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the case of Malaysia

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Transnational Corporations and the Environment: The Case of Malaysia

By Rajah Rasiah

Occasional paper no. 4

Report as part of UNCTAD /CBS Project:
Cross Border Environmental Management in Transnational Corporations

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Background to paper

The globalization of economic activity in general, and the growing role of transnational corporations (TNCs) in particular, have increasingly directed attention toward the environmental consequences of these developments. Increasingly, TNC activity in developing countries has become an issue for various normative initiatives at the international level, in the OECD and in the WTO. However, there remains a pertinent need to gain a better understanding of the environmental implications of TNC activity in developing countries. On this background, the United Nations Conference on Trade and Development (UNCTAD) and Department of Intercultural Communication and Management, Copenhagen Business School (DICM/CBS) in 1997 received a grant from the Danish International Development Agency (DANIDA) to conduct a study of environmental practices in TNCs. The project is called: "Cross border Environmental Management in Transnational Corporations". The project examines environmental aspects of foreign direct investment (FDI) in less developed countries by conducting case studies on environmental practices in Danish and German TNCs with operations in China, India and Malaysia. The project will produce a series of research reports on cross border environmental management seen from home country, host country as well as corporate perspectives. The reports will serve as input to a conference on Cross Border Environmental Management hosted by UNCTAD.

Abstract

This occasional paper presents the role of transnational corporations (TNCs) in the Malaysian economy with specific attention to its environmental implications, and regulatory measures to shield harmful effects. Ruling perceptions and initiatives of TNCs and local constituencies in addressing environmental issues are evaluated. The author concludes that while environmental considerations did not appear very important in the relocation of TNCs to Malaysia, there is evidence of environmentally inferior machinery being transferred because of lower standards in Malaysia. Nevertheless, it appears that many TNCs have innovative environmental practices in place, and that a number of TNCs have pioneered environmental management in the country. Political pressures for improved environmental performance practices in Malaysia, the author argues, come primarily from NGOs, which have increased their influence in the 1990s.

Please note that the views and opinions expressed in this paper reflect those of the author and do not necessarily represent those of UNCTAD or CBS.

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Abbreviations

AFTA	American Free Trade Area
AMCHAM	American Malaysian Chamber of Commerce
APEC	Asia Pacific Economic Corporation
APITD	Action Plan for Industrial Technology Development
ASEAN	Association of South East Asian Nations
BOD	Biochemical Oxygen Demand
CAP	Consumer Association of Penang
DDTI	Double deduction of training incentives
DOE	Department of Environment
EIA	Environmental Impact Assessment
EQA	Environmental Quality Act
FDI	Foreign Direct Investment
FIDA	Federal Industrial Development Authority
FTZ	Free trade zones
GATT	General Agreement on Tariffs and Trade
GATS	General Agreement on Trade in Services
GDP	Gross domestic product
GSP	General System of Preferences
HICOM	Heavy Industry Corporation of Malaysia
IS	Import Substitution
ISO	International Standard Organization
ITA	Investment Tax Allowance
LMW	Licensed manufacturing warehouse
MAI	Multilateral Agreement on Investment
MIDA	Malaysian Industrial Development Authority
MIGHT	Malaysia-Industry-Government-High-Technology
MIMOS	Malaysian Institute of Microelectronics Systems
MSC	Multimedia Super Corridor
MTCD	Malaysian Technology Development Corporation
NGOs	Non-governmental organizations
NIE	Newly industrialized economies
NPC	National Productivity Corporation
ODA	Official Development Assistance
ODS	Ozone Depleting Solvents
PIA	Promotion of Investment Act
PIO	Pioneer Industry Ordinance
SAM	Sahabat Alam Malaysia (Friends of Earth Malaysia)

SIRIM	Standards and Industrial Research Institute of Malaysia
TNCs	Transnational corporations
TQM	Total Quality Management
UNCTAD	United Nations Conference on Trade and Development
WTO	World Trade Organization

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Transnational Corporations and the Environment: The Case of Malaysia

By Rajah Rasiah[1]

I. Introduction

Transnational Corporations (transnationals in the following) have continued to generate considerable controversies in most spheres of political economy across the globe. The environment has been a major arena of contention. It is important to address two major theoretical debates here, which have policy implications. First, one argument posits that a trade off between progress and environmental destruction is necessary to pursue balanced development. This is the middle position adopted by some economists preferring to stay away from environmentalists who see progress as destructive, and technocrats who view environmental degradation as a necessary price of progress. This argument contends that progress inexorably involves destruction to the environment, but since the former is both necessary and desirable, the latter is unavoidable. Within such a strand, there is the neoclassical school, which argues that neo-liberal market forces will allow relative prices to shape environmental practices so that its emphasis would increase with rising living standards and costs. Second, there also exists the argument that foreign and local firms generate different levels of environmental degradation. By being technologically more sophisticated but less concerned nationally, foreign capital is often considered to be more polluting. It is viewed even more damaging because of developing economies' incapacity to screen abuses, as well as, the lack of civil society to question its effects. Submerged in between these arguments is the role of technology in environmental degradation. Schumacherians prefer small intermediate technologies so that it would minimize harm on the environment. However, the increasing generation of environmentally friendly bio-organic technologies has begun to shift consensus. Sophisticated treatment plants in

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transnationals is now increasingly shifting constituencies away from the preference for local small firms (Sonnenfeld, 1997). Emphasis on the environment in major markets has also driven out local firms - under-equipped to treat pollution effectively - from export markets. Some leaders from the South have continued to condemn such efforts as protectionist responses from the North.

While the developed economies have faced catastrophic dismembering of their environment, especially since the advent of the industrial revolution in the 18th century, there has been increasing consensus to establish and maintain standards to prevent further destruction. Hence, political support for environmental standards have been far stronger in developed economies than in developing economies. Indeed, developed economies transnationals have as a consequence relocated environmentally harmful production activities in less environmentally policed sites in the developing economies.

The rising role of market forces following increased globalization and liberalization has drawn concerns from environmentalists. Global efforts to protect environmental destruction has manifested, *inter alia*, in calls for environmental standards to be included within the jurisdiction of the World Trade Organisation (WTO). Environmentalists have since increasingly raised concerns over the negative effects of liberalization on the environment, especially the fear that the pursuit of cheap costs to compete would drive transnationals to the bottom. Given the divergent results reported by past studies, the debate over the role of transnationals and the environment is still inconclusive.

Malaysia is no different as empirical evidence suggest that environmental issues did figure in the relocation of environmentally inferior machinery by transnationals from developed sites (see Rasiah, 1990). The introduction of Total Quality Management (TQM) and legislation, nonetheless, especially since the 1990s have reduced such tendencies although industries classified as strategic or with political connections and those where prevailing measures do not ensure sufficiently adequate controls, continue to enjoy privileged treatment. However, with the exception of Jenkins (1999), few studies have reported a rigorous assessment of the relationship between transnationals and the environment in Malaysia. This country context study attempts to add value to the growing body of literature linking transnationals with the environment.

This country context study presents the role of transnationals in the Malaysian economy with specific attention to its environmental implications, and regulatory measures to shield harmful effects. The first part examines the significance of transnational investment in economic development. The second looks at governance mechanisms addressing environmental protection. The third evaluates the perceptions and initiatives of transnationals and local constituencies in addressing environmental issues.

II. Transnationals and Economic Growth

As with most Western colonies, foreign capital has played a major role in shaping the social map of Malaysia. Tin mining – initially indirectly through purchases from primarily Chinese miners but since the introduction of the dredge directly controlled strongly by Western capital - and plantation agriculture formed the basis of foreign interest in Malaya. Portfolio investment operating through railway, road, dock and other infrastructure construction and maintenance activities formed the primary arm of foreign activity in Malaya. When the Malaysian government took control over public utilities and gradually acquired plantations through parastatals such as Sime Darby, local capital began to dominate. Foreign capital remained strong, including in the import-substitution (IS) sector until export-orientation was introduced and ownership controls were imposed from 1975. Since then foreign direct investment has remained strong generally only in export-oriented manufacturing and oil mining. Beverages and tobacco are the only IS industries still dominated by foreign capital (see Table 1, page 9). Five phases of economic development are examined here.

i. Pre-independence

Malaysia has historically been a major recipient of foreign direct investment among developing economies. Even before direct colonialism, Straits capital operating primarily in the exchange and trade spheres were engaged extensively in tin trade. Prior to that barter exchange characterized Straits trade which centered mainly in Malacca. Local production organization prior to the penetration of Western capital involved a subsistent sedentary tribute paying mode that restricted capital accumulation (see Jomo, 1986). Foreign direct investment in the peninsular states became important following colonialism when the mechanisms of administration enabled private ownership of land. Foreign capital began to own tin mines, plantations infrastructure such as rail lines, which were built using portfolio foreign capital. Foreign ownership gradually overtook local ownership in tin mining, following the successful introduction of dredging in 1912 (see Rasiah, 1995: chapter 3; Lim, 1968; Allen and Donnithorne, 1957). Commercial cultivation of rubber was dominated by foreign ownership until local capital began to grow strongly from the 1930s.

Growing domestic demand following growth in the cash-economy generated primarily by the tin, rubber, infrastructure and administrative economy supported the emergence of consumer and engineering manufacturing and service activities. Foreign direct investment initially operated primarily in agriculture, and functioned as distribution agents handling trade. Local Chinese capital began to participate strongly in consumer food, simple durables and engineering activities from the end of the 19th century (see Rasiah, 1995: chapter 3; Rasiah, 1995a). The war-time disruptions added impetus to domestic manufacturing when local capabilities emerged to supply domestic demand.

Foreign direct manufacturing investment began to grow strongly especially from the 1950s.

ii. First Round Import-substitution

Unlike the rhetoric and praxis that followed post-colonial governments of many developing economies, Malaysia maintained its colonial ties and support for foreign direct investment following independence in 1957. The Pioneer Industry Ordinance (PIO) of 1958, the first government instrument used to promote manufacturing growth did not impose any ownership barriers, confining its controls on stimulating import-substitution. Tariffs were raised and waivers were given to firms producing domestically. There was an initial rise in screwdriver activities as previously import-oriented industries experienced a rise in some processing until the early 1960s (see Edwards, 1975). Tariffs were waived for firms performing at least some processing domestically. Foreign ownership of all industries remained high in the 1960s (see Table 1, last appendix, page 46). Manufacturing was essentially import-oriented.

