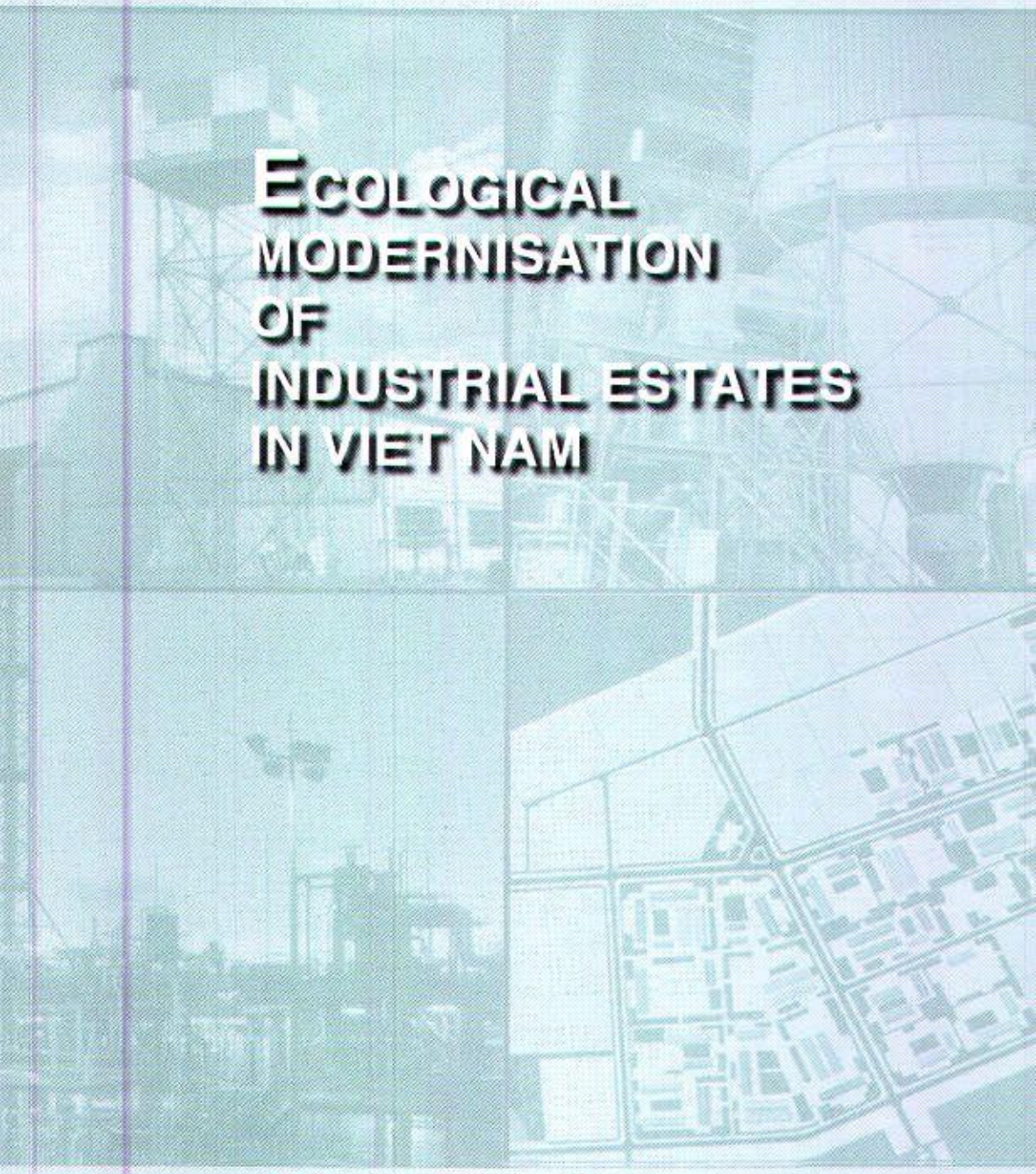

Ecological Modernisation of Industrial Estates in Viet Nam

Phung Thuy Phuong

PROPOSITIONS

1. Notwithstanding the critical assessment of the value of ecological modernisation ideas for non-European contexts, there exist good reasons for not throwing out this baby with the bath water in studying processes of environmental reform outside Europe.

2. Turning 'dirty' industrial estates into 'green' ones requires an investment in the development and implementation of clean technologies. However, the success of clean technologies for pollution control and prevention in industrial estates depends not only on the technological introduction itself, but also on the social context in which the technology is introduced, diffused, and institutionalised.

3. In Viet Nam, the management of industrial estates by Industrial Zone Infrastructure Development Companies and the diversity of industrial sectors in these estates, are advantages in applying the concept of industrial ecology.

4. In developing green industrial estates following the concept of industrial ecology, strong determination of the government remains a vital factor in a developmental state like Viet Nam.

5. The Vietnamese soldier comes to another front now, the environmental front. Without environmental recovery, Viet Nam can not have economic recovery (Vietnamese General Vo Nguyen Giap, as quoted in Beresford, M. and L. Fraser (1992), "Political Economy of the Environment in Viet Nam", *Journal of Contemporary Asia* 22, 1, pp. 3-19).

6. One man's food is another man's poison.

7. There is no end in science.

These propositions belong to the dissertation *'Ecological Modernisation of Industrial Estates in Viet Nam'*, defended on June 5th 2002 at 13.30 hours in the Auditorium of Wageningen University.

ECOLOGICAL MODERNISATION OF INDUSTRIAL ESTATES IN VIET NAM

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ECOLOGICAL MODERNISATION OF INDUSTRIAL ESTATES IN VIET NAM

PHUNG THUY PHUONG

Proefschrift
ter verkrijging van de graad van doctor
op gezag van de rector magnificus
van Wageningen Universiteit,
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Finally, I am proud to be a daughter of Prof. Phung Trung Ngan. His life and his devotion to scientific work has always been a good example for me to follow. I dedicate this work to my father.

Ho Chi Minh City, May 2002

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LIST OF ABBREVIATIONS

ADB	-	Asian Development Bank
BOD	-	Biochemical Oxygen Demand
COD	-	Chemical Oxygen Demand
DO	-	Dissolved Oxygen
DOSTE	-	Department of Science, Technology and Environment
EIA	-	Environmental Impact Assessment
EMS	-	Environmental Management System
EPC	-	Environmental Protection Centre
GDP	-	Gross Domestic Product
GNP	-	Gross National Product
IMF	-	International Monetary Fund
ISO	-	International Organisation for Standardisation
IUCN	-	International Union for the Conservation of Nature
IZIDC	-	Industrial Zone Infrastructure Development Company
IZMB	-	Industrial Zone Management Board
MOSTE	-	Ministry of Science, Technology and Environment
NEA	-	National Environmental Agency
NGOs	-	Non-Governmental Organisations
ODA	-	Oversea Development Aid
OECD	-	Organisation for Economic Co-operation and Development
PPP	-	Polluter Pays Principle
SOEs	-	State Owned Enterprises
UNDP	-	United Nations Development Programme
UNEP	-	United Nations Environment Programme
UNIDO	-	United Nations Industrial Development Organisation
US	-	the United States
USD	-	United States Dollar
VIZA	-	Viet Nam Industrial Zone Authority
VND	-	Vietnamese Dong
WB	-	World Bank
WWF	-	World Wild Foundation

INTRODUCTION

The concept of 'Industrial Estate' was first invented in the industrialised countries in the late nineteenth century. These countries thought it was wise to promote, plan and manage industrial development. Ever since industrial estates were introduced, they have proved helpful instruments in stimulating industrial activities and by doing so they have contributed to the economic development of the countries. However, industrial estates did not bring just economic benefits. They also brought safety, health and environmental problems. Viet Nam is, like many other Southeast Asian countries, experiencing a huge economic and industrial expansion in which industrial estates play a vital role. Lots of industrial estates are being planned and operated with little concern for the surrounding environment. This forms a threat to the ecological balance and environmental quality as the environment is being polluted heavily and its natural resources are being drained. Even though the state has made a lot of efforts to deal with environmental problems, the result is still limited. Increasing consensus emerges that something should be done to prevent the 'development at-all-cost' scenario. This study is an attempt to build a road towards 'green' industrial estates in Viet Nam so that industrialisation and environmental protection can be compromised.

This book is organised in nine chapters. Chapter 1 presents an overview of industrial estate development and environmental problems in general and particular in Viet Nam. Chapter 2 is devoted to a theoretical framework and methodology. In this chapter, industrial ecology is introduced as a model for green industrial estates, and Ecological Modernisation Theory is chosen as a guideline to improve environmental management of industrial estates and to promote the application of the industrial ecology concept in industrial estates. From this theoretical elaboration four key subjects are identified for environmental management of industrial estates: technological change, the role of industry and economic agents, the role of state authorities and policies, and the importance of communities and other non-governmental actors. Before dealing with each of these four issues, chapter 3 presents a review on existing environmental policy-making and management in Viet Nam, with special reference to industrial estates. Chapter 4 deals with current practice of cleaner production and waste exchange in Viet Nam, and analyses the constraints and opportunities to promote cleaner production at company level and waste exchange at estate level. Chapter 5 analyses the role of industry and other economic agents in the

development of industrial ecology. Chapter 6 analyses the role of the state, and how the style of state intervention can be changed in order to promote industrial ecology and to improve environmental management of industrial estates. Chapter 7 analyses the role of community and other non-state actors, non-economic actors to improve environmental management of industrial estates. Chapter 8 brings these four issues together, draws conclusions on future environmental estate management strategies. Finally chapter 9 assesses the value of Ecological Modernisation Theory to improve environmental management of industrial estates in Viet Nam.

CHAPTER 1

INDUSTRIAL ESTATE DEVELOPMENT AND ENVIRONMENTAL PROBLEMS

1. Introduction

Since 1986 Viet Nam committed itself to a policy of renovation, named economic reform policy (*Doi Moi* Policy). Economic reform policy is changing the economic system in Viet Nam from a purely command economy towards a market-oriented economy, introducing a new era for the development in Viet Nam. Sikor and O'Rourke (1996) summarise the main issues involved in Viet Nam's economic reform as follows: the government has liberated economic production and exchange; resource allocation has shifted towards market mechanisms with the goal of increasing flexibility and efficiency; state enterprise reform, the 1993 Land Law, and tax reforms have transferred assets to, and strengthened the role of, the private sector; and international trade and investment have been liberated through the 1987 Foreign Investment Law and more recent foreign trade reforms. Viet Nam has opened its door to all economic sectors (state-owned business enterprises as well as private enterprises), and oversea investors. In an attempt to build up a rich and powerful country, the Eighth Party Congress of the Viet Nam Communist Party, held in June 1996, emphasised that the main goal of Viet Nam in the period of 1996-2000 would be 'to continue the economic and political reform process and to promote industrialisation and modernisation process' (Viet Nam Communist Party, 1996). In other words, industrialisation and modernisation are the country's key development strategies.

2. History of Industrial Development in Viet Nam

The history of the industrial development in Viet Nam can be divided into 5 stages.

The first stage lasted from the beginning of industrialisation up to 1954. Until 1945 the domestic industry was small-scale, very weak, and dependent on colonial power. Between 1945-1954 this small-scale industry started to develop, both to support the resistance against the French (e.g. the defence industry) and to provide goods for the population, which were produced by private small industries and artisans. These development started at a low level and management skills were still lacking (Hanoi Architectural Institute, 1995).

The second stage of industrialisation took place between 1955 and 1975. During that period Viet Nam was divided into the North and the South. Each part of the country followed a different path in its industrial development (Hanoi Architectural Institute, 1995; Ministry of Construction, 1998).

In North Viet Nam, with an industrialisation strategy under Socialism, heavy industry was given a high priority and all production facilities belonged to the state. Many industrial zones[1] were developed in this period, including the ones which are close to urban areas like Hanoi and Hai Phong, and those related to natural resources such as the metallurgical industrial zone in Thai Nguyen, the chemical industrial zone in Viet Tri, and the coal mining industrial zones in Uong Bi and Pha Lai. The facilities of new factories were better than the ones developed during the French occupation, but they were still not at an international standard. Most technologies were inherited from the French Colony and then combined with technologies imported from other centrally planned economies (e.g. Russia, Central Eastern Europe, and China). Economic productivity was generally low. Construction and expansion of industrial areas often did not involve detailed planning and a long-term view. This resulted in a lot of negative consequences for urban life and the environment. The bureaucratic administration and management, which was inherent to a centrally planned economy, became a barrier to further economic growth. Especially towards the end of this stage economic stagnation and regression prevailed.

In the South, the industrialisation path had a capitalist orientation. It depended strongly on foreign support and it had an unbalanced structure (90% was light industry). Most technologies were imported from the United States (US) and some from Europe. Industrial zones developed mostly near big cities such as Saigon, Bien Hoa, Da Nang, Nha Trang, and Can Tho. Especially the Bien Hoa Industrial Zone (now it is known as Bien Hoa I Industrial Zone to distinguish it from the newly established Bien Hoa II Industrial Zone) played an important role in the economic development of South Viet Nam. Besides, there existed some industrial clusters[2] in Thu Duc District and Tan Binh District (in the former Saigon City), which developed spontaneously within residential areas.

Despite of the differences between the North and the South, there are some similarities. In both parts of the country, industrial zones were mostly developed spontaneously without planning or environmental consideration. There were no common waste treatment facilities in industrial zones, and no planning for the overall layout of each industrial zone.

The third stage of industrialisation was from 1976 to 1985. After the reunion in 1975 all firms in the South became state-owned enterprises. Together with the state-owned enterprises in the North they suffered from various difficulties, such as a lack of energy and raw materials, inadequate infrastructure, obsolete equipment, and out-of-date technology (Ministry of Construction, 1998). Consequently, the industry developed at slow speed. Competition was totally absent and state-owned enterprises were neither dynamic nor productive, which severely hindered the industrialisation process (Hanoi Architectural Institute, 1995).

The fourth stage was from 1986 to 1990. With the implementation of the economic reform policy in 1986, the industrial sector in Viet Nam entered a new phase of development. Industry in Viet Nam faced new changes and challenges. The reform policy was implemented without any external financial assistance from industrialised capitalist countries or multinational institutions such as the International Monetary Fund (IMF), the World Bank (WB) or the Asian Development Bank (ADB). In this period, economic reform policy was implemented without adequate legislative and institutional framework but by trial and error. Elements of the old model were discarded and replaced with elements deemed to be more suited to Viet Nam's circumstances (Than and Tan, 1993; Vu Tuan Anh, 1994). This explains to some extent why the changes in the industrial sectors in this period did not result in significant economic achievements. However, this period is widely considered as an important starting point for the economic development that took off during the next period.

