industries. The rapidly emerging economies of India and China, the two largest nations in Asia, are major consumers of natural rubber. Although both countries are important producers, being fourth and fifth respectively in world ranking, they are net importers of the commodity. China, in particular, is one of the most important buyers on the international rubber market. Studies on the development of the rubber

manufacturing industries in these and other smaller producing countries would provide valuable insights into the process of industrialization in developing countries.

11.7 Role of Rubber Manufacturing in Industrialization

In this final section the discussion presents the concluding remarks on the role the rubber products manufacturing sector has played in Malaysia's industrial development programme over the past fifty years or so. The key research question at the heart of the thesis is whether or not the manufacture of rubber products made from locally produced natural rubber has contributed to the country's success in moving from a primary commodity producer to an industrialized country producing a range of items as diverse as air-conditioners, wooden furniture and vacuum cleaners for export on to world markets.

The first rubber manufacturing companies were founded in the 1920s and 1930s. The majority of producers, however, were established in the period 1985 to 2005. The industry has increased in size from about 30 firms in 1950 to over 350 enterprises in 2005, and currently some 80 per cent of businesses are owned by Malaysian interests. The majority of local firms are controlled by private investors belonging to the ethnic Chinese community. Direct foreign investment is concentrated in the industrial products and pneumatic tyre industries where 30 per cent of companies have foreign involvement. A picture of a dualistic structure in the industry has emerged from the analysis of the data. Joint venture and wholly foreign-owned manufacturers are typically larger in size, measured in terms of the amount of capital investment and employee numbers, than local businesses. Firms owned by Malaysian investors are more fully integrated into the domestic economy

compared to those owned either partially or fully by overseas interests. Local companies have stronger linkages with domestic producers and suppliers of manufacturing inputs than foreign-controlled firms. They also use the R&D facilities of the Malaysian Rubber Board as the source of manufacturing technology and technical advice, compared to firms with foreign interests which obtain technical R&D inputs from their parent companies offshore.

The substantial presence of foreign companies is a clear indication that the steps taken by the government to encourage direct foreign investment have borne fruit. The ability of the Malaysian authorities to attract overseas manufacturers to establish production facilities and continue their operations in the country is a reflection of the congenial business environment in Malaysia. Transnational businesses have the capacity to relocate to other countries if the conditions there become more advantageous to foreign investors. However, within the industry the current composition of foreign-controlled and local investment is such that it protects the economy from any likely adverse consequences in such an eventuality. The facts that local companies control some 80 per cent of the industry, are well integrated in the domestic economy, and are ably served by local R&D institutions speak well for a stable sector in the Malaysian economy as it is firmly rooted in itself while enjoying the benefits of foreign investment.

The rubber goods production industry is a major employer of labour and the workforce accounts for six per cent of employment in the national manufacturing sector. Rubber consumption of 480,000 metric tons by the industry generated output revenues of RM10 billion, of which eight billion was in export sales. This compares with exports of one

million tons of raw rubber valued at RM5.8 billion. The industry, therefore, has the ability to add value to locally produced natural rubber by transforming it into manufactured products in an export-oriented industry.

The manufacturing sector consumes the equivalent of some 40 per cent of domestic production of natural rubber and it also imports latex concentrate and solid rubber from abroad for use as manufacturing inputs. In terms of global consumption of natural rubber, the country is ranked sixth in the world. Malaysia is the world's highest consumer of latex concentrate using some 70 per cent of consumption to produce latex goods. The Malaysian rubber-based industry is the largest supplier of medical rubber gloves, hospital catheters and elastic latex thread to international markets. Made-in-Malaysia goods are exported to 160 countries worldwide and South-South trade is of importance to Malaysian manufacturers as well as traditional markets in industrialized countries.

Natural rubber agriculture and the manufacture of rubber products have contributed in the past and still contribute to Malaysia's development in terms of human resource capital, scientific research capacity and the diversification of manufactures. For most of the 20th century the rubber plantation industry was the largest employer of labour in the country, hiring and training three generations of managers, supervisory and clerical staff, skilled artisans and a regular wage-earning labour force. Managers, staff and workers were thus well placed to transfer their skills to newly established manufacturing companies as the country industrialized. The contribution of the rubber industrial sector is evident in the increase of its employment capacity from 5,700 workers in 1950 to 63,000 employees in

2005. The Rubber Research Institute was established in 1925 and the MRB research centre in England began work in 1938. These two institutes have an international reputation in the fields of rubber agronomy and polymer science. The research work of their scientists and technologists greatly enhances Malaysia's R&D capacity and contributes to the knowledge economy. The rubber products industry makes a large number of intermediate and consumer items manufactured from solid rubber and liquid latex concentrate in three main production sectors. While the latex products sector is the most important in terms of export earnings and consumption of natural rubber, the study has demonstrated that the tyre and general rubber goods sectors are substantial export earners and users of rubber raw material. The rubber manufacturing sector, therefore, is diverse and plays a significant role in the process of the diversification of Malaysia's industrial base.

The economy of Malaysia has been transformed from one based on the production of the primary commodities, tin and rubber, to one that is classified as newly industrialized, producing a range of manufactured goods. The study argues that the process of industrial development has been built partly on the back of downstream activities arising from the *Hevea* rubber production industry. The evidence examined during the course of the study demonstrates that the manufacture of rubber products has contributed in no small measure to the success of Malaysia's industrialization programme. The rubber industry taken as a whole is an example of a vertically integrated, resource-based industry using local production of natural rubber as raw material for the manufacturing sector to produce items such as automobile tyres, latex products and general rubber goods to demanding technical standards for domestic and international markets.

Technical Appendix

1. Introduction

The purpose of the technical appendix is to provide information on the rubber goods manufacturing industries and methods of production within each sector of the industry. In order to place an examination of the manufacturing sector in context, the appendix includes a brief overview of the history of the introduction of the rubber tree to the Far East and development of natural rubber as an industrial raw material since the nineteenth century. This is followed by a review of the production and consumption of rubber as an agricultural commodity important in world trade. The end uses and three major markets for rubber manufactures are described. There follows a description of the basic methods used in the processing of tree latex into a material suitable for use in the manufacture of rubber products. The discussion then examines the main inventions in rubber technology that led to the expansion of rubber manufacturing industries from the early nineteenth century to the present day. The account concludes by describing the basic factory procedures for the manufacture of tyres, general rubber goods and latex products.

2. Development of the World Rubber Industry

Natural rubber produced by *Hevea brasiliensis*, a tree indigenous to the Amazon basin, is an agricultural commodity traded on the world market and used in the manufacture of a wide range of products. The area planted to *Hevea* in the humid tropical regions of Asia, Africa and Latin America in the 1990s was calculated to be over nine million hectares (IRSG, 1990). Small farmers, typically with holdings of two hectares or less, cultivate

about 80 per cent of the rubber area. The remaining rubber is grown on estates owned, on the whole, by large corporate plantation companies. It is estimated that over 20 million families in tropical developing countries are dependent on rubber cultivation for their livelihood as either estate workers or small growers (IRRDB, 2007).

The history of the discovery of natural rubber in tropical South America by European explorers and its subsequent introduction as a cultivated crop into the Far East and West Africa is well documented in the literature (Allen & Donnithorne, 1954; Drabble, 1973; Voon, 1976; Barlow, 1978; Lim, 1982; Coates, 1987; Dean, 1987; Baulkwill, 1989; Drabble, 1991; Edington, 1991; Jones & Allen, 1992; Barlow *et al*, 1994; Tate, 1996; Loadman, 2005; IRRDB, 2006, 2007). In the nineteenth century, rubber was collected from wild trees growing in the Amazonian regions of Brazil, Bolivia and Peru, and exported to industrial centres in Europe and the north eastern states of the USA for the manufacture of a range of items including waterproof clothing and footwear, conveyor belts and insulation for electric cables. The introduction of the *Hevea* rubber tree to Asia from its native Amazon habitat owes as much to British imperial, economic expansion in the Far East during the late nineteenth century as it does to growing demand from early industrialists. Sir Clements Markham, an official in the India Office, arranged expeditions to the Amazon to collect seeds for transfer to British colonies in Asia. In 1876, a British adventurer, Henry Wickham shipped a consignment of seeds to Kew Gardens where over 2,000 were germinated and the seedlings successfully transferred to the Botanical Gardens in Ceylon. The cultivation of natural rubber as an agricultural commodity crop grown on large

plantations and smallholdings expanded across the humid tropics from the Wickham collection gathered around the River Tapajos in the lower Amazon region of Brazil.

The first practical pneumatic tyre for bicycles was invented in 1888 by a Scottish veterinarian, John Boyd Dunlop who practised in Belfast, Northern Ireland. This created a new demand for rubber as cycling became popular and the wealthy classes adopted the horseless carriage as a means of transport. The growth in demand for rubber as a raw material for tyre production increased exponentially in the early years of the twentieth century with the development of mass production of motor vehicles including trucks and buses. It was this demand that stimulated the flotation of plantation companies on the stock exchanges of London, Paris and Amsterdam for the establishment of rubber estates in present day Sri Lanka, Malaysia, Cambodia, Vietnam and Indonesia. Restrictions on rubber production imposed by the colonial powers during economic recessions in the 1920s and 1930s caused American tyre companies to establish their own rubber plantations in the Netherlands East Indies, Liberia and Brazil in order to safeguard supplies. It also had the effect of encouraging farmers to plant rubber on their smallholdings in southern Thailand. However, the Japanese invasion of South East Asia in 1941 cut off the supply of a strategic war material to tyre manufacturers and producers of rubber goods in Western countries. The disruption to supplies of raw natural rubber was the catalyst for the establishment and expansion in the USA of the synthetic rubber industry, based on original German technology, using petroleum feedstock. After 1950, increased demand, mainly from the expanding passenger car and commercial vehicle industries, led to the planting of new rubber growing areas where climatic conditions are suitable for *Hevea* production, notably

in the southern regions of Thailand, India and China in Asia, and Ivory Coast in West Africa.