Slow growth, saturation in the limited domestic market and eventually rising unemployment, poverty and inequality influenced the government to enact the Investment Incentives Act (IIA) in 1968 (see Edwards, 1975; Hoffman and Tan, 1980; Rasiah, 1995: chapter 4), which shifted incentives to export-oriented firms. The fall in commodity prices and the political circumstances that led to the 1969 ethnic bloodshed also did not favor the import-substitution manufacturing sector. Growth was primarily confined to domestic consumption sectors such as food, beverages, textiles and garments and metal smelting. The lack of controls on foreign investment enabled foreign capital to dominate ownership.

iii. First Round Export-orientation

Concerted efforts were taken to stimulate export-oriented industrialization to generate an industrial relations environment that would be attractive to footloose firms seeking cheap unorganized labor. The Industrial Relations Act was enacted in 1967 and the Employment Act of 1955 amended in the late 1960s to allow for three shifts and suppress labor militancy. The PIO of 1958 had earlier allowed pioneering firms exemption from unionization. Aggressive promotional efforts ensued following the formation of the Federal Industrial Development Authority (FIDA) in 1964, which was later renamed Malaysian Industrial Development Authority (MIDA) and the Capital Investment Committee in 1970. The Free Trade Zone Act was enacted in 1971, which allowed the formation of free trade zones (FTZ) that functioned as tariff free zones virtually operating outside the principal customs area. Where the location of groups of industries was neither feasible nor desirable, the licensed manufacturing warehouse (LMW) was formed. An array of incentives, including pioneer status that offered complete tax holidays ranging from 5-10 years, were offered. Along with state

representations, MIDA successfully attracted massive export-oriented foreign direct investment from the early 1970s.

Unlike the 1960s when British and Singapore capital dominated ownership, American and Japanese capital – the former especially in the electronics components industry while the latter in electronics and textile industries - became the most important. The first wave of export-oriented foreign direct investment began production primarily in FTZs and LMWs from 1972. Structural change reflected strongly the shift in foreign investment flows. Electric and electronics and textile and garments quickly became the leading manufacturing industries in the 1970s. Foreign ownership also dominated in these industries. Especially, electric and electronics which had its first firm in 1965 (Matsushita Electric) and accounted for less than 1 percent of fixed assets ownership in 1970, became a major manufacturing sub-sector by the end of the 1970s (see Rasiah, 1995: chapter four).

iv. Local Ownership and Second Round Import-Substitution

Foreign ownership gradually fell in import-substituting industries following the Industrial Coordination Act (ICA) of 1975 which stipulated local equity ownership conditions, including *Bumiputeras* involving firms primarily producing for the domestic market. Ownership conditions following the ICA required local ownership depending on the percentage share of output sold in the domestic market. FTZ and LMW firms were exempted from such conditions as their production was geared for the export market. The confusing imposition of the ICA, increasing emphasis on the development of domestic industries from 1980 to 1985 and a slowdown in foreign capital inflows restricted manufacturing growth in the period 1975-85. The ICA also contained conditions that required licensing involving technology transfer. The technology transfer unit within the then Ministry of Trade and Industry, however, did not introduce any vetting, monitoring and *ex-post* appraisal (see Rasiah, 1997; Rasiah and Anuwar Ali, 1998).

The government launched the Look East Policy in 1981 and embarked on state supported heavy industries. Heavy Industry Corporation of Malaysia (HICOM) was formed to spearhead the growth of heavy industries. State investment flowed into cement (including klinker), steel and motorcar production. Although foreign technology through licensing was central in the operations of all state-supported heavy industries, local state capital dominated investment to reduce the overall share of foreign investment in manufacturing substantially by 1985 (see Table 1, last appendix, page 46).

Falling commodity prices and the collapse of the tin mining industry in the wake of massive infrastructure projects and heavy industries stifled growth. Losses faced by these industries were aggravated by falling domestic demand due to the mid-1980s recession. A cyclical trough in the electronics industry crippled domestic demand further.

Foreign firms facing the maturation of financial incentives faced considerable uncertainty as the government delayed processing their renewal applications (see Rasiah, 1993). Massive retrenchments raised the unemployment rate to 8.7 percent in 1986 from 6.0 percent in 1980. The convergence of economic slowdown with unemployment resulted in massive anti-government reactions across the country. The unemployment rate rose to 8.5 per cent GDP recorded a -1.2 per cent fall in 1985. The government ameliorated the situation by reviving its interest on foreign direct investment, which was boosted by external developments.

v. Second Round Export-orientation

The mid-1980s recession forced the government to abandon and re-install pro-foreign investment policies, through the enactment of the Promotion of Investment Act (PIA) of 1986. Like Thailand and Indonesia, Malaysia became a major recipient of Northeast Asian and Singaporean investment as the Japanese and NIE currencies appreciated following the Plaza Accord in 1985 and the withdrawal of the GSP from the latter in February 1988. Generous incentives, including tax holidays through the Pioneer Status, Investment Tax Allowance (ITA) and double deduction rebate on taxable income of exports, double deduction of training incentives (DDTI) proved extremely attractive for foreign capital. Local capital in addition also enjoyed subsidized credit through the export refinancing scheme. Japanese and Taiwanese investment in particular expanded sharply. Electric and electronics in particular grew rapidly, becoming Malaysia's leading export earner since 1987, accounting for 67.5 percent of manufactured exports in 1995. As shown in Table 1, foreign capital owned 91.0 per cent of fixed assets in the electric and electronics industry in 1993.

Rising foreign direct investment and serious labor shortages across the Western corridor of Peninsular Malaysia encouraged the government to impose greater selectivity in the use of financial incentives. Domestic sourcing and high technology were used as important conditions for firms accessing financial incentives from 1991. However, the criteria and conditions were so vague and ambiguous that its effective implementation was cumbersome. Labor shortages and massive investment flows also stimulated the introduction of domestic high technology projects. The Action Plan for Industrial Technology Development (APITD) was launched in 1990 to lay down the rules for high technology development in Malaysia. The Malaysian Technology Development Corporation (MTDC) and the Malaysia-Industry-Government-High-Technology (MIGHT) were set up in 1992-93 to spearhead the growth of local high technology firms. Complementary institutions such as the Malaysian Institute of Microelectronics Systems (MIMOS), Standards and Industrial Research Institute of Malaysia (SIRIM) and National Productivity Corporation (NPC) were corporatized to enable greater demand coordination (see Rasiah, 1999).

vi. Mid-1990s Slowdown and Recession

Rapid growth since the late 1980s, which was primarily driven by foreign capital was not matched by commensurate rise in technical change and did not take into account rising factor costs. While institutions were created or corporatized, serious coordination failures undermined their capacity to support innovation and efficiency gains in firms. Economic overheating debilitated continued growth as serious resource limits and the emergence of cheaper cost sites abroad such as China stifled further growth. Foreign direct investment began to slowdown sharply from the end of 1995, despite continuance of generous incentives (see Malaysia, 1998). A cyclical trough in the electronics industry from late 1995 did not help.

With the real sectors of manufacturing and essential service slowing down and interest rates still low despite a massive expansion of domestic debt, high asset inflation continued to attract investment into real estate and property. The loans to GDP ratio reached 170 per cent by the end of 1997 (see Rasiah, 1998). The growing bubble became a major reason for the financial crisis, which was seriously aggravated by speculation. Thailand became the epicenter of the financial haemorrhage as panic herd behavior and the contagion effect undermined confidence thereby reversing portfolio equity investment sharply and slowing down strongly foreign direct investment. This hollowing effect is likely to slow down the liberalization process.

The introduction of capital and currency controls on 1 September 1998 while having stopped capital movements out due to the imposition of a one-year requirement and driven back the Ringgit to Malaysia due to its non-transactability abroad after 1 October 1998, has also crippled confidence for a recovery. The KLSE stock market after rallying sharply for a week has remained below 700 points– well below the over 1400 points it enjoyed before the financial crisis struck in 1997. The government has stated its commitment to insulate foreign direct investment from such capital controls. Whatever the pace of approval granted to investors, bureaucratic control of production coordination is unlikely to guarantee competitiveness to firms. With an imminent black market and uncertainty over the financial environment here past Malaysian policies of a generally transparent, open foreign capital friendly environment, which boosted high levels of foreign capital inflows can be seen to have been reversed. The replacement of the one year stay with an exit tax since February 1999 is unlikely to affect sentiments strongly. An open economy and lower exchange rate in Thailand is likely to engender a recovery faster, which may divert potential investors away there as a consequence.

The short-term scenario for increased participation of foreign direct investment does not look bright. Developments associated with the World Trade Organization, especially the General Agreement on Trade in Services (GATS) has resulted in the Malaysian government committing to a 61 percent share of equity in telecommunication firms to foreign investors. Efforts to streamline investment coordination under APEC and AFTA, which for a while appeared to work, has been significantly derailed following the

financial crash. New deregulation initiatives under the WTO is also likely to face opposition. Interviews suggest that the government is opposed to the incorporation of the Multilateral Agreement on Investment (MAI) initiatives. The showpiece of the 1990s push toward industrial and information maturity – the Multimedia Super Corridor (MSC) – currently faces considerable uncertainty. After a decade of rapid growth, Malaysia recorded a negative GDP growth of 6.7 percent in 1998. The government is likely to defer some liberalization schedules as a consequence.

Overall it can be seen that foreign direct investment has played an important role in Malaysia, with emphasis shifting gradually from the primary sectors to manufacturing. Within the primary sector, foreign direct investment is still dominant in petroleum exploration and mining. While local ownership has risen in manufacturing, especially in food processing, iron and steel making and automobile assembly, foreign capital still dominates in exports. The biggest manufacturing sub-sector, i.e. electric/electronics, is still heavily dominated by foreign ownership. Unlike traditional arguments, Malaysia has exceptionally relied heavily on foreign capital despite enjoying substantial savings. While investment expansion has been important, technology and international markets were critical in sustaining export growth. Unlike in South Korea and Taiwan where technology inputs were imported and developed locally, in Malaysia technology inputs in manufacturing were largely accessed from abroad without a concomitant development locally. The nature of growth – driven strongly by factor input rather than technical change - has undermined the country's capacity to sustain it in the long run. Hence, economic growth was already slowing down considerably by the time the financial crisis struck in 1997. The financial crisis has affected the macroeconomic conditions substantially as inflation and unemployment has been projected to record higher levels in 1998 and 1999.

NB! In the original document, table 1 is to be found here on this page. In this document prepared for the internet, It is inserted on the last page, page 46, in landscape format.

III. Environmental Regulation

Environmental regulation in Malaysia can be traced back to British colonialism. The colonial government introduced environmental standards to ensure the orderly appropriation of resources to minimize supply disruptions to Europe. The initial elementary standards were followed by the post-colonial state after independence in 1957. Systematic environmental governance emerged following the promulgation of the Environment Quality Act in 1974. It was not until the 1990s that more serious efforts were taken to protect the environment.

i. Colonial Orientation

The early focus of environmental regulation was directed to water pollution, particularly silting. The Mining Code of 1895 (Aiken, Leigh, Leinbach and Moss, 1982: 113), Mining Enactment of 1899 and 1929, the Water Enactment of 1920, Forest Enactment of 1934, the Irrigation Areas Ordinance of 1953 and the Drainage Works Ordinance of 1954 are a few of the important colonial legislation that had environmental provisions. The Dangerous Drugs Ordinance and Poisons Ordinance of 1952 and Medicine Ordinance of 1956 were enacted to offer physical and social security during colonial rule. The post colonial government enacted the Road Traffic Ordinance of 1958, Land Conversation Act in 1960, the Fisheries Act of 1963, and Petroleum Mining Act and the Continental Shelf Act in 1966 and the Radioactive Substances Act of 1968. The Factory and Machineries Act of 1967 deals with protection at the workplace. The Protection of Wildlife Act was promulgated in 1972 (see Table 2).