In most recent period from 1991 onwards, Viet Nam has witnessed a rapid industrial development. During this period, Viet Nam has shown an average economic growth of 8-9% while inflation has fallen below 3% in 1996. Industry is growing with great speed. Since 1993 the industrial output has grown annually by nearly 13%. In 1996 the industrial sector accounted for 25% of Gross National Product (GNP) and, according to the projections of the Ministry of Planning and Investment, it will account for 35% in 2010 (Mol and Frijns, 1997). In 1999, the industry accounted for 48.2% of the total invested capital, and for 61.1% of the total investment projects (Viet Nam Investment Review, 1999). Light manufacturing, particularly food processing, textiles and footwear, dominates the sector even though a lot of the factories have to operate with old

equipment. For instance, textile and garment industries have recently contributed approximately 16% to the total industrial output. It is a key source of employment and one of the country's major export sectors. Heavy industry suffers from outdated machinery and technology, and makes up a minor portion of output nowadays. The reform policy has resulted in the diversification of the economic structure. Private, joint-venture, and foreign direct investment companies are found beside state-owned enterprises. However, in major important industries such as energy, telecommunication, coal mines, shipyards, cement, etc. the government is still the exclusive investor.

In general, the economic reform policy has resulted in an increase in the number of factories and a diversification of the country's economic basis. The country has met some of its major needs but most of the applied technologies are outdated and rather simple. The rate of equipment renewal is only 7% per annum, which is only half of the minimum rate in more developed countries (Hanoi Architecture Institute, 1995). In order to promote the industrialisation process, the Prime Minister decided to accelerate the establishment of industrial estates, and throughout the country industrial estates have mushroomed since 1994.

3. Industrial Estates: Definition and Development

3.1 Definition of Industrial Estates

Industrial estate, industrial park, industrial district, industrial area, industrial town or city, industrial tract, industrial zone, industrial trading estate, business park, etc. all relate to a geographical concentration of business activities. But they differ in terms of size, type, organisation, facilities, etc. These concepts are described in different ways by different authors in the literature (see for example Gloeckerner, 1966; Peddle, 1993; UNEP, 1996). But they all have as a common feature: 'a cluster of industries within a defined geographical area, administered and/or managed by a single authority having a defined jurisdiction with respect to tenant companies'. In this study, industrial estate is used as the common term to represent all types.

In Viet Nam three types of industrial estates can be distinguished (National Politics Publisher, 1998):

- An Export-Processing Zone (EPZ) is a defined geographical area where export products are produced and related export activities and services are carried out. Factories/enterprises in an export-processing zone are allowed to buy raw materials and semi-products from the domestic market, but all their

products must be exported. Export-processing zones are established under the approval of the Prime Minister and are separated from residential areas.

- An Industrial Zone (IZ) is a defined geographical area that contains industrial businesses. Businesses in an industrial zone can produce export products or products intended for the domestic market. Industrial zones are established under the approval of the Prime Minister and separated from residential areas. Industrial zones are classified into four types :
  - Type 1: Industrial zones established in an area where there exists already an industrial cluster, in order to improve the existing infrastructure and to have better environmental control;
  - Type 2: Industrial zones established to support the relocation of enterprises from the inner city to industrial zones;
  - Type 3: Small-scale industrial zones that act as satellites of other industrial zones. These types of industrial zones are usually established near a source of natural resources. The main activity in these industrial zones is to process the natural resources so that they can be used in other factories. The establishment of these industrial zones aims to support rural development;
  - Type 4: industrial zones established to stimulate domestic and foreign investments.

- A High-Tech Industrial Zone (HTIZ) is a defined geographical area containing industrial businesses that use high-level technologies. It can also include services and activities that support the development of high-level technology such as research and training. High-tech industrial zones can produce export products. They are established under the approval of the Prime Minister and separated from residential areas.

3.2 Development of Industrial Estates

Industrial estates became known as a method to organise, house and service industry. It was considered a planning tool when it was first introduced in England in the late nineteenth century. After 1945, the concept was adopted as an economic development strategy, especially by countries in the process of industrialisation (Gloeckerner, 1966). Since 1970, more and more industrial estates were established both in developed and developing countries, especially in industrialising countries in Asia. The total number of industrial estates in the world today is not known exactly, but it is estimated at between 12,000 and 20,000, and still rising. A survey by the International Development Research Council (IDRC) on various types of industrial estates in the mid 1990s listed some 12,600 estates in 90 countries. Number of industrial estates in some OECD countries in the mid 1990s is presented in Table 1.1.

Table 1.1 Number of Industrial Estates in some OECD Countries in the mid 1990s

Country	Number of Industrial Estates
USA	8,800
Canada	1,200
Germany	300
United Kingdom	200
The Netherlands	130

(Source: UNEP, 1996)

Figures on member countries of the Association of Southeast Asian Nations (ASEAN) show that even though industrial development in Asia began much later, the number of industrial estates is growing rapidly. Table 1.2 shows the number of industrial estates in some Asian countries in 1992.

Table 1.2 Number of Industrial Estates in some Asian Countries in 1992

Country	Number of Industrial Estates
Malaysia	166
The Republic of Korea	147
Indonesia	117
Japan	95
The Philippines	63
Singapore	28
Thailand	23

(Source: UNEP, 1997)

There are many reasons why developing countries support the establishment of industrial estates. UNIDO (1978) summarised the reasons for establishing or promoting industrial estates in developing countries as follows: to accelerate national economic development through industrial development; to create employment opportunities; to decentralise industry and to spread the benefits of industrialisation more evenly in the country, particularly in rural and backward areas; to promote small-scale industries; and to relocate small-scale and artisan industries from congested urban areas.

In Viet Nam, there existed some industrial zones before 1991. However, it was not until after the economic reform policy that the advantages of industrial estates were fully recognised. Export-processing zones have been established since 1991 in order to provide the required infrastructure facilities and encourage investors. Since 1994 several industrial zones have been established. Decree No. 36/CP[3] with attached regulations provided the legal basis and offered a wide range of incentives to domestic and foreign investors to invest in industrial estates (National Politics Publisher, 1998). In order to establish an industrial estate, the government rents land to Industrial Zone Infrastructure Development Companies[4]. These companies clear the land, compensate people who are living in the project areas for resettlement, construct basic infrastructure, etc. Then Industrial Zone Infrastructure Development Companies rent plots of

the new industrial estates to investors (firms) at an appropriate rental fee and for a certain period of time. The land rental fee, which is suggested by the Industrial Zone Infrastructure Companies, must be in accordance with the standard price set up by the government.

At the end of the year 1997, the Prime Minister approved 48 industrial estates (Ministry of Construction, 1998). One year later, 12 more industrial estates were approved setting the total number of industrial estates at 60 (VIZA, 1998)[5]. The distribution of industrial estates in Viet Nam is presented in Figure 1.1.

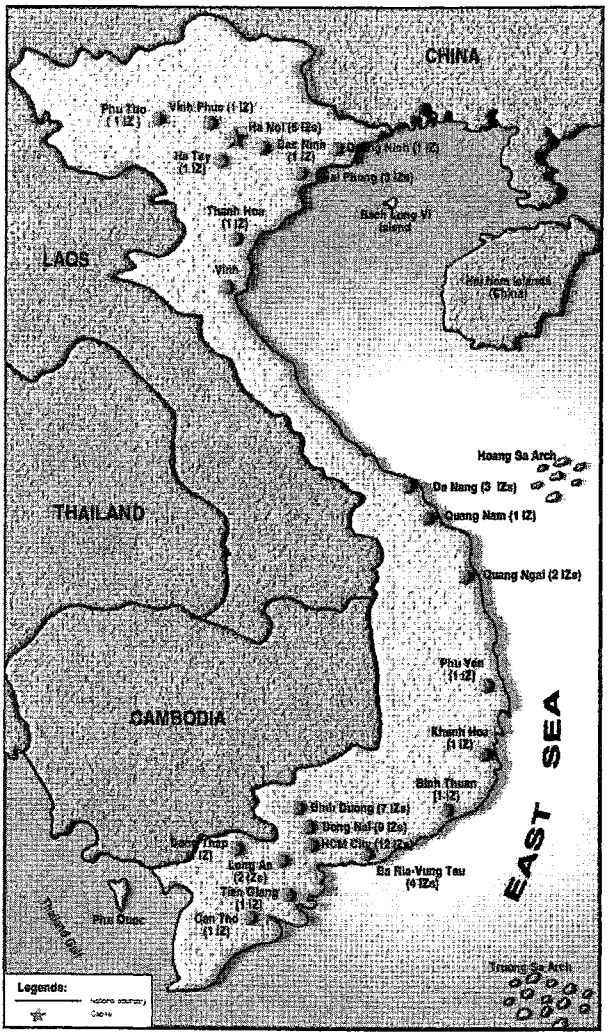

Figure 1.1 Distribution of Industrial Estates in Viet Nam
(*Source: VIZA, 1998*)

Most of these industrial estates are in the three key economic regions: Hanoi-Hai Phong-Quang Ninh in the North; Quang Nam-Da Nang in the Centre; and Ho Chi Minh City-Ba Ria Vung Tau-Binh Duong-Dong Nai in the South. Especially in the Southern Key Economic Region the number of industrial estates is rapidly growing because of favourable conditions such as soil characteristics, transportation, available power and water supply, skilled labour, and other services[6]. Figure 1.2, 1.3, 1.4 present the distribution of industrial estates in Binh Duong Province, Dong Nai Province, and Ho Chi Minh City respectively. Beside the number of industrial estates, the Southern Key Economic Region is also leading the number of industrial investment projects within industrial estates. In 1997, seven industrial estates throughout the country had rented more than 50% of their land. Six of these estates, which are considered the most successful in attracting investors, are located in the Southern Key Economic Region (Ministry of Construction, 1998).