3. World Production and Consumption of Natural Rubber

The growth in world demand for natural rubber over the past hundred years is illustrated in the following figures: production was 45,000 metric tons in 1900, 1.9 million tons in 1950, 3.3 million tons in 1975 and 6.8 million tons in 2000. In 2005 total world output was 8.8 million metric tons with production concentrated in Thailand, Indonesia and Malaysia (Table 1). These three countries in South East Asia account for over 70 per cent of the global output of natural rubber. Other important producers in Asia are India which is basically self-sufficient and China which is also a major importer of raw rubber for its expanding industrial sector. Countries in South America and the western and central regions of Africa are relatively unimportant rubber producers compared to countries in Asia.

Table 1

World Natural Rubber Production

	2000	2005
	'000 metric tons	
Thailand	2,346	2,937
Indonesia	1,501	2,271
Malaysia	928	1,126
India	629	772
China	445	428
Other Asia	526	746
Africa	371	403
South America	151	200
World total (a)	6,762	8,777

(a) Including balancing adjustments

Source: IRSG (2007)

The consumption of natural rubber by manufacturing industry in 2005 was 9.0 million metric tons (Table 2). The most important geographical area for rubber manufacture is Asia accounting for approximately 60 per cent of global consumption. Other important rubber manufacturing centres are North America and Europe. The three largest consumers of natural rubber in 2005 were China (2 million tons), the European Union (1.3 million tons) and the USA (1.2 million tons). Thailand, Indonesia and Malaysia are also substantial manufacturers of rubber products. Together, these three countries used 942,000 tons of rubber in 2005, a figure that is the equivalent of 15 per cent of their annual production or some ten per cent of world output of natural rubber (IRSG, 2007).

Table 2

World Natural Rubber Consumption: 2005
'000 metric tons

Asia/Oceania	5,470
Europe	1,558
North America	1,316
South America	538
Africa	120
World total (a)	9,001

(a) Including balancing adjustments

Source: IRSG (2007)

4. End Uses of Natural and Synthetic Rubber

Rubber, derived either from the *Hevea* tree or petroleum feedstock, is a major industrial raw material used in the manufacture of a vast range of consumer and intermediate products from tyres and dock fenders to condoms and elasticated thread. Table 3 provides a list of many common articles made from this versatile substance.

Table 3

Rubber Manufactured Items

Adhesives	Gum boots and waders
Auto-components	Hoses
(bumpers, engine mounts)	Hot water bottles
Balloons	Mats
Bridge bearings	Milking machine liners
Carpet underlays	Printing rollers
Condoms	Roofing materials
Conveyor belts	Seals and gaskets
Diving suits	Sheeting
Elastic bands	Shoes and sandals
Elastic thread	Tank liners
Electrical insulation	Toys and balls
Foam mattresses	Transmission belts
Fenders	Tyres and inner tubes
Gloves (household)	Walk surfaces
Gloves (industrial)	Weatherstrip
Gloves (medical)	Windscreen wipers

Source: Adapted from Barlow *et al* (1994: Table 1.1)

Table 4

End Uses of Rubber

Products	Per cent
Tyres	68
Latex products	8
Engineering/Industrial	8
Footwear	5
Adhesives	3
Other products	8

Source: IRRDB (2007)

The market for rubber manufactures is divided into three major sectors: tyres, general rubber goods and latex products. The general rubber sector consists of a number of subsectors such as engineering and industrial products, footwear, adhesives and other

general products. Figures for the uptake of rubber by end use provided by the International Rubber Research and Development Board (2007) are shown in Table 4. The tyre sector is by far the single largest user of rubber with an offtake of almost 70 per cent of consumption. The mass manufacture of motor vehicles from the early twentieth century to the present day stimulated and continues to influence the growth of the rubber industry. Production levels of new vehicles create demand for original equipment tyres, whereas the number of passenger cars and commercial vehicles on the road determines the market for replacement equipment. The automotive wider sector that comprises the means of transportation of goods and people by motor vehicles, railways and aircraft is also a significant market for non-tyre products including transmission belts, seals, gaskets and hoses as engine parts, and weatherstrip and wipers for doors and windows. It is estimated that the uptake of rubber by the automotive manufacturing industry, as a whole, is in the region of 75 per cent of total rubber consumption.

5. Technology of Rubber Processing

Tree latex has a dry rubber content (DRC) of approximately 30 per cent rubber solids. Field latex is unstable and has to be processed into material that can be utilized in industrial operations. There are two major types of raw material used in the rubber manufacturing industries. These are solid rubber that goes into the production of tyres and general rubber goods, and liquid latex concentrate which is used for the manufacture of latex products. A major aim of processing is to convert naturally produced *Hevea* rubber of a heterogeneous nature and derived from a variety of sources into a homogeneous, industrial raw material that can be used in automated factory operations.

5.1 Technically Specified Rubber: Rubber produced on estates and smallholdings is processed in central factories into Technically Specified Rubber (TSR) with guaranteed technical specifications. Each of the major producing countries has its own approved scheme to guarantee the quality of its processed rubber. Primary processing under TSR schemes typically produce five basic grades of dry rubber based on dirt content and whether the raw material is tree latex or field coagulum (cup lump and tree lace). The basic steps in producing technically specified rubbers are: bulking and blending; coagulation of tree latex; size reduction; granulation; drying and baling. There are differences in technique depending on the method and machinery employed.

In all processes, field latex is bulked in a reception tank before passing into coagulating tanks where controlled coagulation takes place by the addition of formic acid. Partition plates are inserted into the coagulation tank in order to divide the coagulum into slabs of spongy material. When coagulation is complete, the vertical partitions are removed and the tank is flooded with water for the slabs of coagulum to be floated towards the processing machinery. In the *Heveacrumb* process, coagulated latex slabs are passed through the differential rotating rollers of a creping machine to produce thin crepe with a lace-like texture. Field coagulum is cleaned by slicing in a heavy grooved macerator followed by passing through a creping mill battery where further cleaning and blending take place. Crepes derived from latex and field coagulum are fed into a hammer mill or granulator that converts the crepe material into crumbs or granules of rubber. The *Dynat* method involves feeding latex coagulum and field coagulum material through a rotary cutter for initial size reduction before granulation takes place by a process of extrusion and cutting. Granulated

rubber in both the *Heveacrumb* and *Dynat* methods is transferred by mechanical conveyors through a hot air dryer. After leaving the dryer, the rubber is baled in a hydraulic press then each bale is sealed in a plastic wrapper bag to prevent contamination from extraneous dirt (Morris, 1989: 472-83; Baby Kuriakose, 1992: 386-91; Barlow *et al*, 1994: 150-2, MRB, 2007).

5.2 Latex Concentrate: The centrifuge method is used for the production of latex concentrate in a batch process in custom-built latex factories. Field latex is collected immediately after tapping and treated by the addition of ammonia gas at a collection station to inhibit auto-coagulation caused by bacterial action. Preserved latex is transported by road tanker to the latex factory within the space of a few hours where it is discharged into reception tanks in order for blending to take place. Bulked latex is fed into rows of industrial centrifuges that are started and run continuously until the dry rubber content (DRC) of the latex reaches 60 per cent. The latex concentrate is run off into storage tanks fitted with mechanical stirrers. When the tank is full the contents are stirred for up to 24 hours before the concentrate is transported locally to latex goods factories or to port for shipping (Edgar, 1958: 470-90; Morris, 1989: 484-93; Baby Kuriakose, 1992: 375-81).

5.3 Ribbed Smoked Sheet: Before the introduction of the technically specified rubber schemes, most tree latex was made into ribbed smoked sheet (RSS), whereas field coagulum and small amounts of latex were processed into crepe rubbers. In RSS production, the coagulum is passed from the coagulating tank through a sheeting mill in estate-scale production or through hand mangles on smallholdings. A sheeting battery typically consists

of six pairs of rollers with increasing nip, the last pair being grooved to give a ribbed pattern to the wet coagulum. The ribbed design increases the surface area of the coagulum for faster drying in the smokehouse. It also prevents the dried sheets from sticking together when they are stacked in the packing shed before baling. After passing through the sheeting battery, the coagulum is cut into sheets that are hung on trolleys to drip before the trolleys are moved into a smokehouse or tunnel dryer. The drying process usually takes four days to complete. The RSS is then taken into a packing shed where grading is carried out before the sheet rubber is pressed into bales (Edgar, 1958: 360-430; Morris, 1989: 462-6; Baby Kuriakose, 1992: 382-6; Barlow *et al*, 1994: 152-3).