Despite the emergence of institutional development, environmental problems tended to be addressed in an *ad hoc* basis before the mid-1970s. Much of the concerns were confined to *ex ante* operations. Violations often went unpunished as government officials were preoccupied with attracting firms rather than ensuring better environmental standards. Interviews show that textile often emitted their used resins into the streams from the 1960s until the late 1980s. Drains bordering these firms – irrespective of ownership were often full of colored waters. Similarly until the 1980s, electronics firms did little to retain safely CFCs generated from manufacturing.[2] Steel and other metal smelting firms too have been notorious in their environmental practices (see Appendix 1). Problems only came to the fore whenever environmental mishaps claimed lives or seriously affected the lives of workers and proximate inhabitants. For example, three workers died from a molten steel accident at Malayawata Steel mill which is Japanese-Malaysian joint venture. Within its steel making section alone 923 workers were injured from March 1978 to July 1980. In addition, the 2000 residents staying near the firm have often been subjected to dust.

[2] Interviews by the author in 1986 and 1988 (see also Rasiah, 1993).

Table 2: History of Environmental Legislation, 1920-85

Waters Enactment 1920
Mining Enactment 1929
Mining Rules 1934
Forest Enactment 1935
Natural Resources Ordinance 1949
Poisons Ordinance 1952
Merchant Shipping Ordinance 1952
Sales of Food and Drugs ordinance 1952
Dangerous Drugs Ordinance 1952
Federation Port Rules 1953
Irrigation Areas Ordinance 1954
Drainage Works Ordinance 1954
Medicine (Sales and Advertisements) Ordinance 1956
Explosives Ordinance 1958
The road Traffic Ordinance 1958
Land Conservation Act 1960
National land Code 1965
Housing Development Act (Licensing and Control) 1965
Radioactive Substances Act 1968
Civil Aviation Act 1969
Malaria Eradication Act 1971
Continental Shelf Act 1966 (Revised) 1972
Petroleum Mining Act 1972
Environmental Quality Act 1974
Geological Survey Act 1974
Street, Drainage and Building Act 1974
Aboriginal Peoples Act 1954 (Revised) 1974
Factories and Machinery Act 1967 (Revised) 1974
Pesticides Act 1974
Destruction of Disease-bearing Insects Act 1975
The Protection of Wildlife Act 1972 (Revised) 1976
Antiquities Act 1976
Local Government Act 1976
Town and Country Planning Act 1976
National Parks Act 1980
Malaysian Highway Authority Act 1980
Pig Rearing Enactment 1980
Atomic Energy Licensing Act 1984
Exclusive Economic Zone Act 1984
National Forestry Act 1984
Fisheries Act 1985

ii. National Coordination Efforts

Environmental standards began to receive greater attention and official policy support following the formation of the Department of Environment (DOE) in 1975. The DOE is the principal agency governing environmental enforcement in the country. It has a local office in the states to monitor and enforce environmental regulations. While its offices in most states limit their roles to passive monitoring and enforcement, the presence of robust non-governmental environmental organizations such as ahabat Alam Malaysia (SAM) has transformed its role to an active coordinator of complaints and strategies for the national body from the 1990s.

The mechanisms for screening, research, monitoring and action had already started improving following the enactment of the Environmental Quality Act (EQA) in 1974 (see Table 2). This fairly comprehensive act addresses air in Section 22, noise in section 23, land in section 24, inland waters in section 25, oil or mixtures containing oil in section 27 and discharge of wastes in waters in section 29 (Jamaluddin, 1998: 24). Additional environmental legislation include local acts prohibiting discharge of harmful

effluents and activities endangering fauna and flora. For example, the Fisheries Act of 1985 contains provisions under Section 26(1) controlling the use of poison or pollutants, including explosives for use in fishing. The Petroleum and Mining Act of 1972 *inter lia* requires safeguards against oil discharge into deep sea. The Exclusive Economic Zone Act of 1984 and the Merchant Shipping Act of 1994 call for the respect of civil liability against oil pollution. The National Forestry Act of 1984 prohibits burning in designated forest reserve areas. The Local Government Act of 1976 allows the local government to act more directly to prevent environmental pollution. Several environmental control regulations have been gazetted subsequently (see Table 3). The EQA of 1974 forms the pivot for environmental governance in Malaysia, enabling environmental control through ministerial regulation that requires licenses for:

- The use or occupation of prescribed premises
- Discharge of wastes exceeding acceptable conditions into the atmosphere, noise pollution, polluting or causing to pollute any soil or surface of any land
- Emitting, discharging or depositing any wastes or oil into inland waters or Malaysian waters exceeding acceptable conditions.

Improvements in the regulatory measures and the introduction of penalties on offenders may have led to improvements in the discharge of some air pollutants between 1985 and 1989. Its effectiveness has, however, been constrained due to ambiguities involving the Environmental Quality Act (EQA). The DOE's jurisdiction is limited to factories covered by the EQA, which is restricted to licensed firms. In addition, a lack of resources, both human resource and instruments has stifled environmental planning and management.

Agro-conversion, hydro-dams, mining, logging and shifting cultivation has exfoliated forest reserves substantially. As a consequence, the area under forest coverage fell from 66 percent in 1966 to 55 percent in 1978 and 47 percent in 1990 (Lee, 1973; Othman, 1991). The Pergau and Bakun dams are expected to be the newest in the list of dams to flood land.

Emissions from industrial processes of most pollutants rose with rising industrialization from the mid-1980s. The level of particulates, nitrogen dioxide and carbon monoxide rose from 10.4, 25.9 and 4.7 thousand metric tons in 1987 to 25.2, 27.2 and 7.7 thousand metric tons in 1990 (see Table 4). Nevertheless, the levels of sulphur dioxide and hydrocarbon fell from 54.1 and 3.0 thousand metric tons in 1987 to 39.3 and 1.8 thousand metric tons in 1990. There was an exceptional increase in particulates, sulphur dioxide and nitrogen dioxide recorded in 1988.

The amount Biochemical Oxygen Demand (BOD) load from the manufacturing sector fell sharply from 1979 to 1988-89, from 124 tons per day to 19 tons per day (see Table 5). The manufacturing sector's percentage share of total BOD fell from 19.0 per cent in 1980 to 4.3 per cent in 1988. However, the amount of hazardous wastes

generated rose from 280 thousand cubic meters per year in 1984 to 380 thousand cubic meters per year in 1987 (Sahfi, 1996: 4-5; cited in Jenkins, 1999).

River pollution improved from the late 1980s. Forty two rivers were classified as heavily polluted, 16 as moderately polluted and 7 facing potentially harmful pollution. Rubber and oil palm processing factories accounted for nearly 60 percent of the BOD loan pollution, although in volume terms they only contributed slightly over 17 percent (Jamaluddin, 1998: 6). Manufacturing contributed nearly 15 percent of BOD effluents into rivers in 1976. Manufacturing had the highest daily volume discharged amounting to 55 percent of total BOD (BAS, 1982). Farming and sewage disposal accounted for 26 percent of the BOD effluents into rivers in 1976. Based on equivalent population exposed, domestic and urban sewage accounted for the highest BOD discharge.

While some indicators of pollution in the country show a fall in the mid-1980s until 1988, the reasons seem unclear. Stiffer laws may have improved the situation in the period. However, problems of enforcement have continued to shield violators. For example, Asian Rare Earth's long period of operations in Perak generating substantial environmental harm to proximate humans despite the presence of the Radioactive Substance Act suggests a lack of judicial independence from the executive. Indeed, a few of the environmentalists protesting peacefully against the venture were detained without trial for a period of two years in 1987. While environmental governance improved, a fall in the number of rivers considered heavily polluted from 39 in 1985 and 36 in 1988 could be attributed to the economic slowdown and recession and hence less pressure on the rivers. This is particularly so as the figure rose to 41 in 1989.

Table 3: Environmental Pollution Regulations Gazetted under EQA of 1974

	Regulation/Order	Effective Enforcement Date
1.	Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations 1977 Amendment (1982), P.U. (A) 342.	November 4, 1977
2.	Environmental Quality (Licensing) Regulations 1977, P.U.(A) 198.	October 1, 1977
3.	Motor Vehicle (Control of Smoke and Gas Emissions) Rules 1977 (made under the Road Traffic Ordinance, 1958), P.U.(A) 414.	December 22, 1977
4.	Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order 1977, P.U. (A) 199	July 1, 1978
5.	Environmental Quality (Prescribed Premises) (Raw Natural Rubber) (Amendment) Order 1978, P.U. (A) 338	April 1, 1978
6.	Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations 1978 (Amendment 1980). P.U. (A) 280.	December 1, 1978
7.	Environmental Quality (Clean Air) Regulations 1978, P.U. (A) 280.	October 1, 1978
8.	Environmental Quality (Compounding of Offences) Regulations 1978, P.U. (A) 281.	October 1, 1978
9.	Environmental Quality (Sewage and Industrial Effluents) Regulations 1979, P.U. (A) 296	January 1, 1979
10.	Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations 1985, P.U. (A) 296.	July 11, 1985
11.	Environmental Quality (Motor Vehicle Noise) Regulations 1987, P.U. (A) 244	July 16, 1987
12.	Environmental Quality (Prescribed Activities) Environmental Impact Assessment Order 1987, P.U. (A) 362.	April 1, 1988
13.	Environmental Quality (Scheduled Wastes) Regulations 1989, P.U.(A) 139.	May 1, 1989
14.	Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order 1989 P.U.(A) 140.	May 1, 1989
15.	Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations 1989, P.U.(A) 141.	May 1, 1989
16.	Environmental Quality (Delegation of Powers on Marine Pollution Control) Order 1993, P.U. (A) 276.	September 23, 1993
17.	Environmental Quality (Prohibition on the use of CFCs and other gases as Propellants and Blowing Agent)Order 193, P.U. (A) 434	October 25, 1993
18.	Environmental Quality (Delegation of Powers On Marine Pollution Control) (Amendment) Order 1994, P.U. (A) 536.	December 29, 1994
19.	Environmental Quality (Delegation of Powers on Marine Pollution Control) Order 1994, P.U.(A)537.	December 29, 1994
20.	Environmental Quality (Prohibition on the use of Controlled Substance in soap, Synthetic Detergent and other Agents) Order 1995, P.U. (A) 115.	April 15, 1995

Table 4: Pollution Emission, Industrial Processes and Fuel, 1987-97 ('000MT)

Year	*Particulates*	*SO_2*	*NO_2*	*CO*	*Hydrocarbon*
1987	10.4	54.1	25.9	4.7	3.0
1988	32.6	62.8	23.5	3.0	1.9
1989	21.8	31.8	22.5	2.1	1.4
1990	25.2	39.3	27.2	7.7	1.8
1991	23.2	33.8	27.7	5.8	5.6
1992	89.0	40.0	29.4	3.1	1.5
1993	101.2	43.1	31.2	3.5	1.6
1994	166.2	46.3	34.3	4.1	1.7
1995	103.5	109.2	41.0	5.1	2.4
1996	104.1	117.0	44.5	7.3	4.1
1997	55.1	142.2	51.1	8.4	3.6

Source: Compiled by Jenkins (1999)

Table 5: BOD Load of Manufacturing, 1979-93 (Tons per day)

Year	*BOD Load*	*% of Total BOD*
1979	124	Na
1980	105	19.0
1987	20	4.6
1988	19	4.3
1989	21	4.6
1990	25	5.2
1991	25	5.1
1992	27	3.6
1993	77	7.5

Source: Compiled by Jenkins (1999)

iii. Improved Governance

While the EQA of 1974 was fairly comprehensive it was open to abuse. Firms were considered to violate the EQA provisions only when the levels of pollution exceeded permissable levels, which depended strongly on the availability of best practice technologies to control harmful emissions. Firms are allowed through licenses to emit pollutants beyond permissable levels if it is recognized by the government that best practice conditions do not allow the achievement of such requirements. Hence, the legislation still offers priority to the investment outlay rather than its impact on the environment. In addition, interviews with officials suggest that the lack of know how by

bureaucrats in developing economies such as Malaysia prevent the imposition of stringent standards on firms. Besides, the Minister then enjoyed excessive powers to approve the environment-friendly projects. Environmentalists noted that the lack of vetting by a broader group of environmentalists opened the approval mechanism to abuse. For these reasons a wider platform was made possible since the 1990s. Indeed, the Penang Hill Project, which had initially been supported by the state government, was abandoned when environmental groups – with the Consumer Association of Penang (CAP) taking the lead – criticized the poor impact assessment study used to support its viability.