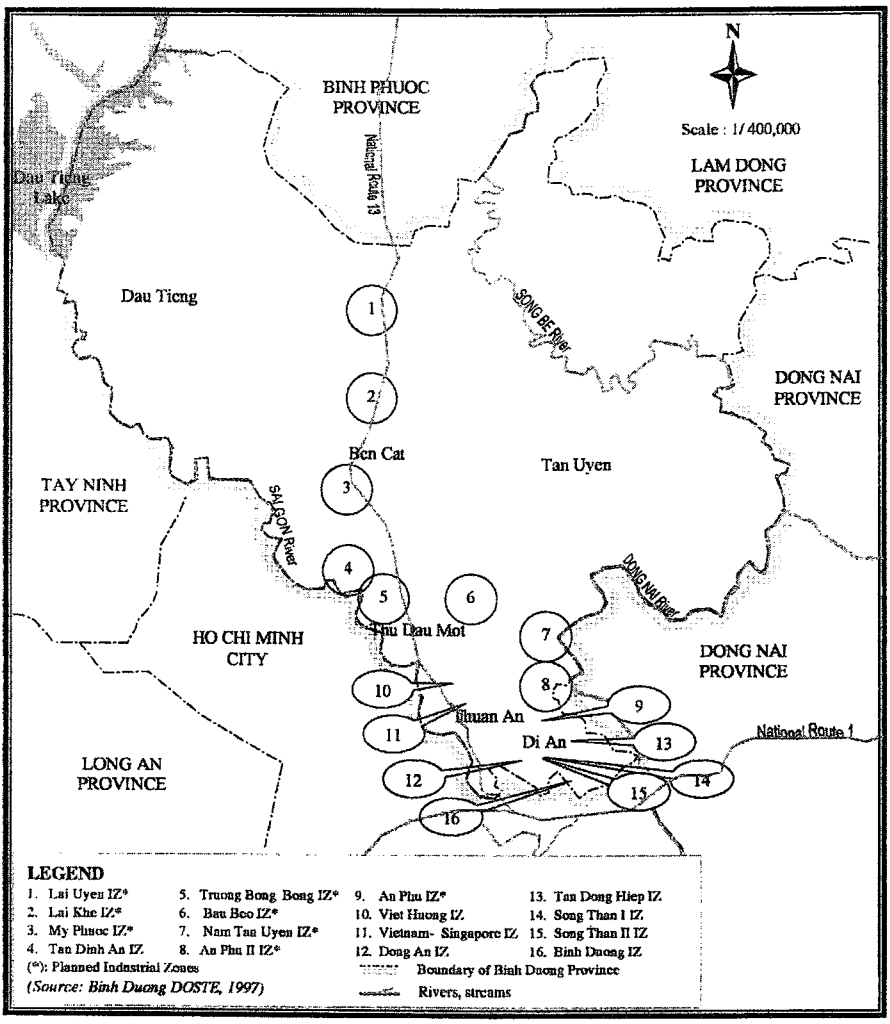

Figure 1.2 Industrial Estates in Binh Duong Province

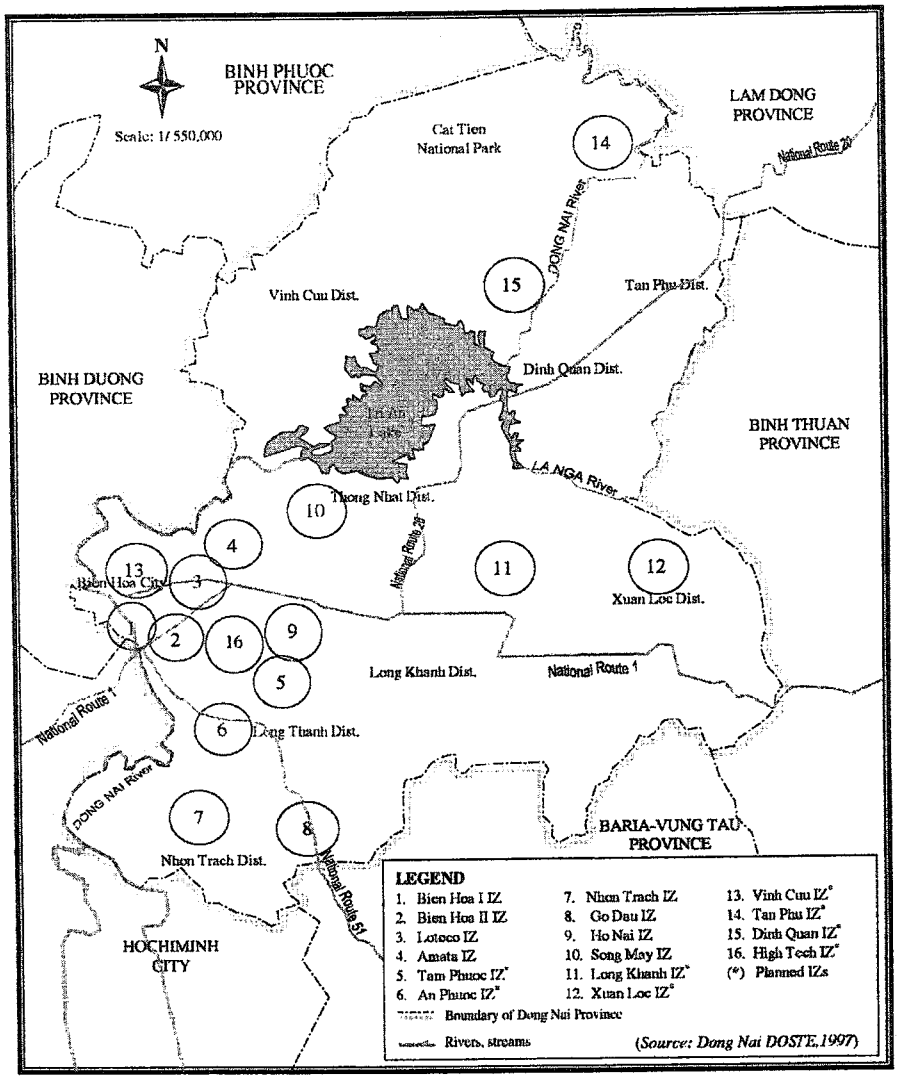

Figure 1.3 Industrial Estates in Dong Nai Province

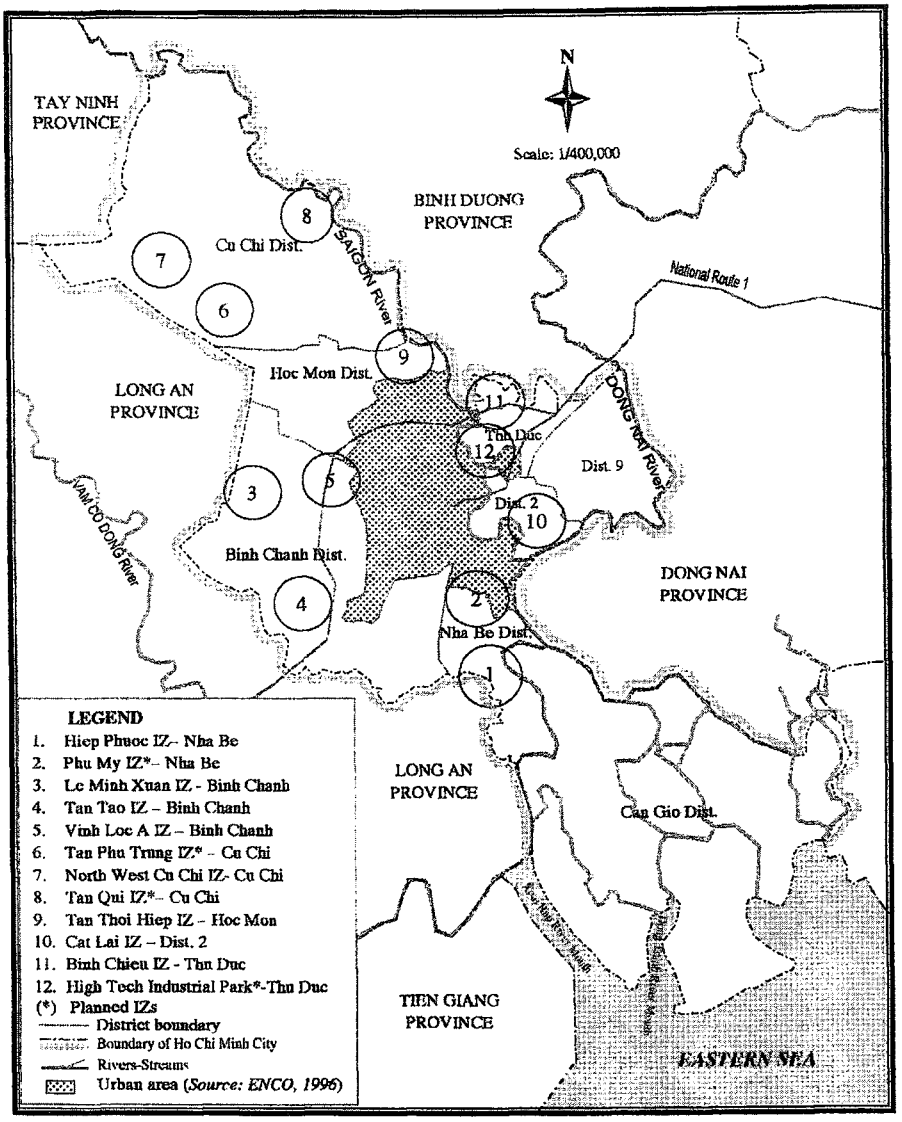

Figure 1.4 Industrial Estates in Ho Chi Minh City

4. Economic and Environmental Aspects of Industrial Estates

4.1 Industrial Estates and Economic and Industrial Development

It is widely believed that industrial estates can play an important role in the development of national economies in general and the industrial structure in particular. Through a series of studies on industrial estates, UNIDO (1997) has summarised the contribution of industrial estates to economic and industrial development (see Box 1.1).

Box 1.1 Contribution of Industrial Estates to Economic and Industrial Development

Industrial estates serve:

(a) To promote more rapid industrialisation of the country
(b) To increase national and local employment
(c) To achieve a more balanced regional distribution of employment and production, and consequently more balanced regional growth
(d) To attract private investment, both national and foreign
(e) To promote the development of small domestically-owned industries
(f) To bring industries and industrial employment to rural areas
(g) To induce structural changes in production and employment, especially diversification
(h) To encourage more effective use of resources through the development of large-scale industrial complexes, including diversified industries of all sizes, centred on major projects such as ports, airports, railroad and highway junctions, power plants, oil refineries, steel mills, and chemical plants
(i) To improve product quality and increase productivity
(j) To train labour and its productivity
(k) To achieve economies in investment in public infrastructure
(l) To reduce the cost of capital investment to the industrialist
(m) To eliminate delays for the industrialist in obtaining a suitable site, utilities and buildings

(Source: UNIDO, 1997)

The role of industrial estates in the economic development in Viet Nam is not an exception to this general UNIDO picture. Industrial estates have mostly been established during the last decade. Therefore industrial estates have a relatively short history, but they have made a significant contribution to the social-economic development of the country. In 1997, industrial estates contributed 10% to the national export value and 12% to industrial output value of Gross Domestic Product (GDP) (Ministry of Construction, 1998). Industrial estates in Viet Nam have promoted rapid industrialisation, increased product quality and productivity, enhanced national and local employment, attracted both national and foreign investors, induced structural changes in production especially through diversification, and have partly eliminated delays in administrative procedure to obtain production licenses. However, according to the government officials and experts, at present the potential of industrial estates is not yet fully exploited. They do not yet contribute much to a balanced regional

growth, as most industrial estates are located around cities. They also do not promote the development of small, domestically owned industries, as most of these are still located outside industrial estates.

Beside the contribution of industrial estates to economic and industrial growth, environmental impacts of activities carried out in industrial estates are worth considering.

4.2 Environmental Aspect of Industrial Estates

In this section, two to some extent contradictory environmental aspects of industrial estates will be discussed. On the one hand the concentration of industrial firms in a small area will cause negative impacts on the environment. On the other hand, the proximity of industries offers opportunities to improve and intensify effective, efficient and stringent environmental management.

4.2.1 Environmental Impacts

The concentration of firms in a small area may pose a substantial threat to the environment. Due to the concentration of different types of industries in one area, the cumulative and synergistic effects of different pollutants could have major impacts on the environment, human health and safety. The possible environmental impacts of industrial estates are presented in Figure 1.5.

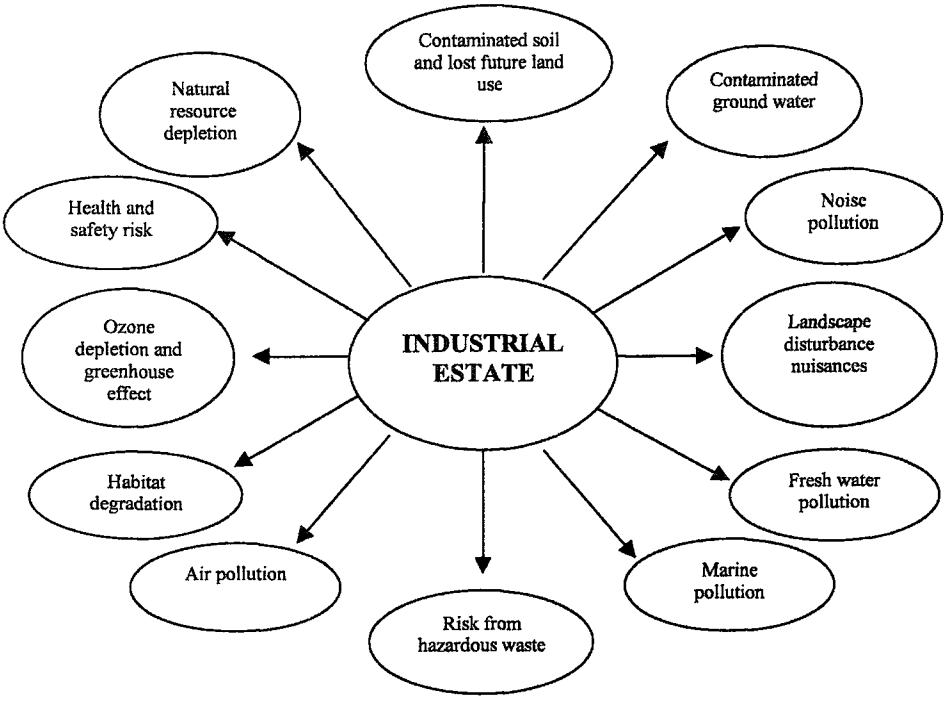

Figure 1.5 Possible Environmental Impacts of Industrial Estates
(Source: UNEP, 1997)

Even though global environmental problem such as ozone depletion and greenhouse effect; national environmental problem such as natural resource depletion, especially non-renewable resources; regional environmental problem such as marine pollution; local environmental problem such as contaminated soil and lost of future land use, landscape disturbance nuisances, and habitat degradation; and other problem such as risk from hazardous wastes are possible environmental impacts of industrial estates, until now hardly any report on these problems can be found in Viet Nam. Most of the reports are related to pollution problems in both old and new industrial estates throughout the country. Few reports were made on the limited availability of water and energy resources. The following section will present some of the reports on resource use and pollution problems in the Southern Key Economic Region, the chosen area for this study (see chapter 2).

* *Natural Resource Use*

To ensure the functioning of industrial estates, electricity and water supply are essential. Providing electricity and water in adequate and stable amount is one of the major concerns in Viet Nam. Compared to the other key economic re-

gions in Viet Nam, the southern region has fewer problems with electricity and water supply, but the provision is still a major challenge for the development of industrial estates. In 1996, the Ministry of Planning and Investment estimated that in the next 15 years, the approved export-processing zones and industrial zones of the Southern Key Economic Region will consume 9-12 billion kWh of electricity per year and 420,000-580,000 m^3 of water per day (Tan Duc, 1996). The available resources are very limited, although large plans for hydroelectric power and for water supply are being carried out.

* *Environmental Pollution*

The following section presents some reports on pollution problems in the Southern Key Economic Region to illustrate part of the picture on the environmental pollution related to industrial estates.

Bien Hoa I Industrial Zone in Dong Nai Province is one of the biggest threats to the water quality of the Dong Nai River as it discharges 30,420 m^3/day of wastewater containing 12,486 kg of Biochemical Oxygen Demand (BOD) (Phung Thuy Phuong, 1994). Water pollution damages aquatic life and causes fish kill in the river. It was estimated that people who depend on fishing in the Dong Nai River near Bien Hoa I Industrial Zone lost one hundred million VND per year (9,000-10,000 USD) as a result of the fish kills (EPC, 1992). Industrial solid waste forms another problem. It was estimated that 250-300 tonnes of solid waste is generated in this zone every month, but up till now there is no special treatment for solid waste, and also not for toxic and hazardous waste (Lam Minh Triet et al., 1999). O'Rourke (1999) reported on undrinkable well water, and nose, eye, and skin problems among the community around Tan Mai Paper Company (Bien Hoa I Industrial Zone). In Ho Chi Minh City, an industrial cluster is located in Tan Binh District, which is a high population density area. Most enterprises in this area have been operating for a long time without any waste treatment facilities. Air pollutants from industrial activities such as textile, food processing, electroplating, etc. penetrate the houses directly and pose a serious threat to human health. Wastewater from this industrial cluster is one of the most important causes of water pollution in Tham Luong, Nhieu Loc, Tan Huong, and Bau Cat Canals (Tran Nguyen Hien, 1998).

The pollution problems also exist in newly established industrial estates[7]. At present, there are no measures to control air pollution at estate level, except that 15% of the land of each industrial estate is used to plant trees as a simple measure to mitigate noise and air pollution. Individual firms in industrial estates have to treat their emissions to comply with local or national standards and regulations. However, neither the overall air quality nor the cumulative and synergistic effects of air pollutants are taken into consideration for the area as a

whole. Regarding wastewater control, all new industrial estates have to construct common wastewater treatment plants in accordance with their environmental impact assessment (EIA) reports (if there are EIA reports). But until now only a few industrial estates have a central wastewater treatment system. Until 1999, in the Southern Key Economic Region, only two export-processing zones and three industrial zones out of 36 newly established industrial estates had their own common wastewater treatment plants in operation (namely Viet Nam-Singapore Industrial Zone in Binh Duong Province; Loteco Industrial Zone and Amata Industrial Zone in Dong Nai Province; Linh Trung Export-Processing Zone and Tan Thuan Export-Processing Zone in Ho Chi Minh City). Bien Hoa II Industrial Zone (Dong Nai Province) was in the process of constructing a common wastewater treatment plant. Other industrial zones still delay the construction and operation of their common wastewater treatment plants, mainly due to lack of capital. Individual factories/enterprises in industrial estates are obliged to treat their wastewater to meet standard type C[8] before discharging it to the common wastewater treatment facilities or to the sewage systems. If the wastewater contains any heavy metals and/or toxic substances[9] it must be treated on-site to remove these substances. However, there are no data available on on-site treatment facilities of firms in industrial estates, on how these facilities work or on their efficiency. Hence, it cannot be made sure that individual firms in industrial estates implement what has been written in EIA report (if there are any). Concerning solid and hazardous wastes, there is little concern about solid and hazardous wastes coming from industrial estates, although significant amounts of these wastes are generated everyday. Most factories in industrial estates have hired private companies or so-called Environmental Service Companies to collect, transport, and 'treat' their wastes (both domestic and industrial wastes). The current fate of these wastes follows this pattern: (i) wastes are separated into plastic, metal, paper, organic fractions, etc., either in-plant by workers, on the way to the dumping site by collectors or at the dumping site by scavengers; (ii) relatively pure organic waste is sold to produce fertiliser while other types of waste that can be reused are also sold for recycling; (iii) the final 'treatment' of the remaining, non-reusable fraction is disposal at the official dumping sites. However, there are some exceptions. Some factories have an incinerator; others bury their waste in vacant land. And still others dump their waste on-site in vacant land and then burn it. Finally it happens that enterprises dump their wastes illegally, outside their factories. At the existing dumping sites, there is no proper measure to prevent pollution or health impacts. Even though, Ho Chi Minh City plans to construct an incinerator for each industrial estate and other provinces in the Southern Key Economic Region plan to build industrial solid waste treatment plants for their provinces. Until now these are just plans, which prove to be patient on papers.