5.4 Crepe Rubber: The preparation of crepe rubbers involves passing coagulum through a creping battery consisting of a series of paired driven rollers that rotate at different speeds. Pale crepe grades are produced from field latex: the first passes are made through diamond shaped, grooved rollers and the final set of rollers is smooth. Pale crepes, including sole crepe grade, are still made by a small number of processors for specialist applications such as medical equipment and shoe soles for fashion footwear where high purity and light colour are important. Brown crepes derived from field coagulum material have been superseded by lower grade TSR production (Edgar, 1958: 431-59; Morris, 1989: 467-72; Baby Kuriakose, 1992: 391-3).

6. Technological Developments in Rubber Manufacture

The account in Sections 2 and 4 has shown that demand, principally by tyre manufacturers, was a key factor in the expansion of rubber tree crop agriculture on smallholdings and

estates. However, advances in rubber polymer science and industrial technology that met the specifications for an expanding portfolio of industrial applications were also of vital importance in the development of rubber manufacturing industries. This section, therefore, briefly discusses the major technological discoveries that helped increase the industrial uses of natural rubber (Coates, 1987: Chaps. 2-5; Jones & Allen, 1992; Barlow *et al*, 1994: Chap. 8; Loadman, 2005; IRRDB, 2006, 2007).

The terms *rubber* and *elastomer* are used to describe a group of materials that have the property of elasticity. An elastomer is defined as a substance that will return rapidly to its original size and shape after substantial deformation by stress and release of the stress. Thus a rubber band can be stretched many times its length without breaking but will revert quickly to its original measurement when the stretching force is disconnected. The property of elasticity is dependent on the fact that all elastomers consist of long flexible molecules known as linear high polymers. Strength and flexibility are imparted to rubbers and other elastomers during manufacturing when the polymer molecular structure is chemically modified through the formation of crosslinks by the use of fillers and the process of vulcanization. It is this combination of elasticity and flexibility coupled with strength that give natural and synthetic rubbers their unique properties used, in the manufacture of a wide range of domestic and industrial products essential to modern life.

From the late eighteenth century onwards, natural scientists, particularly in France, worked on ways of making waterproof coats and the production of elastic thread for fashion garments by experimenting with organic solvents such as turpentine, and dipping yarn and cloth in the resultant rubber solutions. The rubberized textiles produced by this method

were, however, brittle in winter and became sticky in warm weather. In 1823, the Glasgow industrialist, Charles Macintosh developed a process of waterproofing cloth by dissolving rubber in coal tar naphtha and applying the solution between two sheets of fabric. Macintosh's method allowed the large-scale production of raincoats and other waterproof fabrics because the textile layers protected the rubber and the solvent was a cheap, waste product of the expanding town gas industry.

The next significant steps took place, between 1820 and 1845, with the invention of three types of machinery capable of processing rubber in its solid state. In 1820, the English inventor, Thomas Hancock developed a machine that transformed hard, solid rubber to a soft, plastic material by shearing it between two rotors enclosed in an iron vessel. This process known by the technical term of *mastication* enabled softened rubber to be formed into shapes, such as boots, by moulding. The *calender* machine was patented in the USA by Edwin Chaffee in 1836. Calendering produces sheets of rubber of uniform thickness and made possible the bonding of rubber to canvas for the manufacture of belting. The extruder machine was invented to make insulated cables for telegraphic communications in 1845, and later was adapted to produce electric cables and wiring.

Vulcanization or *curing* is the term for the chemical process during which sulphur combines with rubber by the application of heat. The process imparts strength and flexibility to rubber when crosslinks are made between sulphur atoms and the long, polymer molecules of natural rubber to form a complex, three dimensional, matrix molecular structure. Vulcanized or cured rubber retains the property of elasticity and is stable under heating and cooling, unlike non-vulcanized rubber that is soft and sticky at

high temperatures but hard and brittle at low temperatures. The discovery of vulcanization is a matter of contention but is jointly attributed to Charles Goodyear in the USA and Thomas Hancock in England. The American, Goodyear is generally acknowledged as the first in 1839, with an accidental discovery on a hot stove. However the facts are that Hancock obtained a British provisional patent for the process in November 1843 and a final patent in May 1844 whereas Goodyear received his US patent in June 1844 (Coates, 1987: 36-7; Jones & Allen, 1992: 7; Barlow *et al*, 1994: 190; Loadman, 2005: 30-6, 62-6, 287-8; IRRDB, 2006: 22-3). However, as the polymer scientist, John Loadman (2005: 64) comments 'Whilst Goodyear may well have been the first person to vulcanise rubber, he certainly had no control of his process at the time of Hancock's patent, when the latter was able to illustrate his complete understanding and control of the chemistry'.

The development of machinery able to deal with solid rubber together with the process of vulcanization greatly accelerated the evolution of new rubber products. There is general consensus that the empirical discoveries of Goodyear and Hancock established the foundation of the rubber products manufacturing industries of today. Barlow *et al* (1994: 190), for example, regard vulcanization as 'the crucial technological breakthrough enabling rubber to become a pre-eminent industrial material'. The viewpoint of the International Rubber Research and Development Board (IRRDB) is that 'the twin developments of mastication by Hancock and vulcanization by Goodyear enabled the birth of the modern rubber industry' (IRRDB, 2007). From the 1850s onwards, rubber was being used to make industrial and consumer goods familiar to the present day observer, such as springs for

railway rolling stock, conveyors for grain elevators and mines, electrical and telegraphic cabling, waterproof fabrics and rubber footwear.

The assembly line method of automobile production developed in the USA by Henry Ford created a mass market for motor cars. Large-scale motor vehicle manufacturing placed pressure on the tyre industry to make a product that was long lasting and affordable by car owners of moderate financial means. Two developments, the use of carbon black filler in 1904 and the introduction of the Banbury mixer in manufacturing operations in 1916, are regarded as significant in satisfying these needs and contributing to the growth of the tyre industry. The identification of carbon black, produced by the incomplete combustion of natural gas, greatly improves the wear-resistance and tensile strength of natural rubber. The Banbury internal mixer enables large quantities of rubber to be masticated and mixed with carbon black, vulcanizing materials and other chemicals in a relatively short time. A major advance in the 1930s was the discovery that some mineral oils can be incorporated into rubber mixtures making the rubber easier to work during manufacture.

A new industry within the rubber manufacturing sector came into being in the late 1920s with the introduction of liquid latex concentrate. Products manufactured from latex concentrate replaced existing goods produced from rubber solutions because of their superior properties, cheaper production costs and ease of manufacture. Latex concentrate allowed the inexpensive, large-scale production of dipped goods, extruded thread, foam rubber and adhesives. Dipped products such as surgical gloves and condoms were of higher quality compared to similar products made by the solution process. It became possible for

clothing manufacturers to design new forms of garments and underwear incorporating latex extruded thread, and foam rubber was used in the furniture and bedding industries.

The large-scale production of synthetic rubbers that took place in the 1940s were used as an alternative material to natural rubber because supplies of *Hevea* rubber from South East Asia were cut off during the Second World War. Similarly, during the Cold War, the Soviet Union developed massive capacity to produce synthetic rubbers for strategic reasons. Low cost, 'general purpose' synthetic rubber with a molecular structure similar to *Hevea* rubber was a direct competitor to natural rubber, particularly in the tyre industry, and the natural product lost ground to synthetic materials. However, the competitive position of *Hevea* rubber changed in the 1970s with increases in the cost of petroleum feedstock and improvements to the quality of natural rubber by the introduction of technically specified rubber. At the same time, advances in polymer science that led to greater understanding of the differences in properties between synthetic and natural rubbers prompted manufacturers to use blends of both materials. Today, synthetic rubber and natural rubber are generally regarded as complementary products rather than competitors, each with its own cost advantage and unique technical properties suitable for a particular purpose. Both elastomers are used in blends for the majority of manufactured articles, the relative quantities of each rubber being dependent on the desired technical specification of the end product. The consumption of synthetic and natural rubbers by manufacturing industries on a global basis has stabilized at an approximate 60:40 ratio in favour of synthetic materials. In 2005, for example, total world rubber consumption was 21 million metric tons of which synthetics accounted for 12 million and natural rubber nine million tons (IRSG, 2007).

7. Rubber Products Manufacturing

7.1 Basic Processes: The science of the manufacture of rubber into finished products is studied within the discipline of rubber technology, an applied branch of polymer chemistry. There is an extensive body of literature on polymer materials science, rubber technology and rubber industry production methods that is highly specialist in nature. A standard text, for example, is *Natural Rubber Science and Technology* (Roberts, 1988). However, a more general account of rubber polymer chemistry is given by Loadman (2005) and a non-technical description of rubber goods manufacturing may be found in Barlow *et al* (1994: 197-211) as well as on the website of the International Rubber Research and Development Board.

Other materials have been added to rubber and the chemicals used in vulcanization for a variety of reasons since the early days of rubber manufacturing. These materials are used to accelerate the curing process, assist and improve manufacturing operations, provide strength, add bulk, reduce cost, colour the rubber and impart specific properties to the end product, such as resistance to ageing. In the rubber industry, the mixing of different substances such as fillers and accelerators, and curing agents with raw rubber during mastication is referred to as *compounding* and the generic term for all these materials is *compounding ingredients*.

Compounding rubber is a complicated operation because all the materials interact to determine the properties of the final product so that mix formulation is a skilled procedure within the overall manufacturing process especially when production cost factors have to be

taken into consideration. The objectives of compounding have been summarized by Crowther *et al* (1988: 177) thus:

a) to facilitate processing and fabrication;

b) to ensure a rapid throughput with minimal reject rate;

c) to achieve the required balance in vulcanizate properties; and

d) to provide durability.