A massive relocation of FDI, falling unemployment levels (which dropped from 6.0% in 1990 to 2.5% prior to the crisis in 1997) and serious overheating turned around government policy. Unlike until the late 1980s when employment and investment generation were central planks of promotion, higher value added and technology operations and environmentally safer technologies became important in the 1990s. Improvements in the economy helped transform somewhat the bargaining relationship in the 1990s, which was boosted further by environmental standards emphasized by stringent developed markets. The government-transnational relationship was heavily tilted towards serving the latter's interests until the late 1980s due to the economically disadvantaged position of the country. Environmental emissions, health and safety standards can be argued to have been compromised as a consequence. That relationship improved in the 1990s when the government's relative bargaining power improved, albeit unproductive rent seeking is widely believed to have dissipated scarce resources.

Also, rising recognition of environmental issues by the Penang government from 1990 opened the way for local state intermediation of environmental issues. The Penang government have since frequently called non-governmental organizations and university experts to brainstorming sessions with considerable follow-up to actively improve environmental standards and impose state of the art mechanisms to prevent environment abuse. Also, the national DOE body participates strongly in the sessions as an important member. However, local state involvement in states such as Negeri Sembilan, Perlis and Terengganu has been little.

However, it was only in 1996 that substantive amendments to the EQA took place. Amendments to the EQA in 1996 added additional focus to four areas, *viz*.,

- Management and more stringent control of hazardous wastes and products that are considered as environmentally unfriendly, including provision for 'prescribed substance' and 'prescribed conveyance' as in 'prescribed premises' in regulations made earlier.
- Environmental audit
- Establishment of research cess and environmental fund
- Higher penalties for non-compliance

The government introduced preventive measures when it gazetted to enforce Environmental Impact Assessment (EIA) studies to assist better environmental standards *ex ante* activity. Pressure in developed export markets has also been instrumental in checking pollution (see Rasiah and Chang, 1995). Environmental audit procedures have also been adopted by a number of government bodies (Gurmit, Soo and Chandran, 1993). The introduction and gradual acceptance of the International Standards Organization (ISO) 14000 series relating to the environment has become a positive sign. In addition, a committee on environmental standards was formed with the Standards and Industrial Research Institute of Malaysia (SIRIM) as the secretariat, whose main objective is to ensure the widespread use of ISO 14000. There has since been efforts to streamline Malaysian standards with international standards through the promotion of ISO14000. To enable better enforcement, the government introduced six support programs, *viz*.,

- Environmental monitoring
- Environmental education, information, training and public awareness
- Environmental research and development
- Inter agency and federal-state co-operation
- Program co-ordination through state environmental committees
- Bilateral, regional and international legal and institutional arrangements

Table 6: Environmental Promotion Incentives , 1995

1. Pioneer status (PS) and Investment tax Allowance (ITA) for companies undertaking forest plantation project, Pioneer status (PS) and Investment tax Allowance (ITA) for a period of 5 years for companies undertaking forest plantation project, and storing, treating and disposing dangerous toxic wastes. PS offers a 100% tax exemption for a period of 10 years. ITA offers 100% tax exemption equivalent to qualifying investment over a period of 5 years.
2. Capital allowances for companies providing facilities for storing, treating and disposing their dangerous toxic wastes
3. Import duty, sales tax and excise duty exemptions on machinery, equipment and raw materials imported by manufacturing firms for the control of pollution
4. A price differential of 3 cents a litre between leaded and unleaded petrol through price reduction of unleaded petrol effective from January 1 1994
5. Import and sales tax exemption on catalytic convertors
6. Import duty for new diesel powered passenger cars reduced to only 120%. Motor vehicle license fees on road tax halved for new generation diesel-powered motor vehicles
7. Donations to approved organizations established exclusively for environmental protection and conservation offered deductions from taxable income

Source: Adapted from Sham (1998: Table 8)

It is unclear if incentives played a useful role in stimulating the use of environment-friendly technologies. The government introduced several financial incentives to encourage utilization and treatment of environment-friendly technologies from the late 1980s but particularly from the 1990s (see Table 6). Incentives to encourage the utilization of safe technologies to store toxic waste and other hazardous materials include the pioneer status over 5 years. Firms directly involved in storage, treatment and disposal of toxic and hazardous waste in an integrated manner can apply for the pioneer status. Companies generating waste can establish facilities to store, treat and dispose waste, either on-site or off-site would be eligible for a special allowance at an initial rate of 40 percent and an annual rate of 20 percent of capital expenditure in the remaining years (Malaysia, 1995). Firms can access duty drawbacks on machinery involved in storage, treatment and disposal activities. Foreign firms face the same rights and regulations on environmental standards as local firms.

Despite considerable strengthening of environmental governance in the 1990s, with the exception of BOD, pollution levels increased considerably (see Tables 4 and 5). Air pollution worsened in the 1990s as haze caused serious problems of vision and irritations in 1991-94 and 1997. Emissions from industrial processes of particulates, sulphur dioxide, nitrogen dioxide, carbon monoxide and hydrocarbons rose to 104.1, 117.0, 44.5, 7.3 and 4.1 thousand metric tons respectively in 1996 (see Table 5). While the level particulates fell sharply and hydrocarbons slightly in 1997, the rest have continued to rise. In addition to rapid industrialization, the other important reason for the rise could be due to improved measurement coverage and instruments used in the 1990s.

Water pollution levels worsened in the 1990s, though greater surveillance helped improve river pollution. BOD discharge of manufacturing fell in 1992, but rose sharply again in 1993 (see Table 5). A major reason for the worsening conditions has been the scale of industrialization recorded from 1989, which exceeded 12 per cent every year between 1989-97 before declining by –10.2 per cent in 1998 following the financial crisis struck that struck in 1997 (see Rasiah, 1999). Besides, river water pollution improved in the 1990s as unlike the 1970s, of the 199 rivers monitored, only 14 were classified as highly polluted.

With the exception of the period of 1985-90 when economic growth crashed, the number of environmental offences prosecuted under the EQA increased over the years (see Table 7), which reflects in addition to increased economic activity also governance. The fines involving environmental offences have also risen. Also, the improved impact on the oil palm and rubber industries has seen the revenue collected from licensing drop by 88 percent and 44 percent respectively over the periods 1977-89 and 1979-89 (Sham, 1998: 13, 15).

Table 7: Environmental Offences Prosecuted under the EQA, 1980-96

Year	Offences prosecuted
1980	14
1981	33
1982	42
1983	58
1984	94
1985	32
1986	42
1987	26
1988	28
1989	22
1990	19
1991	45
1992	130
1993	113
1994	162
1995	149
1996	256

Source: DOE (1997: 3; cited in Sham, 1998: Table 6)

Toxic and hazardous wastes rose to 420 thousand metric tons (DOE, 1995: 29). Solid waste pollution has remained serious. The DOE (1997) reported that almost 72 percent, 54 percent and 30 percent of their monitoring stations were covered with oil and grease, suspended solids and E.coli respectively in 1996. A summary of studies on environmental deterioration in the 1990s is presented in Table 8.

Table 8: Studies on Environmental Deterioration, 1990s

Area of Deterioration	Nature of Deterioration	Source
1. Forest Depletion	Total area of natural and plantation forest about 61.2%. But fast depleting. In Peninsular Malaysia forest area declined from 69% (1966) to 47% (1990). Major causes include large scale land development, dam construction, mining, shifting cultivation and logging.	Salleh (1993), Lee (1973), Othman Manan (1991), Marajan & Dimin (1989).
2. Biodiversity	The tropical closed canopy forests of which Malaysia has a considerable area, contain more than 50% of world's species. Due to logging and deforestration, a great deal of this diversity has been lost or is being threatened.	Reid & Miller (1989), Tho (1991)
3. Wildlife	The fauna is equally diverse – about 1,000 species of vertebrate and 20,000-80,000 invertebrate species. Many are indigeneous. Following forest clearance, many of these will be threatened.	Tho (1991)
4. Erosion	Erosion is closely associated with deforestation and vegetation clearance on hillslopes best illustrated by steep road cuttings. Many instances of slope failures are being reported in the local media from time to time.	Sham et al. (1993), Douglas (1972), Shallow (1956).
5. Water Pollution	Major sources include organic wastes (sewage and animal wastes), silt from erosion and discharges from industries. Logging activities also contribute to river silting and pollution of water courses. Heavy metals (mercury, lead and zinc) tend to exceed WHO standards for some rivers.	DOE (1993)
6. Marine Pollution	In coastal areas, oil and grease and suspended solids (largely land based) are major contaminants.	DOE (1993)
7. Air Pollution	Major sources include industrial discharge and motor vehicles. Kuala Lumpur and the Klang Valley are badly affected and experience total suspended particulate levels exceeding WHO standards. Regularly threatened by haze and possible acid rain. Becoming more disturbing as local climates have high potential for pollution.	Sham (1980, 1987, 1993a), Sham et al (1991), Leong et al (1988)
8. Heat Island	Heat island intensity in the order of 4^0C – 6^0C influencing air pollution dispersion and energy demand for cooling in urban areas escpecialaly in Kuala Lumpur and the Klang Valley conurbation.	Sham (1973, 1976a & b, 1977, 1984, 1986, 1987, 1988).
9. Toxic and Hazardous Wastes	In 1991, it was estimated that Malaysian industries generated about 380.000m3 of toxic wastes annually. Acids, heavy metals sludge and asbestos accounted for about 59% of these wastes. Metal finishing, textile plants, gas processing, foundries and metal works and asbestos factories were the major sources, accounting for 77% of total. Disposal sites remained a big problem.	DOE (1991, 1993)

Summary

Three phases of environmental governance and effects can be viewed in Malaysia, *viz.*, colonial orientation, initial efforts to establish national coordination and greater regulation and strengthening of the legal framework. Colonial and post-colonial efforts focussed on *ad hoc* regulations. The beginnings of national coordination efforts lasted from the mid-1970s to the late 1980s. The earlier phases faced little serious efforts to govern against environmental degradation. The colonial government may have faced little real need to protect the workers and environment beyond the sustenance of surplus appropriation. The period from the 1970s and 1980s, which was characterized by efforts to woo foreign investment to engender rapid growth and poverty alleviation, seems to be dominated by a weak government in its bargaining relationship with transnationals.