All these emissions and their limited treatment cause severe effect on environmental quality in the Southern Key Economic Region. Preliminary surveys on air quality in industrial estates of Dong Nai Province and Ho Chi Minh City reveal that at present the major cause of air pollution is dust coming from construction and transportation activities in industrial estates (Dong Nai DOSTE, 1998; Ho Chi Minh City DOSTE, 1997). A report on the Go Dau Industrial Zone in Dong Nai Province showed that most of the air pollution in that area is caused by fertiliser and production of enamelled tiles (Dong Nai DOSTE, 1998).

A survey of Lam Minh Triet et al. (1999) showed that industrial estates in the Southern Key Economic Region discharge into the Saigon-Dong Nai River System 130,000 m^3 per day of wastewater containing high concentration of pollutants. It is estimated that in the year 2010, the daily amount of discharged wastewater will be increased together with the concentration of pollutants. Table 1.3 shows the pollution load of wastewater from industrial estates in the Southern Key Economic Region discharging to the Saigon-Dong Nai River System.

Table 1.3 Pollution Load of Wastewater from Industrial Estates in the Southern Key Economic Region Discharging to the Saigon-Dong Nai River System

Parameters	1999	2010
Wastewater (m^3 /day)	130,000	1,542,100
Suspended solid (tonnes/day)	23.2	278
Biochemical Oxygen Demand (BOD) (tonnes/day)	19.4	231
Chemical Oxygen Demand (COD) (tonnes/day)	41.3	493
Total Nitrogen (tonnes/day)	7.5	89
Total Phosphorous (tonnes/day)	1	12
Heavy metals	n.a	n.a

(Source: Lam Minh Triet et al., 1999)

Thi Vai River is severely polluted with high organic matters, nutrients, and coliform from the industrial wastewater of the Go Dau Industrial Zone and the Vedan Factory. At a distance of 5 km from the industrial outlets the dissolved oxygen (DO) value is less than 2 mg/l while the BOD value is more than 50 mg/l. These values are not within the limits of the Vietnamese environmental standard for surface water quality (TCVN 5942-1995)[10]. The pollution has caused severe damage to shrimp and fish population in Thi Vai Basin and the estimated economic loss was calculated to be millions of USD per year (Le Trinh, 1996). Most industrial estates in Dong Nai Province are located along Dong Nai River, which is also the water source for Ho Chi Minh City and Bien Hoa City. And Hiep Phuoc Industrial Zone in Ho Chi Minh City is located near Can Gio Mangrove Forest and not far from Ganh Rai Gulf, which are both very vulnerable ecosystems. If no specific measures are taken to protect the environment in these areas, the rivers and ecosystems will suffer the same conse-

quences. These problems will become even more pressing when all industrial estates in the Southern Key Economic Region are in full operation.

In brief, most of reports on environmental impacts of industrial estates in Viet Nam related to the resource use and pollution problems, and these problems become more and more severe. It does not means that the other impacts have no effect, but until now there is non-available data to draw an overall picture of these environmental impacts.

4.2.2 Advantages of Industrial Estates in Environmental Protection

It is not to say that clustering of industries always enhances environmental problems. On the contrary, the proximity of firms may create opportunities for co-ordination, coherent application, and economies of scale in environmental management. There are several reasons why it is favourable to locate industry in concentrated areas from an environmental point of view.

First, a concentration of industries can theoretically minimise environmental effects. By separating industrial areas from areas of residence, recreation, and public life, the environmental quality of the latter will be enhanced. Also monitoring of waste and emission is easier with companies in industrial estates than with those in widely dispersed locations. Hence, the risk of illegal dumping is minimised. It is also possible to allow companies within industrial estate to exchange permitted emission quota in order to reduce the total amount of emissions in the most cost-effective way. This concept is referred to as 'bubble concept'.

Second, a concentration of industries can enhance efficient use of infrastructure facilities. The provision of water and energy, the sewage system use, etc. is more cost effective in industrial estates due to economies of scale. The water supply may also be optimised by collective collection of rainwater in the industrial estate area and using it as B-quality process and cleaning water.

Third, industrial estates can combine waste processing. In industrial estates, waste streams with similar characteristics can be combined and treated in a common waste treatment system. In this way the cost per unit of treatment is reduced due to scale advantage. Especially for small and medium scale enterprises, which lack sufficient funds, knowledge, staff, or space to treat their own waste, industrial estates may offer good opportunities for sharing common treatment facilities. For example, in Cairo (Egypt), small enterprises have been relocated to an industrial area outside the city, which is equipped with a common disposal facility for chemical waste. In another example, hundreds of small metal-finishing enterprises in Tsubame (Japan), which caused severe

water pollution, have been relocated to an industrial area with a common waste treatment plant (Frijns et al., 1997).

Fourth, industrial estates facilitate the provision and exchange of environmental information. By using information desks, contact persons, meetings and workshops, environmental information can be disseminated among companies. Companies that are not direct competitors can mutually exchange environmental know-how. A cluster of enterprises can be easier to reach with environmental information, and can thus enhance the spread of technologies. In Western India, for example, enterprises in industrial clusters are organised into voluntary forums called 'waste minimisation circles' to collectively identify waste minimisation opportunities (Nyati, 1995). With the emergence of new standards, such as the International Organisation for Standardisation (ISO) 14000 series, well-organised industrial estates can provide advice and service to companies to help them keep up with the international developments.

Finally, clusters of industries can make more efficient use of resources. When natural resources become scarce and thus expensive and raw materials for industrial production are no longer abundant, or when the costs of waste treatment increase, waste exchange between enterprises becomes an attractive option (Nemerow, 1995). For example, metal industries have been using scrap metals for a long time in their production processes. The advent of the electric arc furnace has allowed steel manufacturers to use scrap materials (Rosenthal, 1996). Excess lards from slaughterhouse can be saponified to produce soap, pig bristles can be converted into brushes and hides can be tanned to make leather (Ayres, 1996). Industrial estates provide favourable conditions for waste exchange due to the short distance between factories. If industries with potential symbiotic relationship are put together in the same area, it will enhance waste exchanges. In the literature, the initiatives to minimise industrial emissions and waste generation in industrial estates using waste exchange programmes are labelled with names such as 'Eco-Park', 'Industrial Ecosystem', 'Industrial Symbiosis'. The often used common denominative 'Industrial Ecology' points at the fact that waste from one enterprise can serve as raw material for other enterprises and by doing so industrial estates can in principle create a closed system similar to a natural ecosystem. This opens a new approach for estate managers to develop industrial estates in an environmentally sound way taking into account not only waste minimisation but also reduction of natural resources withdrawal.

The above review on industrial estates shows that a country in industrialisation and an economy in transition cannot ignore the economic and environmental advantages of industrial estates, and Viet Nam is not an exception. However, until now Viet Nam has focused too much on only the economic benefits of in-

dustrial estates. Hardly any attention is paid to the potential advantages of industrial estates in managing the environmental side effects of the rapid economic and industrial development of Viet Nam. This neglect has resulted in ineffective environmental management of Vietnamese industrialisation in general, and of industrial estates in particular, with environmental degradation as a consequence.

In the next section I will elaborate the theoretical framework and methodology to conduct the research on the possibilities for greening of industrial estates in Viet Nam.

Notes

[1] Definitions and distinctions of industrial estate, industrial zone, etc. are presented in section 3.1 of chapter 1.

[2] An industrial cluster, as understood in the Vietnamese context, is a place where there are many factories/enterprises located together accidentally, without planning, intermingled with residential areas.

[3] The letters following the Decrees, Decisions, Directives, Circulars, etc. indicate the governmental organisations that promulgate the above legal documents. For example:

CP : Chinh Phu (Government)
HDBT : Hoi Dong Bo Truong (Council of Ministers)
TTg : Thu Tuong (Prime Minister)

[4] An Industrial Zone Infrastructure Development Company can be state-owned, joint-venture, or private.

[5] Data on the number of industrial estates in Viet Nam differ from source to source. This is caused by the fact that some industrial estates were planned but have not been approved officially by the Prime Minister. The number of industrial estates mentioned in this study, collected from VIZA (1998), indicates the industrial estates that have been approved officially by the Prime Minister. At the end of 2001 the number of industrial estates throughout the country was 68.

[6] In northern and central economic regions, the limited power and water supply are not favourable to the development of industrial estates. Until March 1999, more than half of the total industrial estates of the whole country was found in the Southern Key Economic Region (Le Xuan Trinh, 1999).

[7] Interview Departments of Science, Technology, and Environment (DOSTEs) and Industrial Zone Management Boards of Ho Chi Minh City, Dong Nai Province, and Binh Duong Province.

[8] Environmental standard for industrial wastewater (TCVN 5945-1995) in Viet Nam is divided into 3 categories: category A (the most stringent) for discharging into receiving streams that serve for drinking and domestic supply; category B for discharging into receiving streams that are used for bathing, aquatic breeding, cultivation, irrigation and navigation; category C for discharging to specific streams permitted by authority agencies such as sewage system.

[9] Environmental standard for industrial wastewater (TCVN 5945-1995) in Viet Nam specifies the maximum allowable concentration of toxic substances in industrial effluent.

[10] Environmental standard for surface water quality (5942-1995).

Parameter	Unit	Maximum concentration	
		A	B
BOD	mg/l	<4	<25
DO	mg/l	>=6	>=2

CHAPTER 2

ECOLOGICAL MODERNISATION AND INDUSTRIAL ECOLOGY – TOWARDS A NEW MODEL FOR ENVIRONMENTAL MANAGEMENT OF INDUSTRIAL ESTATES

1. Introduction

The grouping of industries in industrial estates can contribute to an accumulation of environmental impacts. But the proximity of firms in industrial estates also provides many opportunities for co-operation between companies in terms of the economy and the environment. In the environmental literature the opportunity to create environmentally sound industrial estates, taking advantage of the proximity of firms, is reflected in the concept of industrial ecology. Industrial ecology aims to balance industrial development with the sustainable use of natural resources and the capacity of the environment to assimilate wastes. It is an emerging concept that is in line with the pollution prevention principle. In this study, industrial ecology is chosen as a model for environmentally sound industrial estate development. However, the development of industrial estates following the concept of industrial ecology will require a radical transformation in contemporary industrial practices and relationships in Viet Nam. One of the key questions is how such 'industrial ecology-based' industrial estates can be promoted. Which actors, institutions, mechanisms and structures can be put to work for successfully improving the environmental performance of industrial estates? The theory of Ecological Modernisation will be introduced for this purpose. The theory propounds a new model of sharing responsibilities in environmental protection among different actors in society in order to achieve both economic and environmental goals. If industrial ecology is the model of industrial estates, which can minimise environmental impacts, then Ecological Modernisation Theory can serve as a guideline to reform contemporary ideas and practices of industrial environmental management in Viet Nam in order to develop such environmentally sound industrial estates. Ac-

cording to Rinkevicius (2000), the ideology of ecological modernisation encompasses such ideas, principles and beliefs as the precautionary principle, pollution prevention (industrial ecology), shared responsibility, the public's right-to-know, the shift from command-and-control environmental policy to consensus-oriented steering regimes based on economic and communicative instruments, and a belief in the possibility of institutional learning. But ecological modernisation is not only used as a set of normative ideas for environmental reform. According to Buttel (2000), ecological modernisation is now employed in at least four different ways. First, ecological modernisation is a school of sociological thought. Second, ecological modernisation is used to illustrate the prevailing discourses of environmental policy. Third, ecological modernisation is used as a synonym for strategic environmental management, industrial ecology, eco-restructuring, and so on. Finally, ecological modernisation is used to refer to any environmental innovation or environmental improvement.

In this chapter, the concept of industrial ecology and the theory of Ecological Modernisation will be introduced, followed by an analysis of how to use this concept and theory to develop a new model for the environmental management of industrial estates. Finally, these theoretical reflections will lead to a more concise formulation of the research questions and the methodology that will guide this study.

2. Industrial Ecology

2.1 Concepts

In the literature, various authors have developed the concept of industrial ecology using different terms, such as industrial metabolism, industrial ecosystem, and industrial symbiosis. Some authors use these terms similarly, while others differentiate among them (see for example Ayres and Simonis, 1994; Côté, 1995; Graedel and Allenby, 1995; Lowe et al., 1997; Erkman, 1997; Durney, 1997). Although a discussion of terminology is not the purpose of this study, it is necessary to make the distinctions clear in order to be precise about the use of these terms in this research.

* *Industrial Metabolism*

The term *metabolism*, as used in its original biological context, means the internal processes of a living organism. The organism ingests rich, low entropy materials (food), to provide for its own maintenance and functions, as well as a surplus to permit growth and/or reproduction. Wastes consisting of degraded, high entropy materials are also products of this process. Comparing biological organisms and manufacturing firms yields major differences, of course. First,

biological organisms reproduce themselves while firms only produce products or services. Second, firms do not need to be specialised and can change from one product or business to another; by contrast, organisms are highly specialised and can not change their behaviour except for over a long evolutionary time period (Ayres, 1994). However, there are similarities between biological organisms and industrial firms. Industrial firms also start their activities with inputs (raw material, energy, and labour) to produce products together with discharged wastes. The term metabolism is used for both living organisms and industrial firms to indicate the materials and energy flows going through the living organism/industrial firm.

The term *industrial metabolism* was officially introduced at a conference sponsored by the United Nations University in Tokyo (1988) (Ayres, 1997). Ayres (1994: 3) defined industrial metabolism as follows: "The metabolism of industry is the whole integrated collection of physical processes that convert raw materials and energy plus labour into finished products and waste in a (more or less) steady-state condition". Theoretically, the industrial metabolism concept compares the functioning of typical industrial entities (e.g. economic plants or companies) to those of typical biological organisms, each with particular inputs, outputs, regulating processes and links to the wider environment without which they cannot live. This concept implies that industry is unavoidably a part of the metabolism of the biosphere and that it is human economic and industrial activity that causes the environmental problem, by interfering with the balance of natural cycles of biological nutrients. Following its introduction the concept of industrial metabolism has continued to gain international recognition as a theoretical framework useful for investigating the material and energy flows both within industry and between industry and the natural environment.