Compounding solid rubber requires large-scale mixing machinery for economic throughput and, in the case of latex compounding, special equipment to handle a liquid product. Furthermore, cost savings can be made when items such as accelerators for vulcanization and carbon black filler are purchased in bulk. Specialist compounding companies known as compounders, therefore, produce compound rubber mixes or, *masterbatches* of natural and synthetic rubbers with oil, carbon black and other chemicals that are sold to small and medium-sized manufacturers. The masterbatch is added to raw rubber and other ingredients during manufacturing in order to facilitate factory operations.

The methods used in the manufacture of products from dry rubber produced in bales, on the one hand, and liquid latex concentrate, on the other, are so different that latex and dry rubber manufacturing are regarded as two separate sectors of the rubber industry. Similarly, tyre production, the largest consumer of natural and synthetic rubbers, employs a specialized technology in the dry rubber sector so that it too is regarded as a separate industry. The following sections, therefore, examine the manufacturing technologies for tyres, general rubber products and latex goods in turn.

7.2 Tyre Manufacture: The tyre industry is dominated by a small number of transnational corporations that operate on a worldwide basis: the three largest multinational firms are Goodyear (USA), Michelin (France) and Bridgestone (Japan). There are also smaller manufacturers that are strong as specialist tyre producers as well as companies that produce tyres for regional markets. The market for tyres is divided into two categories, *original equipment* (OE) tyres fitted to new vehicles at the time of manufacture and *replacement* tyres purchased to replace OE tyres when the treads are worn out. *Retreading* is important in extending the life of truck and aircraft tyres in the haulage and aviation industries.

Pneumatic tyres are complex engineering products manufactured to rigorous technical specifications. Tyre factories are typically large-scale operations with highly automated production lines because economies of scale offer cost advantages through long production runs. Automation also allows high quality outputs to be obtained with minimum inputs and technical rejects.

The basic design of a tyre consists of a casing (*carcass*) made out of layers of rubberized fabric and steel cord (*plies*) attached to steel wires (*beads*) embedded on the two sides of the carcass. The function of the steel beads is to attach the tyre to the rim of the wheel. The carcass has an overlay of *sidewalls* that extend from the beads to the tyre *tread*. The tread is built on a number of *tread bracing layers* or *breakers*, and it is that part of the tyre that comes in contact with the road surface. Blends of natural and synthetic rubbers are used in the carcass, sidewalls and treads, the amount of each rubber is dependent upon the tyre component and the type of tyre, for example, motor car, heavy truck or agricultural tractor. Tyres are fabricated or built from the individual components on an open-ended metal drum

shell mounted on a driven shaft. After fabrication, the raw tyres are transferred into a compression mould that gives the required shape and tread pattern. Vulcanization then takes place by applying heat from an external source. After cooling, the finished tyre products undergo quality control testing procedures.

7.3 General Rubber Products: There are three main stages in the fabrication of general rubber goods:

- Mixing
- Shaping
- Vulcanization

Mixing: Mixing is carried out in heavy-duty, internal mixers with a capacity to process batches of 200 kg of rubber in two minutes. This operation has two functions: mastication and compounding. Firstly, the solid rubber is softened in the process of mastication by shearing between rotary mixers or mills. Secondly, the rubber is admixed with compounding ingredients that typically include masterbatch, additional fillers such as carbon black or silica, vulcanizing components, accelerator chemicals and protective agents. In many manufacturing operations, it is the practice to add synthetic rubbers during the mixing process to produce a blend of natural and synthetic materials in order to combine the properties of each elastomer. Mixing operations generate considerable heat and the resultant compounded rubber mixture is soft and plastic and so is easily shaped.

Shaping: The soft rubber mix is formed into the final product by three common shaping techniques: *moulding* under pressure; *extrusion* through a die; and *calendering* between rollers.

Moulding under pressure in a heated mould is the most common manufacturing method. In contrast to other methods of shaping, vulcanization takes place during the moulding process. There are three important variants of moulding: compression, transfer and injection moulding. Most rubber articles are made by compression moulding where a *blank* or *slug* of uncured rubber mix is shaped in a steel cavity mould and compressed together with the application of heat until vulcanization is complete. Compression moulding is cheap, rapid and capable of long or short production runs. In transfer moulding operations a slug of rubber is put into an upper chamber, then forced by a ram through a small aperture into a cavity mould where curing takes place. This method is used in short production runs for precision work such as the production of engineering parts. Injection moulding is a semi-continuous process in which the rubber mix is extruded from the heated barrel of a screw or ram machine through a nozzle into a heated mould. Because the rubber reaches the mould at a high temperature, curing times are short. The process is suitable for the long-run production of precision engineering components and other high specification articles.

Extrusion is the method where compounded rubber is forced through a die from a ram or screw extruder to form the required product and shape. Different dies are used depending on the end product. Vulcanization takes place after extrusion as a separate process. Extruded products include hoses, tubing, cables, weatherstrip for automobiles and tyre sidewalls.

Calendering is the process by which rubber mix is passed through three or four rollers to either make a rubber sheet of uniform thickness, or to bond the rubber with fabric material or metal cord. After calendering the product is vulcanized. Rubberized textile and steel cord products include conveyor belting and tyre carcasses. Rubber sheeting may be fabricated into rollers, for example, printing rollers.

Vulcanization: The purpose of the curing process or vulcanization is to modify the molecular structure of the rubber polymer through the formation of crosslinks with vulcanizing chemicals by the application of heat. The most common vulcanizing agent is sulphur which is used with small amounts of other chemicals, including zinc oxide and organic sulphur compounds that activate and accelerate the process. Vulcanization is part and parcel of the manufacturing operation in the production of moulded articles when curing takes place at the same time as shaping in heated moulds. Extruded and calendered products are vulcanized after shaping and the process is performed in a variety of ways, depending on the form and size of product. It includes batch techniques in a steam or air autoclave and heated presses, and continuous methods by passage through steam or hot air, or immersion in molten metal salts.

7.4 Latex Goods: The production of articles from latex concentrate, made by centrifuging raw latex from *Hevea* trees, is a separate manufacturing sector from industrial production of tyres and general rubber goods. This is because the machinery used, factory techniques employed and marketing structure for finished products differ greatly from the rest of the industry. Articles may be manufactured from pure natural rubber latex, a mixture of natural

latex and synthetic latex, or synthetic latex. The manufacture of latex goods involves both compounding and vulcanization similar to dry rubber manufacturing. Larger producers generally operate fully integrated processing plants but many smaller processors purchase latex compounds from specialist compounding firms. Natural rubber is used extensively in the production of medical and household gloves, condoms, catheters and latex thread, whereas synthetic rubber is important in the manufacture of carpet backings, paper making and in paints.

Dipping is the process used in making rubber gloves, condoms, medical catheters and balloons. The manufacturing stages for dipped goods are: a shaped *former* made out of glass or ceramic material is dipped into a bath of coagulant, then into a bath of prevulcanized latex on a continuous production line. Drying is followed by vulcanization before the latex product is stripped away from the former which is then cleaned. Production of examination and surgical gloves for the medical profession is frequently integrated with the manufacture of catheters and condoms. These products are generally marketed through specialist companies supplying the medical, hospital and health care industries.

Extrusion is employed in the manufacture of latex thread. The latex is extruded through glass capillary nozzles and the fine threads are drawn through long tunnels where drying and vulcanization take place. The latex thread industry has its own specialist technology and production techniques, and sells its output to textile firms that produce elasticated thread for the garment industries.

Foam rubber goods are prepared by the aeration of compounded latex followed by the addition of a gelling agent that sets the rubber without breaking down the foam structure. The foamed rubber is shaped in a mould where vulcanization takes place. The major use of foam rubber is in mattresses, pillows and upholstery.

Casting is a technique used to produce latex moulds that in turn are employed in the manufacture of articles made of plaster or other substances with a low setting temperature. Cast latex is used in theatrical make-up, in stage and film set scenery and, more extensively, to make latex rubber toys.

Appendix 1

Introductory letter

(School of Management letterhead)

Dear Sirs,

Survey of Industrial Rubber-Products Manufacturing Sector

The School of Management and the Centre for International Development at the University of Bradford are involved in a collaborative programme of research in international business and management. Current areas of interest include a study of backward linkages and transfer of technology in businesses located in the ASEAN and East Asian regions. A study of the electrical and electronics sector in Malaysia has recently been carried out as part of this programme.

We are now interested in undertaking a similar survey in companies manufacturing industrial rubber-products. One outcome of the project is to determine the impact that production technology developed in Malaysian research institutes has had on the intermediate rubber-manufacturing sector compared to technology transferred from overseas sources. Another important objective is to evaluate the linkages the industrial rubber-products industries have with other sectors of the Malaysian economy.

The research worker responsible for the project is Mr C C Goldthorpe who has over forty years of experience in the natural rubber industry. He first came to Malaysia in 1962 to work as a planter then joined ICI Agriculture employed in the marketing of fertilizers and agrochemicals to the plantation industry. From 1985 to 1997, he was Senior Rubber Industry Development Officer with the International Natural Rubber Organization based in Kuala Lumpur. Currently he is a research worker attached to the Bradford Centre for International Development.

Mr Goldthorpe will contact you shortly with the questionnaire.

We write to invite you to participate in the survey. Your cooperation will contribute greatly to this important area of research and we thank you for it.