Hence, environmental standards were not enforced and firms were actively shielded by the government so as to create a pro-capital environment for transnationals. The government's bargaining power in its relationship with transnationals improved from the late 1990s following a massive inflow of foreign capital, rapid growth, a sharp fall in poverty levels, unemployment and serious overheating. Hence, it can be argued that environmental regulation improved in the 1990s due to improved economic circumstances and rising numbers of transnationals competing to locate in Malaysia. The level of pollution generally improved in the mid-1980s due to a recession that reduced the level of industrial emissions. However, with the exception of some variables such as river pollution and particulates which improved, the pollution levels in the country generally increased in the 1990s due to rapid expansion and better measuring instruments and coverage.

IV. Environmental Practices Involving Transnationals

The opening arguments in this paper addressed opposing strands on the role of transnationals and the environment. The introduction presented some contending arguments on transationals; *viz.*, supporters view transnationals' superior productive capability to enable more effective environmental measures while critics use the same argument to argue over further environmental degradation. Within this debate, a more specific state-versus firms argument can be examined here, which address specific transnationals environmental practices at host-sites. The first contends that transnationals adapt their strategies to meet local regulatory conditions. The second portrays that host-governments lower environmental standards to meet transnational interests. Few studies have actually examined these issues systematically using empirical data to facilitate a cogent account of the impact of transnational operations on the environment. A major difficulty faced by researchers has been the obstacles imposed by transnationals. Transnationals have been reluctant to allow environmental and health researchers inside for fear of negative publicity against them. Government officials have also offered little cooperation partly for fear of discouraging foreign direct investment in the country.

As Rasiah (1995: chapter two) has argued, transnational responses are far more complex than that reflected in the above dichotomy. In addition to internal constraints and capabilities, governments and firms often act based on their relative bargaining power, taking cognisance of prevailing alternatives. Global market pressures – especially following rising support for environment-friendly practices – have also been instrumental in influencing the introduction of better environmental practices by transnationals. In addition to domestic pressure groups, rising international standards seem to have been instrumental in improving environmental governance as well as transnational practices in Malaysia.

This paper relies on studies that use two major methodologies. The first set uses historical analysis involving specific cases selected purposively (see Rasiah, 1990; 1993), while the second uses cross-sectional analysis with and without control variables (Jenkins, 1999). Emissions into the environment and health and occupational safety are the two major aspects of environmental pollution examined. Also, foreign transnational practices are also assessed vis-à-vis local firms' practices.

i. Relocation

Evidence from interviews by the author carried out between 1986 and 1990 suggest that transnationals decision to relocate in Malaysia were driven by a complex set of

variables. Push factors appears to have been the most significant explanatory variables that drove export-oriented firms out of parent sites in the 1970s until the late 1980s.[3] The push factors for American and European electronics and scientific instruments firms appear to be rising labour costs – labour rigidities associated with work-time, wages and other contractual obligations. Tax holidays and environmental laxness were also cited as important. Electronics assembly and textile manufacturing involve considerable use of hazardous chemicals that were increasingly phased out in North America, Europe and Japan. Malaysia as the choice only figured after they were clear of the need to relocate out of their parent locations, and only when involving location outside major markets. Malaysia and Philippines were the most suitable sites for labour-intensive operations in Southeast Asia. Singapore's small population meant that large scale labour-intensive operations could not be located there. Indonesia and Thailand were gripped by political uncertainties, poor weaker infrastructure and lacked an English speaking workforce. Thailand became an important site for labour-intensive operations from the late 1980s due to improvements in investment coordination, infrastructure and rising congestion in Malaysia. As the managing director of National Semiconductor put it,

"It's like being already up in the plane and looking for a suitable site to land. Malaysia figured as one of the two key sites for labour-intensive locations. The Philippines was also very attractive but political instability reduced our options. Thailand and Indonesia did not figure very much in our plans in the 1970s". [4]

While environmental reasons appeared secondary in the relocation of export-oriented subsidiaries in Malaysia, electronics and textile firms reported transferring machinery because of lax environmental conditions in Malaysia. Electronics – American, European and Japanese firms - reported relocating assembly machinery in the 1970s until the mid-1980s. Three Japanese textile firms reported relocating pre-weaving, dyeing and weaving machinery from Japan following the strengthening of environmental legislation.

Domestic-oriented transnational firms understandably place domestic market considerations as critical in relocating to Malaysia. However, it took significant incentives to also lure chemical and plastic transnational firms to Malaysia. In addition to the PIO of 1958, which gave incentives for producing for the domestic market until the end of the 1960s, petrochemical and plastic fiber firms also enjoyed tariffs and incentives in the 1990s to commence production. These industries were classified under the advanced materials technology category of strategic upstream industries. Interviews suggest that environmental considerations were not significant in the relocation of domestic-oriented transnational subsidiaries in Malaysia. However, some managers in food processing industries stated that transnationals have relocated less sophisticated

[3] Parts of the interviews reported in Rasiah (1990).

[4] Interview conducted in 1989.

machinery that were environmentally not as good as the ones used by the same firms in the developed countries. However, it is difficult to compare critically the different domestic-oriented industries due to inconsistent responses from the industries. Comparisons are difficult because of variances in the sophistication of best practice methods used in particular industries and the extent of information respondents are willing to reveal.

ii. Ownership, Size, Technology and Market-orientation

Two past cross-sectional studies, and a number of anecdotal case studies are used here to examine transnationals environmental practices in Malaysia. Anecdotal and simple two variable – ownership against environmental effects – studies tend to support the view that the superior productive capacities and capabilities of transnational firms allow it to enjoy better environmental standards than local firms. A more robust study – controlling for size, age of technology and market-orientation – finds little evidence of transnationals enjoying better environmental standards than local firms. Nevertheless, it can be argued that the superior productive capacities and capabilities of transnational firms allow better environmental standards than local firms.

Rasiah's (1990; 1993; 1995; 1995a) fieldwork on the electronics, textiles and steel industries between 1985 until 1995 suggests that transnational firms generally tend to adopt environmental standards based on cost implications, availability of safer technologies, domestic regulatory policies and market demands. These firms focussed little on environmental issues – whether related to health and occupational or external emissions - in the 1970s primarily because the government did not emphasise much environmental standards. Governmental pressure to restrict opposition against polluting foreign firms have particularly been strong until the 1990s. Consumer and environmental groups have been dealt seriously as anti-government and referred to as treacherous for the country's growth and harmony. Indeed, a number of environmentalists were jailed in 1987 for demonstrating against the storage and dumping of radioactive waste by the Japanese owned Asian Rare Earth (ARE) in Papan (see Appendix 1.a). Other celebrated mishaps include Chemical Company of Malaysia (see Appendix 1.b) and Mamut Copper Mine (see Appendix 1.c). The effects of infrastructural projects and industrial location on pollution involving rivers in the 1970s and the 1980s were simply masked. However, Rasiah's studies only reported transnationals efforts to import used environmental rejects from developed locations. None reported a systematic effort to design or purchase environmentally harmful technologies to reduce costs.

Jenkins' (1999) more serious study reported transnationals greater efforts to utilise environment-friendly technologies (see Table 9). Apart from the proactive category, foreign and majority foreign-owned firms tend to demonstrate better environmental practices than local and majority-local firms when not controlled for other effects.

However, foreign ownership shows little correlation with environmental standards when controlled for technology, market-orientation and size. Jenkins' (1999) general conclusions when control variables were introduced, correlate only size and market-orientation positively with environmental practices/standards. While the conclusion removes inherent ownership implications for environmental standards, the contention that transnationals tend to demonstrate better environmental practices than local firms due to their superior productive capacities, seems to be supported. It can be argued that because foreign firms tend to be larger, more export-oriented and tend to use more recent technologies, they demonstrate better environmental practices.

Table 9: Environmental Effects of Firms by Ownership, Size, Market-orientation and Technology, 1997

	Excellent	Proactive	Compliant	Unconcerned	Total
Ownership					
Foreign	18.8	15.6	43.8	21.9	100.0
Local	7.7	19.2	42.3	30.8	100.0
Size (employees)					
<100	0.0	0.0	44.4	55.6	100.0
100-300	6.3	6.3	68.8	18.8	100.0
301-1000	10.0	30.0	30.0	30.0	100.0
>1000	38.5	23.1	30.8	7.7	100.0
Export/Sales (%)					
0-10	10.0	0.0	20.0	70.0	100.0
11-49	33.3	33.3	0.0	33.3	100.0
50-89	0.0	50.0	50.0	0.0	100.0
90-100	16.7	13.3	50.0	20.0	100.0
Technology (Years)					
>20	0.0	0.0	0.0	100.0	100.0
10-20	33.3	33.3	33.3	0.0	100.0
5-10	0.0	10.0	50.0	40.0	100.0
2-5	0.0	25.0	41.7	33.3	100.0
Current	41.7	8.3	50.0	0.0	100.0
All firms	25.9	43.1	17.2	13.8	100.0

Source: Jenkins (1999: Table 8)

While available evidence supports the contention that foreign transnationals have tended to uphold better environmental standards than local firms because of larger size, export-orientation and better technologies, isolated cases of gross environmental abuse tend to show that their involvement with sophisticated technologies also expose the environment to serious abuse. The ARE (appendix 1.a) is an example, though a more recent study is necessary to establish the latest situation. Also, electronics transnationals,

dominated by American and Japanese ownership, have throughout the 1970s, 1980s and early 1990s accumulated harmful effluents such as CFCs from their operations in Malaysia. Malaysian, German, Taiwanese, South Korean, Singaporean, French and Italian/French joint-ventures complete the ownership structure of foreign electronics firms. Interviews by the author in the mid-1980s suggest that little monitoring occurred by regulatory officials. Two officials, one from a Japanese firm and the other from an American firm, reported in 1990 of leakage into the streams whenever a heavy thunderstorm broke out.

Semiconductor firms have since the late 1980s attempted introducing TQM practices that entail getting workers involved in assembly and test operations. Unlike the sweatshop work regime of the 1970s until the mid-1980s, these firms have increasingly turned towards worker-friendly post-Fordist work-regimes from the late 1980s. Interviews suggest that while international standards such as the Montreal Protocol were important, semiconductor transnationals' efforts to lower hazardous emissions, and improve health and occupational safety at workplace were influenced more by the introduction of worker-friendly TQM methods. Motorola reported having equipped its production facilities with CFC-free manufacturing by the mid-1990s. Intel reported having clean drinkable water leaving the firm since 1991. American, European and to a less extent, Japanese electronics firms tend to show better environmental practices in the electronics industry. Interviews suggest that the preventive measures taken by Malaysian, South Korean, Taiwanese and Singaporean firms were the worst in the industry.[5]

Transnationals have also participated in national and local efforts to improve environmental standards. Growing international concerns and pressure from local environmental groups helped attract greater institutional support for environmental coordination. Five transnationals have participated to pioneer the ISO 14001 certification for environmental standards administered by SIRIM (see Appendix 3). Meanwhile, in addition to introducing better waste treatment measures, several transnationals have also commissioned environmental studies for the improvement of environmental care in the country.