* *Industrial Ecosystem*

Living organisms in an ecosystem must interact with other living and non-living things to survive. Similarly, in order to maintain and to carry out industrial activities, industrial firms have to interact with other actors in the industrial system in particular, and in the society in general. However, in terms of material cycles, an ecosystem is more efficient than an industrial system. An ecosystem involves a food chain including primary photosynthesizers (plants), herbivores, carnivores which prey on the herbivores, saprophytes, parasites, and decay organisms (Ayres, 1996). In ecosystems, living organisms interact with each other and with other non-living things in the way that materials flow in a closed loop from producers (plants) to consumers (animals) and are recycled by decomposers (fungi, microbes) and scavengers (vultures, hyenas, and so on). This idea can be illustrated by the carbon cycle: plants consume carbon dioxide and produce oxygen as waste. Animals, in turn, require oxygen for res-

piration, but produce carbon dioxide as a metabolic waste. The industrial system is essentially a group of firms, together with regulatory institutions and suppliers, workers, and consumers, using a common currency and governed by a common political structure, in which by contrast, materials move in a linear fashion from manufacturer to consumer and then straight into the receiving media (air, water, land). 'Waste' is unavoidable (Smolenaars, 1996). In other words, natural cycles (of water, carbon/oxygen, nitrogen, sulphurous, etc.) are closed, whereas industrial 'cycles' are open. In order to increase the efficiency of industrial systems, Frosch and Gallopoulos (1989) suggested that industrial systems should mimic ecosystems, and they introduced the concept of the industrial ecosystem. They proposed the transformation of the traditional model of industrial activity, in which individual manufacturing takes in raw materials and generates products to be sold plus waste to be disposed of, into a more integrated system, in which the consumption of energy and materials is optimised and the effluents of one process serve as the raw material for another process. This concept focuses on the relations between companies in a direct waste/by-product exchange. Although the term industrial ecosystem has been present in the writings of many ecologists such as Odum, Margalef, and Hall, and geochemists such as Cloud, according to Erkman (1997) it is Frosch and Gallopoulos who made the most vital contribution to the introduction and dissemination of the industrial ecosystem concept.

* *Industrial Ecology*

Industrial ecology can be seen as the overall concept in this new and emerging field of study. Côté (1995) compiled many definitions of industrial ecology from the early literature. But according to Erkman (1997), there is no standard definition of industrial ecology, and a number of authors do not differentiate clearly among industrial metabolism, industrial ecosystem, industrial symbiosis, and industrial ecology. However, whatever the definition chosen, all authors essentially agree on at least three key elements of the industrial ecology perspective:

- It is a systemic, comprehensive, integrated view of all components of the industrial economy and their relations with the biosphere.
- It emphasises the biophysical substratum of human activities, i.e. the complex patterns of material flows within and outside the industrial system, in contrast with current approaches that mostly consider the economy in terms of monetary units.
- It considers technological dynamics as a crucial (but not exclusive) element for the transition from the actual unsustainable industrial system to a viable industrial ecosystem.

As current industrial systems are much more open than their ecological counterparts, relying heavily on energy and materials from the environment and discharging large quantities of wastes into the environment, industrial ecology has tried to demonstrate that based on the principles of ecological science, industrial systems can be developed on a more sustainable basis. According to industrial ecology scholars, an understanding of the workings of the industrial system, its means of regulation, and its interaction with the biosphere is prerequisite to restructuring industrial systems to more sustainable systems, after the fashion of natural ecosystems. At the most basic level, the industrial ecology perspective describes a system in which one industry's wastes (outputs) become another's raw materials (inputs). With such an exchange of wastes, less materials/energy is wasted and less virgin input materials/energy are required. At least three groups of people would benefit from such exchange: waste generators save on waste treatment and disposal costs and at the same time earn revenue from the sale of the waste; waste users reduce their input costs; and the public in general enjoy a healthier environment.

In this work, the above concepts will be differentiated and applied as follows: ***Industrial Ecology*** acknowledges the existence of a wide range of ***Industrial Ecosystems*** with varying degrees and patterns of interactions with the biosphere. Each industrial ecosystem is characterised by the flows of materials and energy ***(Industrial Metabolism)*** similar to those going through a natural ecosystem. ***Industrial Symbiosis*** (or ***Eco-Park***) is a cluster of industries in one geographical area that is developed on the basis of the industrial ecology concept. Kalundborg Industrial Symbiosis is one of the best-known examples (see chapter 4).

2.2 Industrial Ecology - A Model for Industrial Estates in Viet Nam

According to industrial ecology an exchange of wastes can take place between industrial sectors, but the distance from the waste generator to the waste user is problematic. Some wastes or by-products cannot be (cost-effectively) transported over long distances. For example, low-grade sulphurous acid is not worth transporting over distances greater than a few kilometres for reusing elsewhere, but it is useful locally; carbon monoxide, carbon dioxide, sulphurous dioxide are in fact air pollutants, but they are needed for certain chemical synthesis processes. Similarly, hydrogen a by-product from petroleum refineries can be compressed and shipped, but it can be used more economically on-site (Ayres, 1996). Hence, capitalising on the diversity of industrial sectors in industrial estates, and the proximity of industrial firms within industrial estates, industrial ecology offers a new strategy for the development of industrial estates[1]. Many industrial ecologists have focused upon eco-parks as a key strategy for implementing industrial ecology (Lowe, 1997). In this study, the design

for environmentally sound industrial estates is based on the industrial ecology concept. The ultimate goal is industrial estates where industrial firms can exchange waste/energy to form a closed loop of material/energy in order to reduce or prevent environmental impacts and to use resources in an efficient way. However, there are different approaches of industrial ecology. According to Berkel et al. (1997) four different approaches of industrial ecology can be distinguished:

- The materials-specific approach analyses the way a material flows through the industrial system in order to identify, evaluate and implement opportunities. A number of substance flow analyses that have been conducted for selected heavy metals, minerals, and renewable resources are in line with the materials-specific approach to industrial ecology.
- The product-specific approach investigates the way in which different component material flows of a selected product can be modified or redirected in order to optimise product-environment interaction. Integrated product life-cycle management as currently promoted by the Dutch government is roughly equivalent to this approach.
- The regional approach aims at optimisation of the exchange of materials and energy among industries at a local level. A good example of this approach is the Kalundborg (Denmark) Industrial Symbiosis, where industries and the residential areas nearby spontaneously started to exchange wastes and formed a closed web of material and energy flows.
- The actor-specific approach investigates the opportunities and constraints for different actors in the industrial society (suppliers, producers, consumers, and governments) to change material and product flows in an environmentally compatible direction.

Until now studies on industrial ecology at the sector and industrial estate levels have focused mainly on the physical flows of materials (see for example Ayres and Simonis, 1994; Ayres and Ayres, 1996; Ayres, 1996; Nemerow, 1995; Rosenthal, 1996; Bass, 1997; Chertow, 1999, etc.). Other industrial ecology studies at the regional and national levels have also paid attention to flows of industrial substances such as heavy metals, hazardous wastes, and chemical pollutants in order to reduce pollution by improving technology and restructuring the economy (see Durney, 1997; Gielen, 1999). According to Ruth (1998), few analyses have been made of the relationships among technologies, industries, and socio-economic institutions. His article is an attempt to contribute to such an analysis. But thus far the few attempts to develop actor-specific approaches to industrial ecology have usually lacked a solid social theoretical background and have not been very helpful. In this study, the actor-specific approach of industrial ecology will be combined with a regional approach in order to see how industrial estates can be developed on the basis of an industrial

ecology concept. With this in mind, the study will analyse the role and contribution of different actors in the development of industrial estates, following the concept of industrial ecology. As stated above, Ecological Modernisation Theory suggests a new model of sharing responsibilities in environmental reform among different actors in society. As such, this theory can be useful for applying the actor-specific approach to industrial ecology.

3. Ecological Modernisation Theory

Since at least the late 1960s, industrialists and environmentalists have been at odds in industrialised countries. Both sides have generally assumed that industrial development had to come at the cost of environmental quality. While industrialists have been willing to accept that sacrifice, environmentalists have not been willing. Many developing countries have followed the 'growth first and clean up later' strategy, which has resulted in environmental degradation and resource depletion. This can lead to a pessimistic perspective, illustrated by the theory that can be labelled *Counter Productivity*, *De-industrialisation* or *De-modernisation* (cf. Spaargaren and Mol, 1992; Mol, 1995). The central idea of Counter Productivity Theory is the notion that development in industrial production is beneficial to society only up to a certain point or level. Development becomes 'counter-productive' once it passes a so-called 'critical point' and environmental and other types of damage exceed the benefits of material growth. Counter productivity theorists such as Rudolf Bahro, Otto Ullrich, Andre Gorz, Murray Bookchin and Hans Achterhuis emphasise that it is the self-perpetuating industrialisation process which causes the ecological degradation through endless creation of unnecessary products and technologies and social demand for it. They stress the state's inability to react properly to the environmental crisis and plead for anti-growth and anti-industrialisation development strategies as the only way to overcome the environmental crisis (Mol and Spaargaren, 2000; Rinkevicius, 2000). In opposition to this theory, starting in the mid-1980s empirical studies (Jänicke et al., 1989; Weale, 1992; Mol 1995) have shown that in many countries such as Denmark, Sweden, the Netherlands, France, Germany, United Kingdom, Finland, Norway, Austria, the United States, and Japan, economic output has increased and environmental impact has decreased in certain key sectors. The severing of the relationship between economic development and environmental degradation is often referred to as 'the de-coupling' or 'the de-linking' of material flows from economic flows (Mol, 2001). These empirical studies, to a certain extent, have contributed to social theoretical studies on the processes of environmental reform in industrialised countries. Increasingly, these ideas are brought together under the label of the theory of Ecological Modernisation. Although ecological modernisation theorists agree with counter productivity theorists that the state has failed to fulfil its tasks as a guardian of the environment up until at least the late 1980s, they

differ on the reasons for this failure and suggestions for improvements. In contrast to counter productivity theorists, ecological modernisation theorists suggest that economic and environmental goals can be integrated through new technologies and an ecological restructuring of industrial society. They believe that 'the only possible way out of ecological crisis is by going further into the process of modernisation' (Mol, 1997). Instead of perceiving and stressing environmental protection as a barrier to growth, ecological modernisation promotes the application of environmental policy to enhance economic efficiency and technological innovation. Similarly, instead of perceiving and emphasising economic development as the cause of environmental degradation, ecological modernisation seeks to mobilise economic actors in environmental protection activities. Consequently, ecological modernisation provides opportunities to overcome the antagonistic relationship between economic development and environmental protection. Hence, the theory of Ecological Modernisation offers us a useful theoretical concept for analysing the opportunities, possibilities, mechanisms and dynamics to protect the environment under continuing industrialisation and modernisation.

In the following sections, the background of Ecological Modernisation Theory will be presented first, followed by a brief historical development of Ecological Modernisation. Subsequently, the core features of Ecological Modernisation Theory will be introduced, followed by an elaboration on the link between ecological modernisation and industrial ecology as a model for environmental management of industrial estates.

3.1 The Background of Ecological Modernisation Theory

Western industrial societies became concerned about environmental problems at the beginning of the twentieth century. The first wave of environmental concern focused mainly on the degradation of natural landscapes due to increasing industrialisation and the expansion of cities. The environmental wave in this period emphasised the need for protecting nature against the impact of rapid industrialisation and urbanisation (Mol, 1997).

The second wave of environmental concern, which had its heyday in the Western world in the late 1960s to early 1970s, was characterised by the demand for a fundamental reorganisation of the social structure in order to move to an ecologically sound society. Among the most significant achievements of this period were the creation of government departments for the environment in most industrial societies, an expanding environmental legislation and planning, and the rapid increase in the number and membership of non-governmental environmental organisations (Mol, 1997). The publications of *The Blueprint for Survival* (1972), *The Limits to Growth* report to the Club of Rome (1972), and

international conferences like the United Nations' in Stockholm (1972) demonstrated the rising environmental awareness of this period. There were variations in the speed and structure of policy responses in different Western countries; however, there were also some commonalities. In general, the environmental policy of Western countries in this period can be characterised as follows: it was influenced by the belief in a trade-off between economic growth and environmental protection; it was nation-state oriented, lacking an international dimension; it involved institutional adjustments in the form of new organisations, specific governmental agencies responsible for environmental protection; and it relied on add-on techniques and favoured the regulation of pollution by sectoral legislation (Weale, 1992).

The third wave of environmental concern began in mid-to late 1980s partly as the result of the shortcomings of environmental policy strategy in the 1970s, which had left many problems unsolved or worsening. The Brundtland report (WCED, 1987) and the United Nations Conference on Environment and Development (1992) are often cited as the milestones of this third wave (Mol, 1997). Compared to the second wave, in this period there were changes in the belief system, environmental legislation, technology focus, and environmental policy instruments of the Western countries (cf. Weale, 1992). It was believed that a rising level of environmental protection was a precondition of long term economic development. Increasingly it was acknowledged that environmental problems were no longer local or national problems, and could no longer be approached along sectoral lines. Consequently, international dimensions of environmental problems were deemed central to the political agenda and cross-media control systems or integrated pollution control began to emerge in environmental policy. With respect to technology, there was an emphasis on pollution control at the source rather than on effects. End-of-pipe technologies were no longer seem as adequate, and clean technologies were widely preferred. Following implementation failures or deficits of traditional models of regulation, environmental economists began to develop economic approaches to environmental problems, and public participation in making and implementing environmental policy increased (Weale, 1992).

Ecological Modernisation Theory emerged against the historical background of this third wave. It was developed initially in Germany by the German social scientists Joseph Huber and Martin Jänicke (Dryzek, 1997). Later, starting in the late 1980s, the ideas of ecological modernisation spread to the Netherlands, the United Kingdom, Nordic countries and the United States. Social scientists such as Volker von Prittwitz, Udo Simonis and Klaus Zimmermann (Germany), Gert Spaargaren, Maarten Hajer and Arthur P.J. Mol (the Netherlands) and Albert Weale, Maurie Cohen and Joseph Murphy (Great Britain) have

made major contributions to the development of the theory (Mol, 1995; Mol and Sonnenfeld, 2000).

3.2 A Brief Historical Development of Ecological Modernisation

To understand ecological modernisation it is necessary to define the concept of 'modernisation'. According to Huber (1991: 177), "modernisation is a social process which mainly relies on science – or science and technology –, on market economy, on money and credit economy, on modern state building – or modern administration –, on modern law (public and private), and on an ethic of individualism (activity and pursuit of happiness revolving around individual activity and individual responsibility). These are the very important key issues of modernisation". Human society has evolved from a traditional society, where there was only community integration with a subsistence economy, not based on interest, profits, or technological innovation, to a society in which industrial development has played an important role. At the same time industrial development has brought about severe environmental problems. Returning to a traditional society is not a feasible and attractive way to solve these environmental problems. The reconciliation of ecology and industrial growth or economic development in the course of societal change without abandoning the path of modernisation is the basic idea of Ecological Modernisation Theory.