Yours faithfully,

Professor Arthur Francis
Dean and Director

QUESTIONNAIRE

CONFIDENTIAL

BACKWARD LINKAGES and TECHNOLOGY TRANSFER
in the
INDUSTRIAL RUBBER-PRODUCTS
MANUFACTURING SECTOR
in
MALAYSIA

UNIVERSITY of BRADFORD
BRADFORD CENTRE for INTERNATIONAL DEVELOPMENT
BRADFORD BD7 1DP
UNITED KINGDOM

INTRODUCTION

Thank you for your participation. Answering these questions will take about 20 minutes. We know that you are busy, therefore *we are very grateful to you* for taking the time to respond.

- **We are interested in the major manufacturing inputs such as**
  - **Raw natural rubber (NR)**
  - **Synthetic rubbers (SR) and other elastomers**
  - **Compounding ingredients**
  - **Machinery and equipment**

  purchased by your company from manufacturers and local suppliers in Malaysia or from companies based in overseas countries.

- **We are also seeking information about the technology used in the manufacturing process and the technical assistance provided to your firm. The basic question is whether the technological know-how and technical advisory services comes primarily from research and development institutes in Malaysia or overseas.**

- **For the purpose of this survey:**

  - ***Exports* is defined as production sold and delivered to overseas countries, including Singapore.**
  - ***Local supplier* is defined as all types of companies based in Malaysia that provide inputs to your firm, *whether they are Malaysian-owned or not.***
  - ***Technology* is defined as the techniques and processes used in manufacturing operations.**
  - ***Technical assistance* is defined as the advisory or R&D services consulted to upgrade manufacturing technology or to advise on problem-solving in the manufacturing process.**

Please read through the questionnaire before you begin to answer the questions.

Code

Please tick a box to answer the question

1. Ownership of company

Wholly Malaysian owned ☐1. Joint venture: majority Malaysian-owned ☐2.

50:50 joint venture ☐3. Joint venture: minority Malaysian-owned ☐4.

Wholly foreign-owned subsidiary ☐5.

2. Source of foreign investment

Singapore/Hong Kong/Taiwan ☐1. Japan/South Korea ☐2.

USA/Canada ☐3. European Union ☐4.

Australia/New Zealand ☐5. ASEAN countries except Singapore ☐6.

Other countries, please specify ☐7.

3. Paid-up capital

Over RM 2.5 million ☐1. RM 0.5 to 2.5 million ☐2.

Less than RM 0.5 million ☐3.

4. Number of employees

Over 200 ☐1. 50 to 199 ☐2. Less than 50 ☐3.

5. Location in Free Trade Zones
The factory is located in a Free Trade Zone or Licensed Manufacturing Warehouse:

Yes ☐1. No ☐2.

6. Exports as percentage of production
The company exports:

No exports ☐9. All its production ☐1.

75 – 99% of its production ☐2. 50 – 74% of its production ☐3.

25 – 49% of its production ☐4. Less than 25% of its production ☐5.

7. Export markets
The company exports to the following markets *(tick more than one box as appropriate)*:

USA/Canada ☐1. European Union ☐2.

Japan/South Korea ☐3. Australia/New Zealand ☐4.

ASEAN ☐5. Rest of the world ☐6.

8. Source of NR: Malaysia

Wholly from Malaysia ☐1. 75 – 99% from Malaysia ☐2.

50 -74% from Malaysia ☐3. 25 – 49% from Malaysia ☐4.

Less than 25% from Malaysia ☐5.

9. Source of NR: other countries *(tick more than one box as appropriate)*:

Thailand ☐1. Indonesia ☐2.

Other ASEAN countries ☐3. Non-ASEAN countries ☐4.

10. Source of synthetic rubbers (SR) and other elastomers, e.g. thermoplastic polymers
The company purchases SR and other elastomers:

We do not use SR and elastomers ☐9.

Wholly from firms based in Malaysia ☐1.

75 – 99% from firms based in Malaysia ☐2.

50 – 74% from firms based in Malaysia ☐3.

25 – 49% from firms based in Malaysia ☐4.

Less than 25% from firms based in Malaysia ☐5.

Wholly from overseas suppliers ☐6.

11. Source of manufacture of compounding ingredients by volume (e.g. master batches, carbon black and other fillers, accelerators and other processing aids)

All made in Malaysia ☐1. 75 – 99% made in Malaysia ☐2.

50 – 74% made in Malaysia ☐3. 25 – 49% made in Malaysia ☐4.

Less than 25% made in Malaysia ☐5. All made overseas ☐6.

12. Malaysian suppliers of compounding ingredients
The company purchases its compounding ingredients:

Wholly from firms based in Malaysia ☐1.

75 – 99% from firms based in Malaysia ☐2.

50 – 74% from firms based in Malaysia ☐3.

25 – 49% from firms based in Malaysia ☐4.

Less than 25% from firms based in Malaysia ☐5.

Wholly from overseas suppliers ☐6.

13. Source of manufacture of machinery and equipment such as mills and mixers, extruders and moulding machinery

All made in Malaysia ☐1. 75 – 99% made in Malaysia ☐2.

50 – 74% made in Malaysia ☐3. 25 – 49% made in Malaysia ☐4.

Less than 25% made in Malaysia ☐5. All made overseas ☐6.

14. Source of technology.
What is the source of the technology and know-how used in the manufacturing operations? ***(Tick more than one box as appropriate.)***

In the public domain (i.e. know-how and techniques are common knowledge throughout the industry) ☐1

Technology developed on factory floor ☐2

In-house laboratory or research centre located in Malaysia ☐3

Research institutes of Malaysian Rubber Board (RRIM Rubber Technology Centre, Sungai Buloh; Tun Abdul Razak Research Centre, Brickendonbury, UK) ☐4

Standards and Industrial Research Institute of Malaysia (SIRIM) ☐5

Technology transfer agreement with foreign company e.g. licensing agreement ☐6

Parent-company overseas (foreign-owned and joint venture companies only) ☐7

15. Ranking of technology sources.
(Please rank on a scale of 1 – 5 the importance of the technology from various sources)

1: very important 2: important 3: useful 4: unimportant 5: negligible or no importance

Public domain	☐ 1 - 5
Factory floor	☐ 6 - 10
In-house laboratory or research centre	☐ 11 – 25
Malaysian Rubber Board research centres	☐ 16 – 20
SIRIM	☐ 21 – 25
Technology transfer agreement	☐ 26 – 30
Parent-company overseas (foreign-owned and joint venture companies only)	☐ 31 – 35

16. Source of technical assistance

Where do you obtain advice on technical problems? ***(Tick more than one box as appropriate)***

No advice sought	☐ 9
In-house laboratory or research centre	☐ 1
Malaysian Rubber Board research centres	☐ 2
SIRIM	☐ 3
Internet	☐ 4
Owner of technology licence	☐ 5
Parent-company overseas (foreign-owned and joint venture companies only)	☐ 6

17. Ranking of technical assistance

(Please rank on a scale of 1-5 the importance of the various technical advisory services)

1: very important 2: important 3: useful 4: unimportant 5: negligible or no importance

In-house laboratory or research centre	☐ 1 – 5
Rubber Board research centres	☐ 6 – 10
SIRIM	☐ 11 – 15
Internet	☐ 16 – 20
Owner of technology licence	☐ 21 – 25
Parent-company overseas (foreign-owned and joint venture companies only)	☐ 26 – 30

18. Delivery of technical assistance

(Please rank on a scale of 1-5 the effectiveness of delivery of the various technical advisory services)

1: very effective 2: effective 3: useful 4: not very effective 5: negligible or not effective

In-house laboratory or research centre	☐ 1 – 5
Malaysian Rubber Board research centres	☐ 6 – 10
SIRIM	☐ 11 - 15
Internet	☐ 16 – 20
Owner of technology licence	☐ 21 – 25
Parent-company overseas (foreign-owned and joint venture companies only)	☐ 26 – 30

Thank you for your contribution

If you would like a copy of the Executive Summary of the survey,

please tick this box. ☐

Please return the completed questionnaire in the stamped self-addressed envelope to :

Mr C C Goldthorpe
Bradford Centre for International Development
University of Bradford
Richmond Road
Bradford BD7 1DP
UK

Or, fax to:

Chris Goldthorpe
+ 44 1226 762201

Or, if preferred, scan into a file and e-mail to:

c.c.goldthorpe@bradford.ac.uk

Appendix 2

Analysis of Secondary Data

The appendix contains the results, including where appropriate statistical analysis, obtained by using the SPSS computer program of eight Research Questions for seven of the eight categories of rubber manufacturer. A separate analysis of the three companies in the pneumatic tyre sector has been undertaken in Chapter 9. The research questions posed for each sector are:

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

The periods are: in colonial times and early years of independence up to 1969; between 1970 and 1984 when the New Economic Policy was dominant; from 1985 to 2005 during the implementation of the First and Second Industrial Master Plans.

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

The world market has been divided into six economic/regional markets: USA/Canada; European Union; Japan/South Korea; Australia/New Zealand; ASEAN; Rest of the world. The rest of the world market includes China, the Indian subcontinent, the Middle East, North Africa, sub-Saharan Africa and Latin America.