The regulatory environment does not discriminate by ownership. Foreign capital can access incentives *inter alia* on the basis of investing on storage, treatment and disposal of hazardous waste. Hence, foreign capital engaged in waste treatment and disposal, or those involved in production but equipped with such instruments can apply for financial incentives. Despite the presence of several incentives (see Table 6), transnationals have generated much controversy on environmental practices in Malaysia. ARE (Appendix 1.a), Chemical Company of Malaysia (CCM) (Appendix 1.b) and Mamut Copper Mine (Appendix 1.c) are often quoted as negative examples of an environmentally harmful transnational operation in Malaysia. Others such as Johnson Mathey (Appendix 2.a),

[5] Informal interviews undertaken by the author in February 1999.

Tioxide (Appendix 2.b) and Texas Instruments (Appendix 2.c) have been praised for their positive contributions.

Studies also show efforts by some transnationals to remove environmentally hazardous effluents. For example, a recent survey of manufacturers of the American Malaysian Chamber of Commerce (AMCHAM) indicates their active participation in the elimination of Ozone Depleting Solvents (ODS) in Malaysia (see Box 1).

The manufacturing companies who responded to the AMCHAM survey ranged from electronics, healthcare to petrochemicals. The combined survey data showed that the companies have achieved 86 percent reduction in ODS usage in 1993 from 478.484 kg in 1990. The majority of the companies presently do not use ODS or have targeted plans to totally eliminate ODS usage by the end of 1993. Motorola manufacturing sites in Penang, Seremban, and Petaling Jaya are already CFC-free.

In the Motorola plants in Seremban and Penang, the company implemented ODS free alternative technologies, i.e. a terpene system, no-clean reflow and semi-aquous cleaning. The majority of American companies have demonstrated their commitment to accelerate the Montreal Protocol schedule deadline by being ODS free by the end of 1993. Interviews with 5 American semiconductor transnationals suggest that international standards were important but not as significant as the drive to enrich jobs and limit employees exposure to harzardous compounds and emissions. All the 5 firms reported using TQM principles which, *inter alia*, emphasizes health and occupational safety.[6]

Box 1: AMCHAM ODS-alternative technology in use

Company	**Alternative Technology**
• Texas Instrument	Laser Technology
• SEAGATE	Aqueous, HCFC

[6] Interviews conducted by the author in February 1999.

• Baxter	Mechanical assembly process
• Harris Adv. Techn.	Substitute with IPA, Acetono for parts cleaning
	Replaced TCA-III with H2 flame clean off
• AIROD	Low residue no-clean liquid flow, Inert gas wave
	Soldering, semiaqueous cleaning
• Motorola Seremban	Terpene system
• Motorola Penang	"No clean" reflow, Semi aqueous cleaning
• Applied Magnetics	Semi-aqueous cleaning
• HP (Hewlet Packard	Semi-aqueos cleaning

Note: Ozone Layer Issue is something of a misnomer. It is not a clear physical entity, but a broad band 15-50 kms up in the stratosphere, in which molecules of ozone (made up three oxygen atoms) are dispersed thinly. Although toxic to humans at ground level - ozone contributes to smog and is poisonous - high in the sky it absorbs the damaging ultraviolet rays from the sun. Without the ozone layer, life on earth cannot not exist. CFCs - common gas used in aerosols and a range of other consumer items, could damage the ozone layer. Other chemicals that can destroy the ozone layer include: halons used in fire extinguishers and carbon tetrachloride solvents. Methyl chloroform - another ODS is being phased out.

Source: Compiled by Irina Safitri Zen, 1998

Driven by efforts to introduce worker friendly practices within the TQM framework, international organizations calling for better standards, national regulations and internally generated efforts to establish best practice methods of preventing environmental degradation affecting especially employees and local inhabitants, some transnationals have begun cooperating with the government to strengthen environmental management.

As a consequence, Shell, ESSO, Mobil, Caltex and British Petrol enrolled in a workshop conducted by the locally controlled Petronas in 1996 to formulate specific guidelines to govern environmental impact assessment involving oil industries, which has since been included as supplementary guidelines complementing the general guidelines introduced by the DOE. The general guidelines was initially incorporated in 1985 and amended in 1995 (see IMPAK, 1996). However, a number of issues still remain poorly addressed. For example, the legal aspects to force oil companies to decommission used oil rigs, including their conversion to artificial reefs still require development (see Ashok, 1999). Foreign oil companies reported that the responsibility for decommissioning oil rigs should be borne by the local owned Petronas as the latter coordinates and manages the cess pool accumulated through payments by them.

Transnationals have been pioneers in the implementation of a number of the standards introduced in Malaysia. For example, 5 transnationals achieved certification under the ISO 14001 standard from SIRIM, which is coordinated as Environmental Management Standards (MS 14001) in Malaysia. The ISO 14001 have now been officially published and adopted as Malaysian standards.

The Matsushita Electric. MELCOM, Sony Electronics. SEM, Sony Mechatronic Products, Canon Opto and Shell Malaysia Trading became the first group of companies to be awarded Environmental Management System ISO 14001 certification by SIRIM. Sony Mechatronic became the first manufacturer of computer peripherals in Malaysia to be given such a status.

Meanwhile, two other transnationals reported having improved their environmental practices. SEM is a leader in environmental issues within the Sony group. It won the Sony Environmental Award and the Management Prize for Energy Conservation in 1994 and for the Promotion of Systems Environmental Management Environmental Activities in 1996. For MELCOM, SIRIM's pilot scheme provided the opportunity to integrate its environmental protection activities into an effective Environmental Management System. MELCOM reported that its highly-motivated and innovative employees were committed to improve environmental practices to raise overall work quality.[7]

All the five electronics firms reported reduction of hazardous wastes, cleaner environment, better production organization, cost reductions and efficiency gains (see Appendix 3). Thus, it appears that MS 14001 could be successfully applied to Malaysian Industries with the benefits of compliance with legislation, continual environmental improvement, minimizing environmental risk and self-regulation. In addition, EMS application could be an effective marketing tool for Malaysian firms to achieve a competitive edge in the global market.

Summary

The limited evidence available on transnationals' environmental practices allow the following conclusions. First, changes in production technologies, and improvements in legislation influenced the adoption of better environmental practices in a number of transnationals. American, European and Japanese transnationals tend to demonstrate better environmental practices than other East Asian firms in electronics firms. Second, while environmental considerations did not appear very important in the relocation of transnational firms to Malaysia, there is evidence of environmentally inferior machinery transferred because of lower standards in Malaysia. Jenkins' (1999) study shows that inherent ownership do not correlate strongly with environmental practices when controlled for size, technology, market-orientation and industry-type. Size and market-orientation seem to be the most important variables explaining environmental practices in Malaysia. Nevertheless, because transnationals tend to be large and use more recent machinery, they tend to demonstrate better environmental practices. Hence, it does appear that transnational firms do show better environmental practices. Also, a number of transnationals have pioneered better environmental groupings in the country.

[7] This interview was undertaken with a middle-level manager and hence does not necessarily reflect the views of the direct workers.

V. Political Constituencies

While environmental legislation began during colonial rule, the rising recognition of environmental considerations in development policies in Malaysia has been influenced strongly from pressure exerted by non-governmental organizations (NGOs) in the country and international developments. Global efforts to institute better environmental standards across the globe can be argued to have helped quicken the pace of improvements. Official government policy generally tends to be limited to passive application of some regulations. Active involvement have tended to be restricted to efforts to deflect international criticisms of domestic environmental practices. Yet, a number of NGOs in the country have been active in international settings for a calling for better environmental regulations across the world. Two important influences shaping environmental practices are examined here.

i. Social Pressure

Environmental degradation issues have been strongly taken up by NGOs especially from the 1970s. The government at that time led development policy without much consideration for the environment. In fact, the government dealt with environmentalists aggressively. Demonstrations organized by the Consumer Association of Penang (CAP) and Friends of the Earth (SAM) of Penang involving the harmful effluents discharged into Juru and Kedah rivers in the 1970s and 1980s were swiftly put down by the government and condemned as unlawful anti-government incitements. Nonetheless, environmental pressure groups have managed to convince the government to adopt environmental standards particularly from the 1990s, albeit selective enforcement has undermined its credibility. Table 10 presents a list of environmental groups that have been instrumental in the promotion of environmental standards in Malaysia.

Table 10: Selected Environment-related NGOs in Malaysia

Organisation	*Establishment Year*	*Membership (approximately)*
Malayan Nature Society (MNS)	1940	3000
Federation of Malaysian Consumer Association (FOMCA)	1973	NA
Environment Protection Society of Malaysia (EPSM)	1974	140
Worldwide Fund for Nature (WWF)	1972	NA
Centre for Environment, Technology and Development (CETDAM)	1985	50
Environmental Management and Research Association of Malaysia (ENSEARCH)	1984	600
Consumer Association of Penang (CAP)	1969	NA
Sahabat Alam Malaysia (SAM)	1977	500
Centre for Environment and Technology (CETEC)		

Asia Pacific People's Environment Network (APPEN)	1983	NA
Persatuan Ekologi Malaysia (PEM)	1992	NA

Source: Sham (1998: Table 7)

Environmental and consumer groups have been at the forefront calling for the strengthening of the legislation on the environment. CAP and SAM jointly organized a major environmental conference in 1978 to raise awareness over the blatant abuse of the environment. Logging in Endau-Rompin and air pollution involving the Batu Caves quarry and cement works were among the earliest issues raised. Subsequent efforts included the destruction of Gambier Hill in Penang, location of Asian Rare Earth (ARE) in Papan and continuous pollution of rivers in Penang and Kedah. Increasing attention devoted by NGOs and its consequent effect on the media helped raise the significance of environmental governance.

The Penang government began to demonstrate greater attention to the environment from 1990 following recognition of numerous flash floods, silting and alarming levels of pollution in the state. The prelude to it came in the form of a staunch criticism by CAP about the destructive effects of the Penang Hill Project that was commissioned by the Penang government for implementation. Any efforts to launch it would not only have dismembered the hill and destroyed rare plant and animal species, but it would also have caused massive flash floods, silting and traffic congestion. The criticisms were particularly sharp on the efficacy of the environmental impact assessment study undertaken. The project was subsequently shelved and the state began to increase emphasis on the public good characteristics of private investment. The state government also began undertaking substantial studies on the environment. A whole new division was started within its research think tank, which was later privatized, to handle environmental issues.