From the 1980s, the concept of ecological modernisation has very rapidly gained a foothold in environmental sociology. After Huber, various authors contributed to the theory of Ecological Modernisation. Ecological Modernisation Theory developed in three phases (Mol, 1999; Mol and Sonnenfeld, 2000). Initially, in Ecological Modernisation Theory, Huber focused on the role of technological innovations, especially in the sphere of industrial production. He criticised the bureaucratic state and favoured market dynamics, instruments, and actors in environmental protection. From the late 1980s onward, ecological modernisation theorists paid more attention to the institutional and cultural dynamics of ecological modernisation processes instead of only technological innovations and market dynamics (cf. Spaargaren, 1997; Cohen, 2000). From the mid 1990s onward, studies of ecological modernisation were expanded to non-European countries. (see various contributions in Mol and Sonnenfeld, 2000; Spaargaren et al., 2000; and this research). During this period, studies on the ecological modernisation in industrial production were complemented by studies on ecological modernisation in the consumption sphere. Nowadays, growing attention is paid to global dynamics of ecological modernisation (cf. Mol, 2001).

3.3 Different Perspectives of Ecological Modernisation

Various authors use ecological modernisation in different ways. Mol (1997) and Gibbs (2000) made a distinction between ecological modernisation as a social theory and ecological modernisation as a political programme. Spaargaren and Mol (1992) and Jokinen (2000), state that environmental social scientists are used to associating three interrelated basic meanings to the notion of ecological modernisation: ecological modernisation as a social theory, ecological modernisation as a theoretical framework for environmental policy analysis, and ecological modernisation as an environmental policy strategy that is supposed to be successful. As described above in this chapter, according to Buttel (2000), ecological modernisation is now employed in at least four different ways. This study focuses on an actor-specific approach to industrial ecology, which is in need of a social theoretical background. Consequently, ecological modernisation as a social theory is more relevant for this study.

Often an additional distinction is made. As a social theory, Ecological Modernisation Theory has both an analytical/descriptive value and a normative/prescriptive value. The analytical/descriptive value of Ecological Modernisation Theory provides concepts and ideas to analyse the way contemporary industrial societies are trying to cope with the environmental crisis. The normative/prescriptive value of Ecological Modernisation Theory provides guidelines for environmental reform (Mol, 1997; Murphy, 2000; Mol and Sonnenfeld, 2000). As one of the prominent theories within environmental sociology, Ecological Modernisation Theory has not gone without criticism. While the analytical value of Ecological Modernisation Theory is often believed to have major relevance to European countries (cf. Weale, 1992; Hajer, 1994; Mol, 1995; Mol, 1999; Mol, 2001; Murphy, 2000), its analytical meaning for developments in the so-called third world is more debated. Consequently, most of these recent third world critics focus on the Eurocentric basis of Ecological Modernisation Theory (see Mol, 2001, Frijns et al., 2000 for a review) mostly from an analytical perspective. In addition, with respect to the normative perspective, some critics doubt that third world countries, which differ from European countries in their socio-political, economic and cultural conditions, can follow the paths of ecological modernisation.

Against this background, this study will use the theory as a framework for environmental reform through the establishment of an effective environmental management system of industrial estates on the basis of the industrial ecology concept. At the same time, this study will analyse the extent to which Ecological Modernisation Theory is of normative or analytical value in the context of Viet Nam. As such it contributes to the debate on the value of Ecological Modernisation Theory in Third World Countries. In the course of the study, four

core features of Ecological Modernisation Theory will be used to analyse the possibilities for modernising environmental management system in Viet Nam, which can help to redirect industrial estate development to incorporate industrial ecology principles.

3.4 The Core Features of Ecological Modernisation Theory

The main objective of Ecological Modernisation Theory is to analyse the environmental reforms taking place in production and consumption processes. Ecological Modernisation Theory focuses on the role of technology and innovators, the state, economic agents and mechanisms, and communities and non-governmental organisations (NGOs) in environmental reform processes. Traditionally, from the public goods perspective of environmental quality, state authorities are seen as unique actors responsible for environmental protection whose main instrument is coercive force. Ecological Modernisation Theory widens this perspective considerably and argues that actors in different fields and at different levels (central government, local authorities, companies, consumers, social groups, communities, etc.) have a major role to play in environmental protection, via a variety of mechanisms and dynamics. Based on this wider ecological modernisation perspective of environmental reform, this study analyses the potentials of the variety of actors, mechanisms and dynamics for reorganising production processes in industrial estates along sustainability lines. In doing so this study is based on four core features of Ecological Modernisation Theory (cf. Mol, 1995; Mol and Sonnenfeld, 2000).

** Technological Innovation (The Role of Technology in Environmental Reform)*

Rather than viewing modern science and technology only as a cause of the environmental crisis, Ecological Modernisation Theory highlights the role of science and technology in environmental reform. Ecological Modernisation Theory identifies the transformation from first-generation environmental technologies (end-of-pipe or add-on and clean-up technologies) to the second-generation technologies (process-integrated and prevention technologies) in the process of environmental reform. In doing so, Ecological Modernisation Theory does not reject the role of end-of-pipe technologies, but it emphasises that prevention of wastes at the source rather than treatment is preferable and can provide economic and environmental benefits. Thus cleaner production is often put forward to interpret the notion of technological innovation in Ecological Modernisation Theory (Mol, 1999; Frijns et al., 2000). Cleaner production, based on the pollution prevention principle, includes good housekeeping, recycling, reuse of waste materials, and other practices aiming for the continuous integrated environmental improvement into industrial processes and products to prevent pollution of air, water and land, and to minimise risks to the human-

beings and the environment. As the industrial ecology concept carries with it the prevention approach, which is the core idea in cleaner production practice, it is possible to assess the application of cleaner production as a useful indicator for the implementation of industrial ecology (Berkel et al., 1997). The relation between cleaner production and industrial ecology will be analysed in detail in chapter 4.

** Economic Reform (The Role of Economic Agents and Mechanisms in Environmental Reform)*

Ecological Modernisation Theory analyses the role of economic agents and market mechanism in ecological reform. According to Ecological Modernisation Theory, some tasks and responsibilities of environmental reform are believed to shift from the state to the market and economic agents. According to Ecological Modernisation Theory, not only the state but also producers (polluters), economic associations and consumers/customers can and do play a role in ecological reform processes. For example, producers can become involved in ecological reform by certification of products and processes through environmental management systems (EMS) or international organisation for standardisation (ISO) certification, asking for environmental audits, and advocating competition on environmental performance. Customers/consumers can demand ecological products: eco-labelling is one response to this demand. Economic agents such as insurance companies, credit institutions, certification organisations, and branch associations may also play a significant part in environmental protection through their power to ask for environmental criteria for economic activities. With respect to this study, it is hypothesised that economic agents and market mechanisms can act as one of the driving forces to develop industrial estates in line with the industrial ecology concept. The potential and actual role of producers, customers/consumers and other economic agents in environmental reform in Viet Nam will be discussed in chapter 5.

** Political Modernisation (The Role of the State in Environmental Reform)*

Ecological Modernisation Theory also analyses the shift of the role of the state in environmental reform processes. The role of the state in environmental policy is believed to change from curative and reactive to preventive environmental governance, so that it supports the shift from end-of-pipe to modern second-generation technology. The state also moves from closed policy-making to more participatory policy-making, and from centralised to more decentralised governance styles. These political modernisation dynamics imply new relationships between state-industry and state-non-governmental actors with more decentralised, flexible and consensus-oriented governance styles. With this in mind, a market-based approach (economic instruments) and communi-

cative approach (communicative instruments) illustrate the changing role of state and state policy in Ecological Modernisation Theory. In this study, the political modernisation in Ecological Modernisation Theory is hypothesised to provide a useful guideline for environmental reform in Viet Nam so that it can support the development of more environmentally sound industrial estates. Although the role of the government cannot be neglected, especially in contemporary Viet Nam, governments do not have all the knowledge necessary to prescribe production process innovations for pollution prevention under favourable economic conditions. In today's complex, globalised world, governments are more successful in pollution control if they provide the conditions and incentives for industries to invest in new, clean technologies via different mechanisms, instead of relying solely on direct regulations. In other words, cleaner production is inherently connected with a movement away from command-and-control instruments. The relationship between state-industry and non-state actors in Vietnamese environmental reform will be elaborated in chapter 6.

* *Modification of Social Movements (The Role of Communities and NGOs in Environmental Reform)*

Another core feature of Ecological Modernisation Theory deals with the modification of the position, role and ideology of social movements in the 1990s, compared to those in the 1970s, in the process of ecological transformation. Rather than acting simply as an outside commentator, environmental NGOs increasingly participate in direct negotiations with state representatives and economic agents, and contribute to the development of concrete proposals for environmental reform. Although Viet Nam mostly lacks the sort of conventional environmental NGOs and social movements characteristic of Western countries and described and analysed in Ecological Modernisation Theory, other Vietnamese social organisations (e.g. The Youth Union, The Women's Association, The Veterans' Association, etc.), and local communities may exert pressure on producers to redirect production into more environmentally sound processes. The role of international environmental NGOs, which have recently gained ground in Viet Nam, can also be crucial in an age of globalisation. The role of communities, NGOs and other social organisations in industrial restructuring will be analysed in chapter 7 based on case studies in industrial zones in the Southern Key Economic Region.

4. Ecological Modernisation Theory and Industrial Ecology

There are some clear differences between industrial ecology and ecological modernisation. First, industrial ecology is a concept focused on substance flows, while ecological modernisation is not only a concept but also a theory on environment-induced social change. Second, industrial ecology mainly pays

attention to units in industrial systems (suppliers, producers, consumers) and their material relationships to optimise substance flows. Ecological Modernisation Theory, by contrast, focuses on the role of the state, economic actors (producers, suppliers, consumers, and other economic agents such as insurance companies, banks, branch associations, etc.), environmental experts, and societal actors such as NGOs in environmental reform. In short, industrial ecology and ecological modernisation both analyse the role of different interdependent 'actors' in processes of reduction and/or prevention of emissions and environmental impacts. But while industrial ecology focuses on units related to industrial systems, ecological modernisation focuses on a broader set of actors that can influence the process of industrial restructuring and environmental reform.

Notwithstanding these differences, even though formulated in different times and places by different authors, Ecological Modernisation Theory and the concept of industrial ecology converge at several points. First, they share the idea that human-beings and their activities are the cause of environmental degradation. Consequently, Ecological Modernisation Theory analyses strategies to overcome environmental problems by technical and social interventions in production and consumption systems. It focuses on the way in which substance-flows-management can and should be organised in a more efficient way (Spaargaren, 2000). The industrial ecology concept focuses on minimising environmental impacts by both technological means and the transformation of management and organisation schemes. It focuses on the way substances and energy flow in manufacturing processes and means of increasing the environmental efficiency of these flows. Second, Ecological Modernisation Theory and industrial ecology implicitly reject the fundamental opposition between economy and ecology. Third, Ecological Modernisation Theory and industrial ecology highlight the role of different 'actors' (not only industrialists but also economic agents) involved in production (and consumption) processes to redirect the processes in a more environmentally sound direction. Fourth, industrial ecology pleads for a proactive approach to technological innovation, similar to Ecological Modernisation Theory. In general, industrial ecology concept comes close to Ecological Modernisation Theory as was rightly argued by Buttel (2000).

The salient question is how Ecological Modernisation Theory can be helpful in putting industrial ecology idea to work in industrial estates in Vietnamese context. To address this question one may start from the observation that an industrial estate is neither similar to one company nor just a cluster of individual companies. On the one hand, it is not adequate to approach an industrial estate as a single company. Normally, an industrial estate houses different industrial firms with different industrial sectors, each with its own goals, activities, pro-

duction processes, and management strategies and systems. On the other hand, firms in industrial estates are not located at random in an area but are locked into a relationship of management interdependence. The social and physical proximity and management interdependence of industrial firms offer opportunities to industrial estates to increase their efficient use of materials and energy. To apply the industrial ecology concept in practice is not simply a matter of technological measures but even more a matter of socio-economic and institutional arrangements. As Ecological Modernisation Theory is a social theory that brings together technological innovation, economic reform, political modernisation, and a perspective on the role of social movements pertaining to environmental reform, this theory may offer a useful guideline for the application of industrial ecology.

Viet Nam's economy shares similarities with others in Southeast Asia. Viet Nam shows a rapid industrialisation even though its economic development started later and is still lagging behind that of countries such as South Korea, Singapore, Malaysia, Taiwan and Thailand. In that respect, Viet Nam is a typical example of the 'newly industrialising countries' in Southeast Asia. According to Castells (1997) the most significant commonality between the Southeast Asian developing economies is the role of the state in the development process. These states play a critical role in planning and prioritising economic development in the process of industrialisation. Evans (1995) calls these countries developmental states to distinguish them from predatory states and intermediate states among developing countries[2]. On the other hand, Viet Nam is now in the process of transition from a centrally planned economy to a market-oriented economy. In this respect Viet Nam is similar to transitional economies in Central and East European countries. Positioned at the crossroads between two developments, transforming from a centrally planned economy to a market-oriented economy and embracing the path of newly industrialising or high-performance economies, Viet Nam offers an interesting case study to analyse the usefulness of Ecological Modernisation Theory for non-European countries.

5. Methodology

5.1 Research Objectives

* *General Objective*

The first aim of this study is therefore to review existing environmental management system of industrial estates in Viet Nam and to analyse possibilities and potential new institutional arrangements for greening industrial estates. In analysing industrial estates and in developing ideas for more ecologically

sound industrial estates, the Ecological Modernisation Theory will be applied. As a second objective, this study aims to contribute to the theory of Ecological Modernisation, particularly by answering the question of its relevance for Viet Nam.

* *Specific Objectives*

More specifically, this study seeks to fulfil the following objectives:

(i) To review the existing environmental policy-making and management in Viet Nam with special reference to industrial estates by

- Including an inventory of existing environmental management arrangements, strategies, and policies concerning industrial estates in Viet Nam.
- Reviewing the actual and/or potential role of state and non-state actors in environmental protection activities and arrangements concerning industrial estates in Viet Nam.
- Analysing the reasons behind the ineffectiveness of the existing environmental management system of industrial estates in Viet Nam.

(ii) To outline some core features for future environmental management system of industrial estates which build upon and complement existing arrangements and policies, and which can fit the overall institutional characteristics of Viet Nam.

(iii) To assess the relevance of Ecological Modernisation Theory for Viet Nam.

5.2 Research Strategy

A picture of the environmental management system of industrial estates should highlight the current government policies, strategies, institutional arrangements that aim to maintain industrial activities within acceptable limits in terms of environmental impacts. This picture is not adequate if it is described only one way from government to target groups. It is also necessary to describe environmental performance of firms making up industrial estates and industrial estates as a whole under such an environmental management system. In addition, as firms and industrial estates are not isolated entities but are related to and embedded in complex social-economic conditions, their environmental practices are not only driven by government but also by other (f)actors. In order to understand firms' environmental behaviour, it is necessary to know its relationship in such a complex network.