1: Automotive, engineering and industrial sector: 110 companies

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A1.1
Ownership

	Frequency	Per cent
Malaysian	78	70.9
F & JV	32	29.1
Total	110	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

TableA1.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	4	5.1
	1970 – 1984	28	35.9
	1985 – 2005	39	50.0
	no record	7	9.0
F & JV	before 1970	1	3.1
	1970 – 1984	2	6.3
	1985 – 2005	29	90.6

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A1.3
Source of Foreign Investment

	Frequency	Per cent
USA	1	3.1
European Union	4	12.5
Japan	22	68.8
Australia	1	3.1
Singapore	2	6.25
Taiwan	2	6.25

The 4 EU countries are: Denmark; Germany; Italy; UK one company each.

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A1.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	54	0.1	51.7	3.1	7.75
F & JV	27	0.3	26.0	6.1	5.63

Kossan Rubber Industries is a public listed company quoted on the Malaysian Stock Exchange with a capitalization of RM51.74 million which is an extreme outlier compared to the other 53 Malaysian-owned firms. When this enterprise is removed from the analysis the following results are obtained:

Table A1.4b
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	53	0.1	20.0	2.2	3.85
F & JV	27	0.3	26.0	6.1	5.63

Using the figures in Table A1.4b above, an independent-samples t-test was conducted to compare the level of capitalization for 53 Malaysian, and 27 foreign and joint venture companies. There was a significant difference in the paid-up capital for Malaysian companies (M = 2.2, SD = 3.8), and foreign and joint venture companies [M = 6.1, SD = 5.6; t (32) = 3.2, p = 0.002]. The magnitude of the means was large (eta squared = 0.13). The conclusion is that foreign and joint venture companies are more heavily capitalized than Malaysian companies.

Table A1.4c

Capitalization Class

All Companies

		Frequency	Per cent
Malaysian	over RM2.5 m	10	12.8
	RM0.5 to 2.5 m	27	34.6
	less than RM0.5 m	17	21.8
	no record	24	30.8
F & JV	over RM2.5m	20	62.5
	RM0.5 to 2.5m	6	18.8
	less than RM0.5m	1	3.1
	no record	5	15.6

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A1.5a
Number of Workers
All Companies

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	61	10	520	88	103.2
F & JV	29	30	1160	234	268.7

An independent-samples t-test was conducted to compare the number of workers employed in 61 Malaysian companies and 29 foreign and joint venture companies. There was a significant difference in the number of workers in Malaysian companies (M = 88, SD = 103.2), and foreign and joint venture companies [M = 234, SD = 268.7; t (32) = 2.8, p = 0.008]. The magnitude of the differences of the means was moderate (eta squared = 0.08). The conclusion is that foreign and joint venture companies employ more workers than Malaysian companies.

Table A1.5b
Employee Class
All Companies

		Frequency	Per cent
Malaysian	over 200 workers	9	11.5
	to 199 workers	27	34.6
	less than 50 workers	28	35.9
	no record	14	17.9
F & JV	over 200 workers	10	31.3
	50 to 199 workers	15	46.9
	less than 50 workers	5	15.6
	no record	2	6.3

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A1.6
Large and Small/Medium Enterprises
All Companies

		Frequency	Per cent
Malaysian	large-scale	12	15.4
	small/medium-scale	55	70.5
	no record	11	14.1
F & JV	large-scale	24	75.0
	small/medium-scale	7	21.9
	no record	1	3.1

A Chi-square test for independence (with Yates Continuity Correction for a 2 x 2 table) indicated a significant difference in size between foreign and joint venture companies, and Malaysian companies, Chi-square (1, n = 98) = 29.8, p = 0. The result is significant, therefore, the number of large-scale foreign and joint venture companies is significantly higher than the number of large-scale Malaysian companies.

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A1.7
Exports as Percentage of Production

		Frequency	Per cent	Valid per cent
Malaysian	95 – 100%	2	2.6	5.4
	75 – 94%	5	6.4	13.5
	50 - 74%	6	7.7	16.2
	25 – 49%	13	16.7	35.1
	less than 25%	8	10.3	21.6
	no exports	3	3.8	8.1
	total	37	47.4	100.0
	no record	41	52.6	
F & JV	95 – 100%	2	6.3	9.5
	75 – 94%	12	37.5	57.1
	50 – 74%	5	15.6	23.8
	25 – 49%	1	3.1	4.8
	less than 25%	1	3.1	4.8
	total	21	65.6	100.0
	no record	11	34.4	

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A1.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	28	32	24	30	50	39
F & JV	10	9	17	11	23	18

Table A1.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	48.3	55.2	41.4	51.7	86.2	67.2
F & JV	35.7	32.1	60.7	39.3	82.1	64.3

2: Motor cycle tyre, bicycle tyre, inner tube and solid tyre sector: 13 companies.

Question 1: How many companies are wholly Malaysian-owned and how many are foreign-owned and joint venture enterprises?

Table A2.1
Ownership

	Frequency	Per cent
Malaysian	12	92.3
F & JV	1	7.7
Total	12	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

TableA2.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	2	16.7
	1970 – 1984	5	41.7
	1985 – 2005	5	41.7
F & JV	1985 – 2005	1	100.0

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A2.3
Source of Foreign Investment

One company	Japan

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A2.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	11	0.1	20.0	4.10	6.05
F & JV	1		30.0	30.0	

Table A2.4b
Capital Class

		Frequency	Per cent
Malaysian	over RM2.5 m	3	25.0
	RM0.5 to 2.5m	6	50.0
	less than RM0.5m	2	16.7
	no record	1	9.1
F & JV	over RM2.5m	1	100.0

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A2.5a
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	12	35	550	128	139.6
F & JV	1		190	190.00	

Table A.2.5b
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	1	9.1
	50 to 199 workers	10	83.3
	less than 50 workers	1	8.3
F & JV	50 to 199 workers	1	100.0

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A2.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	3	25.0
	small/medium-scale	9	75.0
F & JV	large-scale	1	100.0

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A2.7
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	50 - 74%	1	8.3
	25 – 49%	3	25.0
	less than 25%	1	8.3
	no exports	3	25.0
	no record	4	33.0
F & JV	no exports	1	100.0

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A2.8
Export Markets

No. companies	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	1	6	1	6	7	8
F & JV	0	0	1	0	0	0

Malaysian companies sell into four export markets compared to the Japanese firm that supplies its home market.

3: Latex dipped goods sector: 111 companies.

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A3.1
Ownership

	Frequency	Per cent
Malaysian	88	79.3
F & JV	23	20.7
Total	111	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

Table A3.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	0	
	1970 – 1984	7	8.0
	1985 – 2005	70	79.5
	no record	11	12.5
F & JV	before 1970	0	
	1970 – 1984	7	30.4
	1985 – 2005	16	69.6

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A3.3
Source of Foreign Investment

	Frequency	Per cent
USA	6	26.1
European Union	7	33.4
Japan/South Korea	6	26.1
Australia/New Zealand	2	8.7
International private	2	8.7

The 7 EU countries are: Germany 3 firms; France 2 firms; Denmark and Sweden one company each. Japan 5 firms. South Korea, Australia and New Zealand one company each.

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A3.4a
Outlier Companies

Company	Paid-up Capital	Ownership
APL Industries	RM347.6 million	Malaysian
WRP Asia Pacific	RM385.0 million	Joint venture

Table A3.4b
Malaysian Public Listed Companies: Capitalization (RM m)
Outlier companies removed for independent-samples t-test.

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	3	70.5	94.3	84.9	12.6
F & JV	19	0.5	120.0	19.7	29.0

An independent-samples t-test was conducted to compare the level of capitalization for three Malaysian-owned, public listed companies, and 19 foreign and joint venture companies. There was a significant difference in paid-up capital for Malaysian companies (M = 84.9, SD = 12.6), and foreign and joint venture companies [M = 19.7, SD = 29.0; t(20) = 3.78, p = 0.001]. The magnitude of differences of the means was very large (eta squared = 0.4). The conclusion is that Malaysian companies listed on the stock exchange are more heavily capitalized than foreign and joint venture enterprises

Table A3.4c
Malaysian Non-public Listed Companies: Capitalization (RM m)

	N	Minium	Maximum	Mean	Std Dev
Malaysian	68	0.2	28.0	3.15	4.0
F & JV	19	0.5	120.0	19.70	29.0

An independent-samples t-test was conducted to compare the level of capitalization for 68 Malaysian-owned, non-public listed companies, and 19 foreign and joint venture companies. There was a significant difference in paid-up capital for Malaysian companies (M = 3.15, SD = 4.0), and foreign and joint venture companies [M = 19.7, SD = 29.0; t(18.19) = -2.48, p = 0.023]. The magnitude of differences of the means was moderate (eta squared = 0.07). The conclusion is that foreign and joint venture companies are more heavily capitalized than Malaysian companies that are not listed on the stock exchange.

Table A3.4d
Malaysian Public Listed Companies: Capital Class
All Cases

		Frequency	Per cent
Malaysian	over RM2.5 m	4	80.0
	no record	1	20.0
F & JV	over RM2.5m	16	69.6
	RM0.5 to 2.5m	4	17.4
	no record	3	13.0

Table A3.4e
Malaysian Non-public Listed Companies: Capital Class
All Cases

		Frequency	Per cent
Malaysian	over RM2.5 m	24	28.9
	RM0.5 to 2.5 m	38	45.8
	less than RM0.5 m	6	7.2
	no record	15	18.1
F & JV	over RM2.5m	16	69.6
	RM0.5 to 2.5m	4	17.4
	no record	3	13.0

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A3.5a
Malaysian Public Listed Companies
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	4	1000	6500	2750	2533.1
F & JV	21	80	3055	820	825.1

An independent-samples t-test was conducted to compare the number of workers employed in four Malaysian, public listed companies, and 21 foreign and joint venture companies. There was no significant difference in the number of workers in Malaysian, public listed companies (M = 2750, SD = 2533.1), and foreign and joint venture companies [M = 820,SD = 825.1; t(3.122) = 1.51, p = 0.225]. The magnitude of the difference in the means was moderate (eta squared = 0.09). The conclusion based on the result of the t-test is that there is no statistical difference in the number of employees in the workforce in the two classes of company.