While environmental impact assessment studies have become mandatory since the 1980s throughout the country, much of the studies undertaken have been carried as a means of endorsing the economic merits of projects. All government development projects have since required mandatory environmental impact assessments. However, as stated earlier a number of loopholes have allowed environmentally sensitive projects to continue operations. The overwhelming strength of the executive in the political process has reduced the capacity of environment regulators to ensure sufficiently acceptable standards. Also where reforms have been allowed, its adoption has generally come from within government forces, even if NGOs initiated such efforts from outside government platforms. Such feudal practices remain quite strong even though the royalty has little executive powers in the country.

ii. International Dimension

Malaysia's international environmental concerns have been rather mixed. Environmental awareness and the need to participate in international fora to voice its stand has indeed increased since the late 1980s. Its role in shaping the contours of environmental management has been far less serious. It can be argued that Malaysia's international stand on the environment appears to be driven by two main concerns, *viz.*, one, protectionist response from the North, and two, that rapid economic growth still requires some environmental destruction. Thus, a number of environmentally sensitive projects such as the Bakun Dam have been approved without careful impact assessments. Some environmentalists have added a third reason, i.e. the private businessmen enjoying government contracts have preferred short-termist strategies to reap profits. It is for these reasons, while adhering to some international environmental regulatory procedures, official Malaysian efforts have hardly promoted greater environmental surveillance globally. Much of the support for international coordination of the formulation and supervision of environmental standards still come from non-governmental organizations such as CAP and SAM.

As with its general non-interference stance, Malaysia has neither taken on an active role to shape environmental standards nor condemn governments or other international bodies involved in environmental destruction. However, the Malaysian government has consistently condemned the North's efforts to link environmental standards to trade. The Malaysian government has often stated that there is a trade-off between growth and environmental harm when launching the Bakun Dam project, that it had no choice but destroy the environment a little to raise the living standards of its people. The government stated further that environmental issues raised by the North is primarily a luxury the latter pursues for its own self interest as it had destroyed its own environment in the past. Malaysia did not officially condemn cross-border pollution arising from open-air burning in Indonesia, which caused massive haze over the country for several months in 1997, though, Malaysian officials did engage in debates questioning efforts by the Indonesian government, even sending a team of personnel to help resolve it.

Where mega projects designed to speed up growth and structural change and linked to politically-connected interest groups have been involved, environmental issues have been overlooked. For example, the construction of the Bakun Dam was launched to support power generation without an adequate report on its implications for local flora and fauna. Efforts by environmental groups to call the government to undertake more rigorous environmental impact assessment studies have so far not materialized. Pressure from the people affected by the project has also failed to generate greater concerns by the government. The project was shelved due to collosal losses by the contractor assigned to build the dam, after RM2.5 billion ringgit was already spent. At the time of the debacle the value was US$1 billion. However, the project has since been resumed with a more modest budget.

Nonetheless, participation in international fora has raised the level of consciousness and concern over the need to understand and value environmental issues. Malaysia

joined international efforts to enhance environmental standards when it mooted and led the Langkawi Declaration on Environment and Development on 21 October 1989 to support a program for affirmative action to protect and conserve the planet. Malaysia also became signatory to the Rio Declaration in 1992.

While supporting global environmental initiatives, Malaysia has refused to allow global bodies to introduce compliance measures as a means to enforce standards. For example, Malaysia joined other ASEAN economies, India and Brazil to criticize efforts by some members of the North to include environmental and social clauses onto trade within the jurisdiction of WTO. While its claims that the North is seeking new protectionist guises against the interests of the South need addressing, its reluctance to bring the debate to a level that links it to compliance measures may rob the opportunity for global equalization of basic environmental standards. It is unclear how the government will position itself when more serious efforts are made to document environmental clauses.

It can be seen that political forces initiating environmental practices in the country come primarily from the NGOs, though globalization of environmental regulations have also been important. NGOs' influence have particularly been most significant from the 1990s when a number of such organizations managed to work together with the DOE, PDC and other government bodies to strengthen the regulatory mechanisms. However, because of dominance of the executive and prevalence of feudal practices, environmental regulations have generally been used selectively. Hence, environmentally questionable projects such as the Bakun Dam continue to be launched in the country. Also, NGO influences have only been successfully absorbed when aired from within government platforms as feudal practices have meant that rebellious NGOs views have consistently been shunned. In the international arena, apart from raising protectionist concerns, the government has tended to limit international efforts to bring an equalization of environmental standards arguing that the country needs development first.

VI. Conclusion

It can be seen that foreign transnationals have played a major role in Malaysia's economic growth enabling rising production through the use of foreign capital, technology and access to international markets. Foreign capital's involvement in the country has been strong since colonialism, mainly directed to the mining, plantation agriculture and construction and maintenance of infrastructure. The post-colonial government maintained the emphasis on foreign orientation, but initially through the introduction of import-substitution policies. The narrow domestic market and mis-guided governance instruments mitigated fast growth. Export-orientation was introduced as a consequence.

The two strategies operated alongside each other without much integration. Efforts were taken to integrate them since the late 1980s after the second-round import substitution involving state-supported heavy industries began to reap the rents from high protection. Export-orientation – driven primarily by foreign transnational who expanded manifold following the Plaza Accord of 1985 and the withdrawal of the GSP from the Asian NIEs - helped magnify investment and structural change. Rapid growth caused overheating due to a lack of concomitant institutional development to support technical change. As a consequence transnational investment gradually slowed down substantially from 1995 as China and India became more attractive for low wage activities. The slowdown did not deter a continued rise in investment as asset inflation supported massive loans build up. Hence, when contagion from the speculative attack on the baht reached Malaysia the economy crashed as confidence fell.

Three phases of environmental governance and effects can be viewed in Malaysia, *viz*., colonial orientation that continued well after independence until the mid-1970s, initial efforts to establish national coordination from the mid-1970s until the late 1980s, and greater regulation and strengthening of the legal framework in the 1990s. The earlier phases faced little serious efforts to govern environmental degradation. The colonial government may have faced little real need to protect the workers and environment beyond the sustenance of surplus appropriation. The period from the 1970s and 1980s, which was characterised by efforts to woo foreign investment to engender rapid growth and poverty alleviation, seems to be dominated by relatively weak bargaining power enjoyed by the government in its relationship with transnationals. Environmental standards were not seriously pursued and transnationals were often protected by the government. The government's bargaining power with transnationals improved from the late 1980s following a massive inflow of foreign capital, rapid growth, sharp fall in poverty levels and unemployment, and serious overheating. Hence, it can be argued that environmental regulation improved in the 1990s due to improved economic circumstances and rising numbers of transnationals competing to locate in Malaysia. Pollution levels generally improved in the mid-1980s due to a recession that reduced the level of industrial emissions. The introduction of worker-friendly work practices in knowledge-intensive and export-oriented industries such as electronics also resulted in transnationals improving their environmental practices. However, with the exception of some variables such as river pollution and particulates which improved, the pollution levels in the country generally increased in the 1990s due to rapid industrial expansion and better measuring instruments and coverage.

The limited evidence available on transnationals' environmental practices allow the following conclusions. First, changes in production technologies, and improvements in legislation influenced the adoption of better environmental practices in a number of transnationals. American, European and to a lesser extent, Japanese transnationals tend to demonstrate better environmental practices than other East Asian firms in electronics

firms. Second, while environmental considerations did not appear very important in the relocation of transnational firms to Malaysia, there is evidence of environmentally inferior machinery transferred because of lower standards in Malaysia. Jenkins' (1999) study shows that inherent ownership do not correlate strongly with environmental practices when controlled for size, technology, market-orientation and industry-type. Size and market-orientation seem to be the most important variables explaining environmental practices in Malaysia. Nevertheless, because transnationals tend to be large and use more recent machinery, they tend to demonstrate better environmental practices. Hence, it does appear that transnational firms do show better environmental practices. Also, a number of transnationals have pioneered better environmental surveillance in the country.

Political forces initiating environmental practices in the country come primarily from the NGOs, though globalization of environmental regulations have also been important. NGOs influence have particularly been significant in the 1990s when a number of organisations managed to work together with DOE, PDC and other government bodies to strengthen the regulatory mechanism. However, because of dominance of the executive and the prevalence of feudal practices, environmental regulations have generally been used selectively so that environmentally questionable projects such as the Bakun Dam continue to be insulated from stringent regulation. Also, NGO influences have only been successfully absorbed when aired from within government platforms as feudal practices have meant that rebellious NGOs views have consistently been shunned. In the international arena, apart from raising protectionist concerns, the government has continued to block international efforts to bring an equalization of environmental standards arguing that the country needs development first.

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Appendix 1: Negative Environmental Practices by TNCs

a. Asian Rare Earth

Asian Rare Earth (ARE) shifted storage and disposal of radioactive effluents from Japan following the imposition of strict environmental standards in Japan. Japan Mitsubishi Chemical stopped monazite processing in Japan. ARE has subsequently been processing monazite at Bukit Merah, Papan, Perak. The rare earth is shipped to supply Japanese industries, while the radioactive and toxic remains have been retained in Malaysia.

ARE started and maintained operations for 4 years in Malaysia without an environmental impact assessment (EIA) study and even proper licensing for generation, handling and storage of radioactive effluents. Research has shown that the production of rare earth between 1982-85 was conducted under extremely unsafe and dangerous conditions. Effluents were so loosely handled that significant amounts ended in the air and streams.

Reports of bad smell, choking, coughing, colds and tearing, coupled by more studies of leukemia, infant mortality, congenital diseases and lead poisoning alerted the plight of nearby village folks to the country. Eight people sued the company in 1985 on behalf of themselves and 10,000 residents of Bukit Merah, calling for its immediate closure. The fight to protect citizens rights against the environmental abuse continued with sustained demonstrations and signature campaigns. Some officials supporting such campaigns were even jailed under the Internal Security Act (ISA) in 1987, which allows the police to detain without trial.

b. Chemical Company of Malaysia (CCM)

The Chemical Company of Malaysia (CCM), a subsidiary of the British controlled Imperial Chemical Industries (ICI) has brought negative environmental implications to inhabitants located at Padang Jawa in Selangor. CCM was founded in 1965 and manufactures ammonia, paraquat, chlorine, caustic soda, nitric acid and fertilizer.

CCM's highly hazardous manufacturing practices has not only exposed it 560 employees but also the 20,000 inhabitants in its vicinity to serious health risks. There already two fatalities in the factory over the last few years, the last Lasimin Sardi dies after inhaling chlorine fumes leaking from a valve. Workers complained that CCM's management has hardly yielded to their requests for better environmental and safety standards in the factory. To make matters worse, the workers were seriously apprehended for airing their grievances to Factories and Machinery Department in 1983. The management claimed that the workers had breached the collective

agreement signed between hem and the company. While no action was taken against the worksite committee for making the complaint (which could have been the result of widespread publicity given in the local media and the support of trade unions, there is little evidence that the company has installed better environment-friendly instruments.

Sahabat Alam Malaysia's (SAM) showed that the residents of Padang Jawa have faced breathing difficulties and eye trouble. Students from a school located near the factory too have been exposed to the gasses and dust generated. SAM in particular has made serious efforts calling for the closure of the factory (SAM, Undated).

c. Mamut Copper Mine

Mamut Copper Mine (MCM) was formed in 1970 as a joint-venture with an equity breakdown of 51 percent Japanese capital and 49 percent Malaysian capital. MCM's short-termist strategies of minimizing costs saw extremely poor environmental management strategies adopted. Consequently, its operations generated one of the worst environmental tragedies. The poor environmental standards has continued even after Malaysian capital acquired all the shares in 1987 (SAM, 1990).

MCM operates as an open-cast mine some 1,500 meters above sea-level on the Southeastern slope of Mt. Kinabalu. It extracts about 120,000 tons of copper, 2.4 tons of gold and 14.4 tons of silver annually from an estimated 83 million tons of minable ore. It covers 3,000 hectares of land around the rivers of Mamut, Bambangan and Lohan.