The triad-network model developed by Mol (1995) was used as an analytical tool in this research. The triad-network model is suitable for analysing the actors/factors which have a major influence on environmental performance of industries in industrial estates, how these actors interact, how effective their interactions are, and how they trigger change and improvements in environmental management. This model, encompassing a policy network, an economic network, and a societal network, provides a useful tool to study and analyse the political, economic, and social relationships between industry and other actors in the networks shaping environmental performance of industry. The tripartite division provides us a better understanding of interactions between actors within complex socio-economic and political conditions. In such a way, the triad-network can help to analyse the economic reform, political modernisation and social movements that induce technological innovation and influence on environmental improvements of industry as described by Ecological Modernisation Theory.

* *Policy Network*

Policy networks emphasise the relationship between industry and governmental institutions. They serve to illuminate the main mechanism and type of relations through which industry deals with governmental environmental policy and vice-versa. The main actors interacting with industrial firms in policy networks include the Industrial Zone Management Boards (IZMB), the Department of Science Technology and Environment (DOSTE), and the National Environmental Agency (NEA). Other actors might have indirect relations such as Provincial People's Committees, Department of Planning and Investment and other departments. Especially now that Viet Nam is opening up, policy network studies might include international organisations such as UNEP, UNDP, and UNIDO that play an important role in triggering environmental innovation. The policy network study will be used in chapter 3.

* *Economic Network*

Economic network studies analyse industry-industry interactions in the vertical product chains (from suppliers to producers and to consumers through several steps) or in horizontal lines (among competing companies). The interactions between industry and other economic agents (bank, credit institutions, insurance companies, etc.), and research institutes are included in this network. In this research, the central actors of the network are firms in industrial estates. Other actors such as Industrial Zone Infrastructure Development Companies (IZIDC), other firms in the same industrial estate, General Corporations, parent companies, quality testing service organisations, and tax and custom agencies have specific relations with firms in industrial estates, and are also included in

the economic network. Some of these actors effectively influence industrial firms to improve their environmental performance. Others have no influence. Some actors even hamper the environmental improvement of industrial firms. The interactions between economic actors in the economic network will be presented in chapter 5.

* *Societal Network*

The actors involved in this network are industry on the one hand and communities and all sorts of social organisations such as NGOs, mass media, Women's Association, and Youth Union, on the other hand. In societal networks, attention will also be paid to international NGOs, which have emerged recently in Viet Nam. The social network study will be used in chapter 7.

In this research, the triad-network was used as a general framework to enable us to look into different groups of actors involved in different perspectives. One should bear in mind that although divided into three separate networks, the actors are closely interacting and partly overlapping.

The networks of industrial firms in industrial estates in Viet Nam are presented in Figure 2.1.

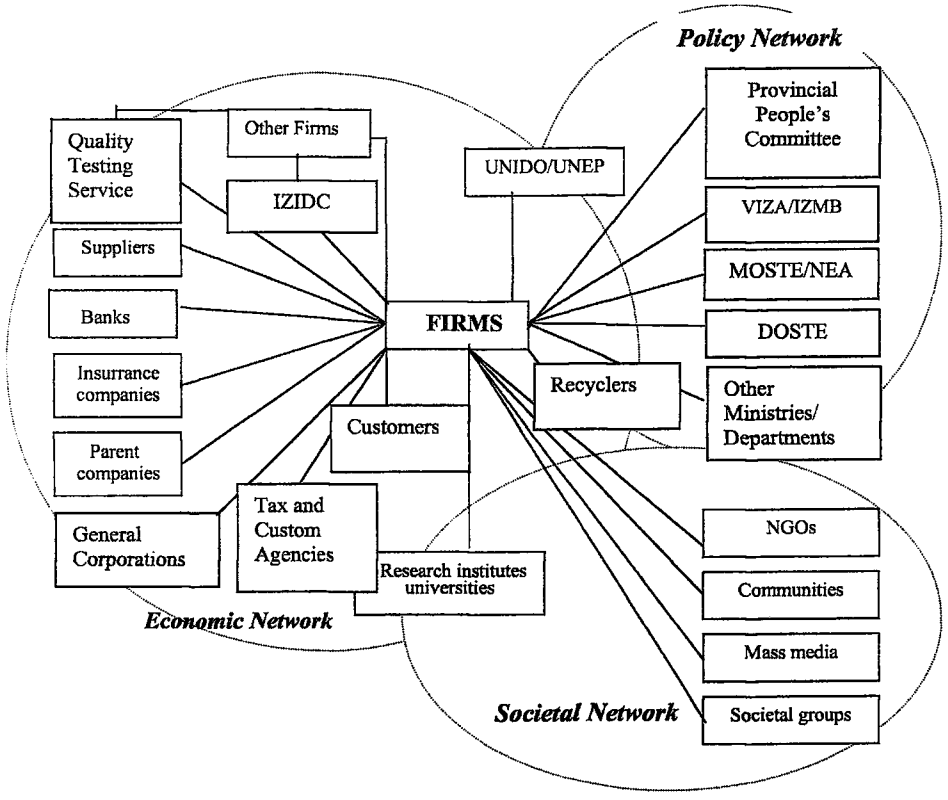

Figure 2.1 Networks Relevant to Firms in Industrial Estates

In order to analyse these networks to gain into the research question on how existing environmental management system works and the possibilities to improve the environmental management, it is impossible to conduct quantitative research based on large sample with limited quantitative variables. It needs a broad information from different actors. These types of data call for research methods like document analysis, site observation, open-ended and semi-structured interviews in qualitative research. Since most qualitative research provides broad information about the research subjects and gives insight in the perception of different actors (Nooij, 1997), qualitative research is suitable for this study.

Within qualitative research, case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the researcher has little control over

events, and when the focus is on a contemporary phenomenon within some real-life context (Yin, 1984). Therefore, this research was constructed on the basis of a qualitative case study: The Southern Key Economic Region.

5.3 Selection and Description of Research Units

The Southern Key Economic Region was chosen as a study area. The Southern Key Economic Region includes Ho Chi Minh City, Dong Nai Province, Binh Duong Province, and Baria-Vung Tau Province. It covers an area of 12,720 km^2 (3.85% of the national surface area), with a population of about 8 million people (in 1997). Its borders are:

- The Mekong Delta – the southern rice bowl of Viet Nam – in the south where agricultural products are abundant and various types of fruits and fresh water products can be found.
- The plateau of Central Viet Nam in the north, which is rich in forests, perennial trees, and minerals.
- The 500 km-long coastal area with a vast shelf of ocean bed in the East and Southeast. This area has a high potential in the development of oil and petroleum, seafood, and tourism.
- The border of Viet Nam-Campuchia in the West and Northwest.

Located near the international sea transport system of Southeast Asia, the Southern Key Economic Region has many competitive advantages for international business development. In this region, the river system of Saigon-Dong Nai has played a pivotal role as the main transport system, linking Saigon Port to other provinces in the South, and linking the Southern Key Economic Region to other countries in Southeast Asia and in the world. The river system also functions as a water source for domestic use and agriculture and a receptor of wastewater. Besides the advantages in location and the river system, the Southern Key Economic Region also profits from good infrastructure, abundant and relatively skilled labour, high domestic consumption, and a capacity to adapt quickly to new structures of the market economy and international trade. Due to these favourable conditions, the Southern Key Economic Region has the highest rate of economic and industrial development in Viet Nam (Institute for Natural Resources and Environment, 1998). According to statistic data in 1997, the Southern Key Economic Region contributed 30% to the national gross domestic product (GDP). In 1997 the rate of increase in GDP in the Southern Key Economic Region was 13%. Ho Chi Minh City, Ba Ria-Vung Tau Province, Dong Nai Province, and Binh Duong Province contributed 24%, 7.5%, 6%, and 2.5% to the GDP, respectively. At the end of 1998, about 36 industrial estates had been approved, most of them located along or near the Saigon-Dong Nai River system and its canals. According to the development master plan for the

Southern Key Economic Region[3], in the first decade of the twenty-first century, the Southern Key Economic Region will continue to be the largest industrial region of the country with an expected economic growth rate of 16% in 2010. This region was chosen because it plays a significant role in national industrial development, with the largest number of industrial estates and a large diversity of industrial estates in terms of size, type, and organisation.

As most of the industrial estates operating currently in Viet Nam are industrial zones, the case study will focus on industrial zones in the Southern Key Economic Region. Within the Southern Key Economic Region, strategic sampling for interviews across industrial zones, firms in industrial zones, and communities in the vicinity of industrial zones was carried out.

- Industrial zones: In each city/province of the Southern Key Economic Region, among industrial zones that are in full operation, some 'best practice industrial zones' and some 'bad practice industrial zones'[4] were selected.
- Firms in industrial zones: Based on the list of firms in the selected industrial zones, firms with different sectors, types of ownership, scale, and market for products were identified for more in-depth study. In this way, it is possible to compare and analyse the reasons behind the environmental performance of best and bad practices of industrial zones as well as firms in these industrial zones. After selecting the industrial zones and firms in each industrial zone, I delivered letters of introduction and questionnaires to the interviewees and made appointments for interviews. However, at the end it turned out that not all the managers of the chosen industrial zones and firms were willing to respond. Thus, industrial zones and firms were partly selected on the basis of their willingness to co-operate. Among 100 firms approached, 33 responded positively for in-depth investigation. They include state-owned enterprises (SOEs), joint-venture firms, foreign companies and private firms with different sectors, scales and markets for products. List of enterprises respond to interviews is presented in appendix 1.
- Community: case studies were carried out in eight industrial zones in the Southern Key Economic Region (Viet Nam-Singapore Industrial Zone, Viet Huong Industrial Zone, Tan Dinh An Industrial Zone, Tan Dong Hiep Industrial Zone in Binh Duong Province; Bien Hoa I Industrial Zone, Bien Hoa II Industrial Zone in Dong Nai Province; Le Minh Xuan Industrial Zone, and Binh Chieu Industrial Zone in Ho Chi Minh City). These were chosen not completely on a random basis but primarily on the criterion that the industrial zone is in full operation and that permanent communities live in the surrounding area. Individual members and groups from local communities around these industrial zones were selected, following the suggestion of local authorities. Subsequently I took advantage of the snowball effect whereby the first interviewee(s) introduced the second(s), and so on. In ad-

dition, I chose a limited number of households randomly for interviews at each industrial zone. Simultaneously, I supervised three other studies on the role of communities around industrial zones (Le Vinh Phuoc, 2000; Truong Thi Thu Thao, 2000; and Woltjer, 2001), and this research also profits from these studies.

5.4 Data Collection and Analysis

This research uses a variety of research methods to collect data relevant for understanding the current situation of environmental management in industrial estates and to develop new ideas for improvement of the institutional arrangements that guide environmental performance.

* *Site Visit*

Site visits were conducted at industrial zones in the Southern Key Economic Region. In addition, site visits at industrial estates in Thailand and the Philippines were conducted to learn about experiences in environmental management of industrial estates in other countries in the Southeast Asia region.

* *Secondary Data Studying*

Documents were collected through literature, both published and unpublished governmental documents and papers, research documents and papers from Provincial People's Committees, Viet Nam Industrial Zone Authority (VIZA), Industrial Zone Management Boards, Ministry of Science, Technology and Environment (MOSTE), Departments of Science, Technology and Environment (DOSTEs), Environmental Protection Centre (EPC), environmental service centres, environmental research institutes, etc. These data provide insight in the socio-economic profile of the industrial zones, and the environmental profile of the study site. It also gives information on management system in general and the environmental management system of industrial estates in the Southern Key Economic Region in particular. Moreover, it played an important role in the selection of industrial zones, and enterprises in industrial zones to conduct in-depth interviews. In addition, participation in conference and workshops was also the other way of data gathering.

* *Primary Data Collection*

Data were collected by interviews with key informants in the main organisations making up the industrial zone networks. Open-ended interviews were used for policy makers, environmental experts, reporters, etc. In-depth, semi-structured interviews were applied with managers of Industrial Zone Infra-

structure Development Companies, factory managers, and community members. List of interviewees and questionnaires are presented in appendix 2 and 3 respectively. Information from different sources was cross-checked to ensure reliability. Interviews and analysis in this research were carried out on a qualitative basis.

Notes

[1] In East Asian countries, industrial estates were chosen as pilot projects for the application of industrial ecology (Hamner, 1998). In the United States and Canada, industrial estates are designed as Eco-parks, a kind of industrial estate that is based on industrial ecology concepts (Côté, 1998a). In the recent publication of UNEP on the environmental management of industrial estates, industrial ecology is used as the core idea to illustrate the attempt to organise industrial estates on the basis of resource efficiency and pollution prevention (UNEP, 1997).

[2] Evans (1995) makes a distinction between three types of states in developing countries: developmental states, predatory states, and intermediate states. Developmental states govern economic development and have a close co-operation with social actors (e.g. most of Southeast Asian countries). Predatory states extract resources at the expense of society, undercutting development even in the narrow sense of capital accumulation (e.g. Zaire). Intermediate states fall in between the two typical states (e.g. Brazil, India).

[3] The project Aus-AID 'Master Plan for the Southern Key Economic Region in Viet Nam' was accomplished by Kinhill and Tasmania Pacific and Centre for Economic Development of Southern Viet Nam (belongs to the Ministry of Planing and Investment), with the collaboration of the Environmental Protection Centre and various scientific organisations in Viet Nam.

[4] At the start of the research (1998) only certain industrial zones in the Southern Key Economic Region were in full operation. Only fully operating industrial zones were selected for site visits. This explains why industrial zones and firms in Ba Ria-Vung Tau Province are not included. According to the staff of DOSTEs, 'best practice industrial zones' are those that have common wastewater treatment plants in operation, and those that have not generated any complaints from the local community. By contrast, those that have no common wastewater treatment plant or face numerous complaints by the local community are seen as having poor environmental performance.

CHAPTER 3

ENVIRONMENTAL POLICY-MAKING AND MANAGEMENT IN VIET NAM WITH SPECIAL REFERENCE TO INDUSTRIAL ESTATES

This chapter deals with the policy network that firms in industrial estates are embedded. An overview of the policy network is presented in Figure 3.1. In this chapter, the state involvement in the management of industrial estates is presented first, followed by the environmental institutions, legislation, and policy instruments related to industrial estates. Finally the current environmental policy-making and management in Viet Nam is evaluated.