Nevertheless, an examination of the mean values as well as the minimum and maximum values indicates a substantial difference between Malaysian companies and those with foreign capital participation. The striking anomaly between the observed figures and the result of non-significance of the t-test may be explained by two factors that could adversely influence the statistical analysis. Firstly, the number of firms in each group is dissimilar (n 4 and n 21) so that the assumptions for the Levene test for equality are violated because the ratio between the two groups is larger than 1.5. Secondly, the small sample size (n = 25) leads to the possibility that a non-significant result was obtained because the power of a test is very dependent on the size of the sample used in the study. It is suggested that the influence of these two factors has resulted in a Type 2 error occurring where the null hypothesis has been falsely rejected leading to the conclusion that the two categories of company do not differ, when in fact they do.

Table A3.5b
Malaysian Non-public Listed Companies
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	77	20	1200	283	291.9
F & JV	21	80	3055	820	825.1

An independent-samples t-test was conducted to compare the number of workers employed in 77 Malaysian, non-public listed companies, and 21 foreign and joint venture companies. There was a significant difference in the number of workers in Malaysian, non-public listed companies (M = 283, SD = 291.9), and foreign and joint venture companies [M = 820, SD = 825.1; t(21.38) = -2.937, p = 0.008]. The magnitude of the differences in the means was moderate (eta = 0.08). The conclusion is that foreign and joint venture companies employ greater number of workers than Malaysian companies that are not listed on the stock exchange.

Table A.3.5c
Malaysian Public Listed Companies
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	4	80.0
	no record	1	20.0
F & JV	over 200 workers	12	52.2
	50 to 199 workers	9	39.1
	no record	2	8.7

Table A.3.5d
Malaysian Non-public Listed Companies
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	33	39.8
	50 to 199 workers	36	43.4
	less than 50 workers	8	9.6
	no record	6	7.2
F & JV	over 200 workers	12	52.2
	50 to 199 workers	9	39.1
	no record	2	8.7

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A3.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	45	51.6
	small/medium-scale	39	44.3
	no record	4	4.5
F & JV	large-scale	19	82.4
	small/medium-scale	3	13.0
	no record	1	4.3

A Chi-square test for independence (with Yates Continuity Correction for a 2 X 2 table) indicated a significant difference in size between foreign and joint venture companies, and Malaysian-owned companies, Chi-square (1, n = 106) = 6.5, p = 0.01. The conclusion is that foreign and joint venture companies are typically larger in size than Malaysian companies.

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A3.7
Exports as Percentage of Production

	Frequency	Per cent	Valid per cent	
Malaysian	95 – 100%	43	48.9	74.1
	75 – 94%	13	14.8	22.4
	50 - 74%	2	2.3	3.4
	total	58	65.9	100.0
	no record	30	34.1	
F & JV	95 – 100%	13	56.5	68.4
	75 – 94%	5	21.7	26.3
	50 – 74%	1	4.3	5.3
	total	19	82.6	100.0
	no record	4	17.4	

It was not possible to carry out the Chi-square test for independence because 3 cells (50.0%) have an expected count of less than 5.

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A3.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	71	77	55	40	35	64
F & JV	18	22	19	12	15	19

Table A3.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	80.7	87.5	62.5	45.5	39.8	72.7
F & JV	78.3	95.7	82.6	52.2	65.2	82.6

4: Latex other products sector: 16 companies.

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A4.1
Ownership

	Frequency	Per cent
Malaysian	13	81.3
F & JV	3	18.8
Total	16	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

Table A4.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	2	15.4
	1970 – 1984	3	23.1
	1985 – 2005	8	61.5
F & JV	before 1970	1	33.3
	1970 – 1984	1	33.3
	no record	1	33.3

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A4.3
Source of Foreign Investment

	Frequency	Per cent
USA	1	33.3
European Union	2	66.7

E U countries: Germany: 1 company; Netherlands: 1 company.

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Extruded latex thread companies are excluded from the analysis.

Table A4.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	6	0.4	10.5	2.65	3.9
F & JV	1			5.4	

Table A4.4b
Capital Class

		Frequency	Per cent
Malaysian	over RM2.5 m	1	11.1
	RM0.5 to 2.5 m	4	44.4
	less than RM0.5 m	1	11.1
	no record	3	33.3
F & JV	over RM2.5m	1	33.3
	no record	2	66.7

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Extruded latex thread companies are excluded from the analysis.

Table A4.5a
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	8	16	160	78	42.9
F & JV	2	40	335	188	208.0

Table A.4.5b
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	0	
	50 to 199 workers	6	66.7
	less than 50 workers	2	22.2
	no record	1	11.1
F & JV	over 200 workers	1	33.3
	50 to 199 workers	0	
	less than 50 workers	1	33.3
	no record	1	33.3

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

All cases including manufacturers of extruded latex thread.

Table A4.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	5	38.5
	small/medium-scale	8	61.5
F & JV	large-scale	2	66.7
	no record	1	33.3

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A4.7
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	95 - 100%	3	23.1
	75 – 94%	1	7.7
	50 – 74%	1	7.7
	25 – 49%	1	7.7
	less than 25%	0	
	no record	7	53.8
F & JV	less than 25%	1	33.3
	no record	2	66.7

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A4.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	7	9	9	10	10	10
F & JV	2	2	2	2	0	2

Table A4.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	53.3	69.2	69.2	76.9	76.9	76.9
F & JV	66.7	66.7	66.7	66.7	0	66.7

5. Low technology general products sector: 47 companies

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A5.1
Ownership

	Frequency	Per cent
Malaysian	38	80.9
F & JV	9	19.1
Total	46	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

Table A5.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	1	2.6
	1970 – 1984	10	26.3
	1985 – 2005	19	50.0
	no record	8	21.1
F & JV	1970 – 1984	2	22.2
	1985 – 2005	6	66.7
	no record	1	11.1

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A5.3
Source of Foreign Investment

	Frequency	Per cent
Germany	2	22.2
Japan	5	55.5
South Korea	1	11.1
Taiwan	1	11.1

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A5.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	22	0.1	22.5	2.6	5.13
F & JV	6	0.4	5.0	3.3	2.20

Table A5.4b
Capital Class

		Frequency	Per cent
Malaysian	over RM2.5 m	4	10.5
	RM0.5 to 2.5 m	10	26.3
	less that RM0.5 m	8	21.1
	no record	16	42.1
F & JV	over RM2.5 m	4	44.4
	RM0.5 to 2.5 m	1	11.1
	less than RM0.5 m	1	11.1
	no record	3	33.3

An independent-samples t-test was conducted to compare the level of capitalization for 22 Malaysian companies, and six foreign and joint venture companies. There was no significant difference in the paid-up capital for Malaysian companies (M = 2.6, SD = 5.1), and foreign and joint venture companies [M = 3.3, SD = 2.2; t (26) = - 0.32, p = 0.755]. The magnitude of the differences in the means was very small (eta squared = 0.004).). The conclusion based on the result of the t-test is that there is no statistical difference in the level of capitalization in the two classes of company.

However a note of caution may be required in interpreting the result. The result of non-significance of the t-test may be explained by the small sample size (N = 28) that could adversely influence the statistical analysis. The small sample of only 28 companies leads

to the possibility that a non-significant result was obtained because the power of a test is very dependent on the size of the sample used in the study.

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A5.5a
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	30	14	250	70	62.03
F & JV	8	10	450	148	150.16

Table A.5.5b
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	2	5.3
	50 to 199 workers	13	34.2
	less than 50 workers	15	39.5
	no record	8	21.1
F & JV	over 200 workers	3	33.3
	50 to 199 workers	3	33.3
	less than 50 workers	2	22.2
	no record	1	11.1

An independent-samples t-test was conducted to compare the number of workers employed in 30 Malaysian companies, and eight foreign and joint venture companies. There was no significant difference in the number of workers in Malaysian companies (M = 70, SD = 62.03), and foreign and joint venture companies [M = 148, SD = 150.17; t (7.7) = -1.45, p = 0.187]. The magnitude of the differences in the means was moderate (eta squared = 0.05). The conclusion based on the result of the t-test is that there is no statistical difference in the number of employees in the workforce in the two classes of company.

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A5.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	5	13.2
	small/medium-scale	27	71.1
	no record	6	15.8
F & JV	large-scale	5	55.6
	small/medium scale	4	44.4

It was not possible to carry out the Chi-square test for independence because 1 cell (25.0%) has an expected count of less than 5.