Studies by Universiti Kebangsaan Malaysia experts show that MCM generates considerable amounts of silt and rubble during the wet season and dust during the dry season, heavy metals, chemical residues and acid waste. The pipeline carrying the tailings bust several times in 1976 releasing silt and heavy metals into clean water supply involving nearly 20 villages. The affected 17 villages are located in the Lohan Valley. Four villages lost 480 acres of land to make way for the Lohan tailings dam. (SAM, 1990). About 4,000 acres of paddy land were flooded with the waste and silt in 1977. About 2,000 acres were severely damaged – crop damage varied between 10-70 percent of output. Experts from Tokyo University detected extremely high levels of toxic metals – copper, chrome and zinc – in two of the soil samples in the Lohan Valley in 1978. MCM was consequently forced to compensate the affected through the government. A sum of US$5 million was paid out, with the instalment reportedly paid in 1988.

A study in 1983 also showed that rice from the Lohan Valley was found to be contaminated with heavy sediments of heavy metals. Rice from the affected area of Lohan Valley was found to contain much higher levels of copper, iron and chromium than normal rice.

Air and water quality has also been seriously affected. Lohan Valley residents have complained of irritations and breathing difficulties during the dry season. Studies by the Department of Manpower and Environment in the late 1970s showed that copper content in the water reached 10 times the standard level. Another study in 1982 showed high levels of metals and solids; manganese (40.53 mg per liter), iron (14.10 mg. Per liter), nickel (0.95 mg per liter), chromium (0.57 mg per liter) and copper (0.62 mg per liter). The Medical Department reported excessively high levels of lead content and warned that fish caught in the proximate rivers were unfit for consumption.

Appendix 2: Positive Environmental Practices by TNCs

a. The Johnson Mathey HICOM (JM HICOM) Sdn Bhd. Autocatalyst

A joint venture between Johnson Matthey (a British company and the world's leading supplier of autocatalysts) and HICOM was set up to produce catalytic converters for the Malaysian car industry.

These catalytic converters helped reduce the volume of carbon monoxide (CO), unburnt hydrocarbons (HC) and nitrogen oxide (NOx), which are by-products of engine combustion.

Autocatalyst is the active component in a car's catalytic converter which provides the catalytic surface for the chemical breakdown of vehicle emissions such as oxides of nitrogen, CO and hydrocarbons into harmless gases.

b. Treatment and disposal of wastes from Titanium Dioxide Production

Tioxide group, formerly a wholly owned subsidiary of ICI, is the largest international manufacturer of titanium dioxide pigment. It is now owned by DuPont. Titanium dioxide is the only inert, non-toxic white pigment in wide-scale use.

It will incorporate the latest gas emission abatement technology and effluent treatment to fully neutralize all liquid emissions prior to release into the environment. Solid residues from the plant will be contained in a designated storage area adjacent to the production plant. The storage site is underlain by impermeable soft marine clay, over sands and granite or metasediment rock. Solid residues will be retained behind impermeable embankments, landscaped to blend with the natural surroundings. Treated liquid residues from the plant and all rainfall run off from the factory site will be passed to setting ponds which will form a buffer zone for futher treatment. The system is

designed to cope with monsoon conditions, capable of handling most storms expected on a 50-year frequency. Total protection of the environment is maintained by the concept of containment. No liquids can leave the site without passing through the treatment system. An environmental management system will be included in the factory. Total Quality Management Scheme to ensure proper control and assessment of the environmental impact of the factory operation.

The Tioxide (M) Sdn. Bhd. Factory in Terengganu will be operating under standard rules, which are among the most restrictive in the world; it will be a model for environmental performance within the chemical industry, geared up to now for the requirements of the 21st century.

The Titanium bearing raw material used at the majority of the plants in the world is ilmenite, a mixed iron-titanium oxide, which occurs as a mineral sand in Australia and Malaysia and as marine rock deposits in Canada and Norway. Ilmenite contains 40-50 percent titanium dioxide, thus in processing the material a large amount of unwanted residues are generated, mainly iron-with other trace-metals such as chromium and manganese as significant contaminants.

The ore is attacked with concentrated sulphuric acid. When extraction is complete, the acid remains, diluted and contaminated with the iron and other metals as a liquid waste. The quantities involved are significant - to make 50,000 tonnes of Titanium dioxide require the use of 100,000 tons of ilmenite and 150,000 tons of concentrated sulphuric acid.

In the early 1980's, the conventional disposal route of the waste was direct disposal without treatment to the sea, estuaries or deep well injections. Indeed to this day partially treated wastes are still emitted that way. Tioxide reported being opposed to such methods of waste disposal..

c. Phase-out of CFCs at Texas Instruments Malaysia.

CFCs, methyl chloroform and other chemicals have been used as solvents because they are cheap and effective, non-toxic and non-explosive. CFCs have found uses across a wide range of industrial applications. In Texas Instruments Malaysia, they are vital in degreasing and symbolizing. A key part of Texas business would not exist without the presence of these chemicals. However, the law of unintended consequences states that the resolution to one problem can create other problems and the invention of CFC has been no exception to that rule.

CFC not only cleans dirt, oil, grease and grime but also the elements that are essential for human and other living beings existences that the ozone layer strives to protect. The CFC-based chemical that is used in the permanency test process of the ink

is CFC 113-Freon TMC. However, since the middle of 1995, Texas Instruments no longer uses Freon TMC.

Freon TMC converted to a new non-ODS chemical which is called Bio Act EC-7 (98% Terpene Hydricarbon, a clear, light colored liquid with citrus odor). It contains neither CFC nor chlorine, it is a biodegradable and non-corrosive, cleans liquid flux and solder paste residues and is ideal for water recycling. CFC-11 and CFC-12 are using to maintain Texas chiller and air conditioning system. These chemicals are also ozone-depleting substance with an ozone-depleting potential rated at 1.0. Texas Instruments current plan is to replace CFC-11 with HCFC-123 and CFC-12 with HFC-134 a (also called tetrafluroroethane) by the year 1996.

Texas Instruments fire fighting system had shifted from using halon in the computer room sprinkler system to wet sodium bicarbonate. In addition, halon extinguishers and sprinkler systems in the plant were substituted with Carbon dioxide system.

Appendix 3: Environmental Management Standards Implemented by Five Pioneer Companies

Company	Scope of certification	Benefits
1.Matsushita Electronic Co (M) Bhd. *Site: Shah Alam*	Operation of plant for the manufacture of electric fans and vacuum cleaners inclusive of plastic injection moulding, stamping rotor assembly, stator assembly, motor assembly, spotting and powder coating.	Reduction of hazardous waste following the introduction of cleaner technology, better conditions and management of chemicals, energy and cost savings.
2. Sony Electronics (M) Sdn. Bhd. *Site: Prai*	Operation of plant for manufacturing of audio products inclusive of assembly including PCB assembly, calibration and design.	Maintaining effluent parameter of sewerage treatment plant within legislation, better control of the disposal of solvents and spent chemicals.
3. Sony Mechatronic Products (M) Sdn. Bhd. *Site: Prai*	Operation of plant for assembly/manufacturing f floppy disk drives and CD Rom drives inclusives of PCB assembly.	Cost reduction through reuse, reduce and recycle, better competitive edge, greater environmental awareness for stakeholders.
4. Canon Opto (M) Sdn. Bhd. *Site: Shah Alam*	Operation of plant for manufacture of optical lenses and penta prisms involving polishing, centering, coating, cementing, painting and assembly processes; manufacture of cameras involving surface mounting, plastic injection, soldering, printing and assembly.	Implementation of work procedures for handling of chemicals more systematically, promotion of upstream waste generation control resulting in lower treatment costs, recycling programs contributing to less 'kept' generated waste.
5. Shell Malaysia Trading Sdn. Bhd. *Site: Butterworth*	Depot operation involving receipt, storage, addition of additives, filling and dispensing of petroleum production into lorries and barges.	Implementation of a health, safety and EMS (HES-MS) identifying occupational and environmental hazards and risk levels of activities. Control measures and plans for recovery in the event control is lost, have been put into place to reduce the risk of hazards to a level As Low As Reasonable Practicable (ALARD), control of weaknesses in the present system and cost-savings.

Table 1: Foreign Ownership of Fixed Assets, Manufacturing industries, Malaysia, 1968-93, 1993 (%)

Industry	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	93
Food	74	73	71	72	69	62	56	55	56	48	45	39	32	31	29	28	27	25	26	26	28	30	30	33
Beverage and tobacco	93	91	89	86	82	81	81	79	78	77	77	76	76	66	66	67	67	67	70	69	70	69	62	58
Textile and apparel	52	41	29	48	53	66	65	63	62	60	58	56	54	54	52	49	48	48	53	54	53	59	61	64
Leather *	17	56	56	54	54	53	51	48	46	45	44	45	48	54	56	57	56	54	48	45	51	58	59	57
Wood	15	8	11	12	13	11	9	8	10	12	13	14	13	14	14	12	10	9	8	9	15	15	19	36
Furniture and fixtures	50	73	71	69	66	65	63	61	56	48	42	38	31	19	28	22	19	19	16	14	25	36	45	45
Paper, printing and publishing	na	na	na	na	24	21	18	16	15	13	12	10	10	9	11	10	19	20	19	20	21	10	14	13
Chemical	53	59	61	66	66	69	65	63	61	59	54	56	53	51	48	44	42	16	21	19	21	23	24	25
Rubber	14	9	14	16	28	36	44	42	46	46	45	44	46	34	36	65	38	42	41	45	56	56	55	51
Petroleum and coal	78	75	77	77	79	78	81	79	79	78	79	80	78	66	65	36	43	37	37	40	41	44	44	50
Plastic	na	na	na	na	Na	na	Na	na	na	Na	na	na	12	12	12	14	12	13	15	15	18	27	27	46
Non metal mineral	57	59	60	63	61	56	58	52	46	42	36	24	19	36	37	36	29	32	31	33	33	34	33	39
Basic metal @	49	45	45	46	44	43	43	42	41	42	39	36	35	29	28	32	31	32	33	34	34	23	17	33
Fabricated metal	66	76	69	69	72	71	69	59	45	42	39	36	26	30	27	27	24	23	23	25	26	28	30	56
Machinery	74	66	58	57	59	61	54	51	51	51	48	45	42	49	45	36	34	35	39	43	48	50	53	65
Electric and electronics	70	69	67	74	82	83	83	84	85	82	82	81	80	79	76	74	77	73	77	77	81	86	89	91
Transport and equipment	na	na	58	57	62	61	56	51	49	49	48	42	32	27	22	11	18	15	21	22	22	25	25	35
Other	60	25	67	72	75	72	71	69	66	62	58	56	57	62	63	60	55	53	58	62	63	62	69	81
Total	61	61	59	57	57	57	56	52	50	47	46	50	39	36	38	36	37	33	34	36	39	40	42	50

Notes : 1971-9 figures nave been estimated from projects approved by MIDA; *- excludes rubber footwear; @ - includes iron and steel; na - unavailable.
Source : Computed from unpublished MIDA data (see also Rasiah, 1995).