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A5.7
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	95 – 100%	2	5.3
	75 – 94%	5	13.2
	50 - 74%	2	5.3
	25 – 49%	1	2.6
	less than 25%	2	5.3
	no record	26	68.4
F & JV	95 – 100%	2	22.2
	75 – 94%	3	33.3
	no record	4	44.4

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A5.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	14	18	14	13	15	18
F & JV	3	3	7	3	4	6

Table A5.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	36.8	47.4	36.8	34.2	39.5	47.4
F & JV	33.3	33.3	77.8	33.3	44.4	66.7

6: Footwear sector: 19 companies

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A6.1
Ownership

	Frequency	Per cent
Malaysian	17	89.5
F & JV	2	10.5
Total	16	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

Table A6.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	1	5.9
	1970 – 1984	5	29.4
	1985 – 2005	7	41.2
	no record	4	23.5
F & JV	before 1970	1	50.0
	1970 – 1984	1	50.0

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A6.3
Source of Foreign Investment

	Frequency	Per cent
Canada	1	50.0
Norway	1	50.0

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A6.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	4	0.6	7.2	3.1	2.9
F & JV	2	1.5	8.0	4.7	4.6

Table A6.4b
Capital Class

		Frequency	Per cent
Malaysian	over RM2.5 m	2	11.8
	RM0.5 to 2.5 m	2	11.8
	no record	13	76.5
F & JV	over RM2.5m	1	50.0
	RM0.5 to 2.5m	1	50.0

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A6.5a
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	12	15	171	92	52.4
F & JV	2	300	510	405	148.5

Table A.6.5b
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	1	5.9
	50 to 199 workers	8	47.1
	less than 50 workers	3	17.6
	no record	5	29.4
F & JV	over 200 workers	2	100.0

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A6.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	2	11.8
	small/medium-scale	10	58.8
	no record	5	29.4
F & JV	large-scale	2	100.0

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A6.7
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	less than 25%	3	17.6
	no record	14	82.4
F & JV	95 – 100%	1	50.0
	less than 25%	1	50.0

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A6.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	1	4	3	5	5	9
F & JV	1	1	1	1	1	1

Table A6.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	5.9	23.5	17.6	29.4	29.4	52.9
F & JV	50.0	50.0	50.0	50.0	50.0	50.0

7: Compounding and retreading materials sector: 21 companies

Question 1: How many companies are wholly Malaysian-owned, and how many are foreign-owned companies and joint venture enterprises?

Table A7.1
Ownership

	Frequency	Per cent
Malaysian	20	95.2
F & JV	1	4.8
Total	21	100.0

Question 2: In what period of time were wholly Malaysian-owned companies, and foreign-owned companies and joint venture enterprises established?

TableA7.2
Year of Incorporation

		Frequency	Per cent
Malaysian	before 1970	4	20.0
	1970 – 1984	3	15.0
	1985 – 2005	9	45.0
	no record	4	20.0
F & JV	1985 – 2005	1	100.0

Question 3: What is the source of direct foreign investment in the case of the foreign-owned and joint venture companies?

Table A7.3
Source of Foreign Investment

	Frequency	Per cent
Japan	1	100.0

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

Table A7.4a
Capitalization (RM m)

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	17	0.1	13.0	4.3	4.4
F & JV	1			2.4	

Table A7.4b
Capital Class

		Frequency	Per cent
Malaysian	over RM2.5 m	9	45.0
	RM0.5 to 2.5 m	5	25.0
	less that RM0.5 m	3	15.0
	no record	3	15.0
F & JV	RM0.5 to 2.5 m	1	100.0

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

Table A7.5a
Number of Workers

	N	Minimum	Maximum	Mean	Std Dev
Malaysian	17	12	400	108	94.4
F & JV	1			150	

Table A.7.5b
Employee Class

		Frequency	Per cent
Malaysian	over 200 workers	2	10.0
	50 to 199 workers	10	50.0
	less than 50 workers	5	25.0
	no record	3	15.0
F & JV	50 to 199 workers	1	100.0

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A7.6
Large and Small/Medium Enterprises

		Frequency	Per cent
Malaysian	large-scale	9	45.0
	small/medium-scale	9	45.0
	no record	2	10.0
F & JV	small/medium-scale	1	100.0

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A7.7
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	75 – 94%	2	10.0
	50 – 74%	3	15.0
	25 – 49%	5	25.0
	no record	10	50.0
F & JV	no record	1	100.0

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A7.8a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	5	7	11	10	10	15
F & JV	0	0	0	0	0	0

Table A7.8b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	25	35	55	50	50	75

8. Industry Total: 340 companies

Question 4: Are foreign-owned companies and joint venture enterprises more heavily capitalized in terms of paid-up capital than wholly Malaysian-owned companies?

All cases including statistical outliers: 251 companies

Table A8.1
Capitalization (RM m)

	N	Mean	Std Dev
Malaysian	191	8.1	31.4
F & JV	60	20.5	58.5

An independent-samples t-test was conducted to compare the level of capitalization for 191 Malaysian, and 60 foreign and joint venture companies. There was a significant difference in the paid-up capital for Malaysian companies (M = 8.1, SD = 31.4), and foreign and joint venture companies [M = 20.5, SD = 58.5; t (70) = 1.6, p = 0.12]. The magnitude of the means was small (eta squared = 0.0.1). The conclusion is there is no difference in the mean scores for the two groups

Excluding the statistical outliers: pneumatic tyre sector, public listed, dipped products companies and WRP Asia Pacific, extruded thread companies and Kossan Rubber Industries: 238 companies

Table A8.2
Capitalization (RM m)

	N	Mean	Std Dev
Malaysian	181	2.9	4.3
F & JV	57	10.6	18.4

An independent-samples t-test was conducted to compare the level of capitalization for 181 Malaysian, and 57 foreign and joint venture companies. There was a significant difference in the paid-up capital for Malaysian companies (M = 2.9, SD = 4.3), and foreign and joint venture companies [M = 10.6, SD = 18.4; t (58) = 3.1, p = 0.003]. The magnitude of the means was small (eta squared = 0.0.4). The conclusion is that foreign and joint venture companies in the sample are more heavily capitalized than Malaysian companies.

Question 5: Do foreign-owned companies and joint venture enterprises employ more workers than wholly Malaysian-owned companies?

All cases including statistical outliers: 292 companies.

Table A8.3
Number of Workers

	N	Mean	Std Dev
Malaysian	226	211	499.7
F & JV	66	462	656.0

An independent-samples t-test was conducted to compare the number of workers employed in 266 Malaysian companies and 66 foreign and joint venture companies. There was a significant difference in the number of workers in Malaysian companies (M = 211, SD = 499.7), and foreign and joint venture companies [M = 462, SD = 656.0; t (88) = 2.9, p = 0.005]. The magnitude of the differences of the means was small (eta squared = 0.03). The conclusion is that foreign and joint venture companies employ more workers than Malaysian companies.

Excluding pneumatic tyre sector, public listed, dipped products companies and extruded thread companies: 281 companies.

Table A8.4
Number of Workers

	N	Mean	Std Dev
Malaysian	217	158	209.4
F & JV	64	418	578.2

An independent-samples t-test was conducted to compare the number of workers employed in 217 Malaysian companies and 64 foreign and joint venture companies. There was a significant difference in the number of workers in Malaysian companies (M = 158, SD = 209.4), and foreign and joint venture companies [M = 418, SD = 578.2; t (68) = 3.5, p = 0.001]. The magnitude of the differences of the means was small (eta squared = 0.04). The conclusion is that foreign and joint venture companies employ more workers than Malaysian companies.

Question 6: Are foreign-owned companies and joint venture enterprises more likely to be classified in the large-scale industry category (over RM2.5 million paid-up capital and/or over 200 employees) compared to wholly Malaysian-owned companies?

Table A8.5
Large and Small/Medium Enterprises
All Product Sectors: 340 Companies

		Frequency	Per cent
Malaysian	large-scale	82	30.7
	small/medium-scale	157	58.8
	no record	28	10.4
F & JV	large-scale	55	75.3
	small/medium-scale	15	20.5
	no record	3	4.1

A Chi-square test for independence (with Yates Continuity Correction for a 2 x 2 table) indicated a significant difference in size between foreign and joint venture companies, and Malaysian companies, Chi-square (1, n = 309) = 41.2, p = 0. The result is significant, therefore, the number of large-scale foreign and joint venture companies is significantly higher than the number of large-scale Malaysian companies.

Question 7: Do foreign-owned companies and joint venture enterprises export a greater proportion of production compared to wholly Malaysian-owned companies?

Table A8.6
Exports as Percentage of Production

		Frequency	Per cent
Malaysian	95 – 100%	50	18.7
	75 – 94%	26	9.7
	50 - 74%	15	5.6
	25 – 49%	24	9.0
	less than 25%	14	5.2
	no exports	7	2.6
	no record	131	49.1
	total	267	100.0
F & JV	95 – 100%	18	24.7
	75 – 94%	20	27.4
	50 – 74%	6	8.2
	25 – 49%	2	2.7
	less than 25%	3	4.1
	no record	24	32.9
	total	73	100.0

Question 8: What are the export markets supplied by foreign-owned companies and joint venture enterprises compared to wholly Malaysian-owned companies?

Table A8.7a
Export Markets: Frequency

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	128	154	118	115	113	164
F & JV	35	39	49	31	45	48

Table A8.7b
Export Markets: Per Cent

	USA/Can	EU	Jpn/ Korea	Aust/NZ	ASEAN	Rest world
Malaysian	61.5	73.7	56.7	55.3	63.9	78.8
F & JV	53.8	60.0	75.4	47.7	69.2	73.8

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