1. State Management of Industrial Estates in Viet Nam

The emergence of dozens of industrial estates required the formation of an organisation to manage them. The Prime Minister decided in 1996 to do that by creating the Viet Nam Industrial Zones Authority (VIZA) and its provincial departments (Export-Processing Zone and Industrial Zone Management Boards or Industrial Zone Management Boards for short). VIZA, Industrial Zone Management Boards (IZMB) and other related governmental agencies form the management system of industrial estates in Viet Nam.

1.1 National Level

On December 28, 1996 the Prime Minister signed Decision No. 969/TTg to establish the Viet Nam Industrial Zone Authority (VIZA) (National Politics Publisher, 1998). VIZA is a body, which is attached to and under the direct guidance of the Prime Minister. It assists him in conducting the preparation, development and management of industrial estates that have already been planned and approved. The Prime Minister has delegated VIZA to co-ordinate the examination; inspection and supervision of the ac-

tivities of industrial estates by related ministries, provincial authorities and provincial Industrial Zone Management Boards.

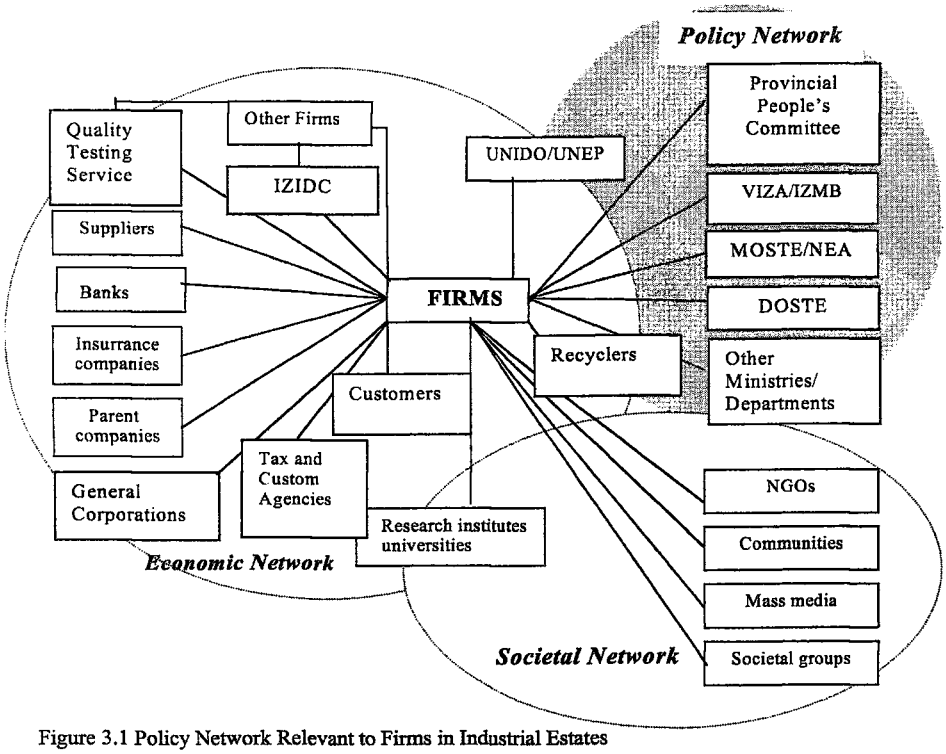

Figure 3.1 Policy Network Relevant to Firms in Industrial Estates

The board of VIZA includes one chairman; four vice chairmen who are suggested by the relevant ministers (Ministry of Planning and Investment; Ministry of Industry; Ministry of Construction; Ministry of Science, Technology and Environment and Ministry of Commerce) and the chairman of the Government Organisation Department (see below). In 1999, VIZA was staffed with 35 persons. The staff is selected by the Chairman of VIZA, with the consent of the related ministers and the chairman of the Government Organisation Department, and appointed by the Prime Minister. The staff is distributed over 4 Divisions: an Administrative Division, a Division of Local Industrial Estate (responsible for the industrial estates' activities in every city or province), a Policy Division (responsible for the policies related to industrial estates), and a Division of Specific Subject (responsible for specific subjects such as planning, environment, investment etc.). The Government Organisation Department decides about the budget, location of offices, working conditions, etc. of VIZA[1].

Even though its name suggests an 'authority', VIZA has only limited powers. For example, the Prime Minister's decision to approve or disprove of the establishment of

new industrial estates is based on the report prepared by VIZA. It has no decisive legal power. The Policy Division and the Division of Specific Subjects have no role in policy making, planning or preparing environmental programmes. The related ministries take care of these issues[2]. Compared to the Industrial Estate Authority of Thailand (IEAT)[3], VIZA is a rather weak organisation.

According to the Regulations on Industrial Zones, Export-Processing Zones and High-Tech Industrial Zones, attached to Decree No. 36/CP, the various ministries including the Ministry of Planning and Investment; Ministry of Industry; Ministry of Construction; Ministry of Science, Technology and Environment; and Ministry of Commerce have to carry out the tasks of state management of industrial estates. These ministries play an important role in preparing policies and strategies related to industrial estates and in assessing feasibility studies and environmental impact assessment (EIA) reports of new estates. In practice, the collaboration between ministries is difficult, due to conflicts of interests. For example, the National Environmental Agency (NEA), belonging the Ministry of Science, Technology and Environment (MOSTE), and the Ministry of Finance developed a proposal for the National Reserve Fund, but this was a difficult process. One of the difficulties lies in the belief that environmental concerns are of secondary importance, especially in time of crisis. Another problem is made up by the fact that a number of ministries, including the MOSTE; the Ministry of Finance; the Ministry of Industry; the Ministry of Planning and Investment; and the Ministry of Commerce, want to control the funding. NEA's political weakness is also a problem (Roodman, 1999). Although on paper economic and environmental issues are equally taken into account in all decision-making and ministries are equal in power, in practice the environmental agency is much weaker than the economic and planning agencies. Consequently, it should not surprise us that most decisions favour economic interests. This contributes to the ineffectiveness of the environmental management of industrial estates.

There is one more organisation, which plays a part in the national management system of industrial estates: the Government Organisation Department. According to the Regulations attached to Decree No. 36/CP, this Department has a consultative voice in the appointments by the Prime Minister of candidates for the positions of chairman and vice chairmen of VIZA and of candidates for positions in provincial Industrial Zone Management Boards. The Government Organisation Department also works together with VIZA in developing regulations on personnel, salary, organisation, etc. in provincial Industrial Zone Management Boards. This organisation does not have much to do with the development and activities of industrial estates, except for managing the human resources of the industrial estate management agencies.

1.2 Provincial level

At the provincial level, two institutions are relevant for industrial estate management. According to the Regulations attached to the Decree No. 36/CP, the People's Committees of provinces where industrial estates are located, have the duty and right to implement the state management of industrial estates and of provincial Industrial Zone Management Boards (see below) within their territory. In addition to that, they have to solve the problems related to industrial estates in their territory within the scope of their delegated authority. For matters, which go beyond the scope of their delegated authority, they need the consent of the national government bodies. For instance, a provincial People's Committee has no right to shut down polluting factories that belong to the central state, even though the factories are located in their territory. In this case they need the consent of the MOSTE and other related ministries to solve the problem.

The second institution, related to provincial industrial estate management, is the provincial Industrial Zone Management Board. In vertical line, these boards belong to VIZA, in horizontal line, they belong to the provincial People's Committee (refer Figure 3.2 below). Provincial Industrial Zone Management Boards receive their funding from the national budget. Provincial Industrial Zone Management Boards have to report every year on the establishment, development and management of industrial estates in their provinces. The reports are sent to the provincial People's Committees, to VIZA, and to other related governmental bodies. Each province and large city has one Industrial Zone Management Board, except for Binh Duong. In Binh Duong Province, one Industrial Zone Management Board is responsible for the Viet Nam-Singapore Industrial Zone (the industrial zone that was developed by a joint-venture company with Singapore) and one for the other industrial estates. Industrial Zone Management Boards in the study area are staffed with 20 to 30 persons, who are distributed over five to seven divisions, such as the Administration Division; the Planning and Environment Division; the Investment Division; the Import/Export Division; the Labour and Service Division; the Factory/Enterprise Management Division; and the Construction Division[4].

On paper, the formation of Industrial Zone Management Boards should facilitate the 'one-window mechanism' and thus reduce complicated, cumbersome and time-consuming administrative procedures in the investment processes. However, in practice the implementation of this mechanism is still limited. Under the existing delegation mechanism, provincial Industrial Zone Management Boards cannot exert their entire capacity to carry out tasks, and they cannot decide flexibly what to do in specific local circumstances. For example, the Industrial Zone Management Boards of Dong Nai and Binh Duong Provinces are required to establish a labour service centre in order to provide the estate with skilled workers for a year. Although this is agreed upon by VIZA, the Ministry of Planning and Investment, and Dong Nai People's Commit-

tee, this service can not be called into operation without the approval of the Ministry of Labour and Social Affairs (Nguyen Minh, 1999). Also, the task of environmental protection is not specifically delegated to the Industrial Zone Management Boards by law. As a consequence, for instance, the Dong Nai Industrial Zone Management Board did not have the authority to approve the design of a common wastewater treatment plant in Bien Hoa II Industrial Zone, as proposed by SONADEZI (Industrial Zone Infrastructure Development Company). The start of the construction had to wait for the central government's approval, which took a long time.

In accordance with the amendment of the Decree 36/CP, VIZA has consulted the related agencies and drafted some suggestions to solve these difficulties. Among these suggestions is the 'renovation' of the management mechanism, so that more functions are delegated to Industrial Zone Management Boards, in order to form a more effective management mechanism (Nguyen Minh, 1999; Minh Van, 1999).

Apart from these state management agencies, the tasks of the Industrial Zone Infrastructure Development Companies (IZIDC) are also worth considering. According to the Regulations attached to the Decree 36/CP, the government encourages and provides favourable conditions for domestic companies (both state-owned and private) and for joint-ventures of foreign and domestic companies, to invest, construct and carry out business related to the infrastructure of industrial estates in Viet Nam. These companies are called Industrial Zone Infrastructure Development Companies. According to the regulations, and as its name indicates, the tasks and functions of Industrial Zone Infrastructure Development Companies are limited to the development of infrastructure in industrial estates. The companies are also given the responsibility of protecting the environment within industrial estates. However, what this specific responsibility means, is not clearly defined in the regulations. As a result, in practice different companies use different interpretations of this responsibility. Some of these companies are very creative and active in fulfilling their environmental tasks and responsibilities. SONADEZI (the Industrial Zone Infrastructure Development Company of Bien Hoa I, Bien Hoa II and Go Dau Industrial Zones in Dong Nai Province) forms a positive example. SONADEZI has constructed a common wastewater treatment plant in Bien Hoa II Industrial Zone and is currently operating it. This plant serves to treat all wastewater generated by factories and enterprises located in Bien Hoa II Industrial Zone. Effluent from the common wastewater treatment plant is controlled by SONADEZI to meet the national standard (TCVN 5945, 1995). It should be emphasised that, until 1999, among the four industrial zones in the Southern Key Economic Region that have a common wastewater treatment plant, Bien Hoa II Industrial Zone was the only one which was developed by a state-owned company. Joint-venture companies developed the other industrial zones. Recently, the Dong Nai People's Committee has assigned SONADEZI to undertake a project of hazardous waste treatment for Dong Nai Province[5]. According to the law, the tasks and responsibilities of an Industrial Zone Infrastructure Development Company are limited to the boundaries of an

industrial estate. Province-wide hazardous waste treatment does not belong to its tasks. Another example is the Industrial Zone Infrastructure Development Company of Le Minh Xuan Industrial Zone, which will be discussed in chapter 5.

In order to utilise and enhance the capacity of Industrial Zone Infrastructure Development Companies, one of the recommendations of the amendment of the Government Decree No. 36/CP is to expand the Industrial Zone Infrastructure Development Company into an Industrial Zone Development Company. Again, SONADEZI can be taken as an example of an Infrastructure Development Company that already actively started to evolve as such (Nguyen Minh, 1999; Minh Van, 1999). To a certain extent, this recommendation is more a codification of existing practices than a modification.

In brief, Viet Nam has no specific organisation like the Industrial Estate Authority of Thailand to manage industrial estates. The existing management system is still weak, the 'one-window mechanism' has not fully been brought into play and the distribution of tasks between different organisations is making administrative procedures cumbersome. VIZA and Provincial Industrial Zone Management Boards, whose tasks are related directly to industrial estate activities, do not have enough authority to carry out their duties. The capacity of Industrial Zone Infrastructure Development Companies has not fully been utilised.

2. Environmental Institutions, Legislation, and Policy Instruments related to Industrial Estates

This section presents the environmental policy framework for environmental protection in Viet Nam first; then the establishment of environmental organisations and the formulation of environmental legislation. Finally, the environmental policy instruments will follow.

2.1 Environmental Policy Framework

The protection of the environment was not a state concern until 1982, when the Directives of the Council of Ministers were promulgated. In 1985 these were followed by Resolution No. 246 of the Council of Ministers on 'The Survey and Rational Use of Natural Resources and Environmental Protection'. Later on, in 1991, the 'National Plan on Environment and Sustainable Development 1991-2000' was approved by the Council of Ministers. This plan aims at developing a more coherent and integrated environmental policy. Subsequently, the Law on Environmental Protection (January 1994) supported it and several newly founded environmental organisations.

In 1991, industrial pollution control did not have a high priority in the 'National Plan on Environment and Sustainable Development', because at that time the rapid growth of industrialisation and its related pollution were not foreseen. To overcome this draw-

back, Viet Nam drew up a 'National Environmental Action Plan' in 1995, building on the 'National Plan on Environment and Sustainable Development'. The 'National Environmental Action Plan' assessed the situation, identified the main problems, and developed a programme to combat pollution (Nguyen Ngoc Sinh and Friederich, 1997). In 1998, the Communist Party of Viet Nam – the highest policy-making body of the country – promulgated Directive No. 36/CT-TW to promote activities to protect the environment and to cope with the side effects of the process of modernisation and industrialisation. Viet Nam has had policies on environmental protection since the early 1980's, but the most significant developments in the environmental policies dated from the 1990's (SRV, 1992; Nguyen Cong Thanh, 1993). However, until 2001 there has been no specific environmental policy regarding industrial estates, even though most industrial estates have been in operation since 1994.

2.2 Governmental Environmental Organisations

At national level the governmental agencies in charge of environmental issues are: the National Environmental Agency (NEA) belonging to the MOSTE; 23 Departments of Science and Technology (DST) that belong to 23 line ministries; and the Division of Specific Subject, which belongs to VIZA. At provincial level the Departments of Science, Technology and Environment (DOSTE) and the Divisions of Planning and Environment, which belong to provincial Industrial Zone Management Boards, are responsible for the environmental management of industrial estates. At district level, there are Environmental Bureaux that take care of environmental issues within their district.

Figure 3.2 presents the organisations involved in environmental management of industrial estates in Viet Nam.

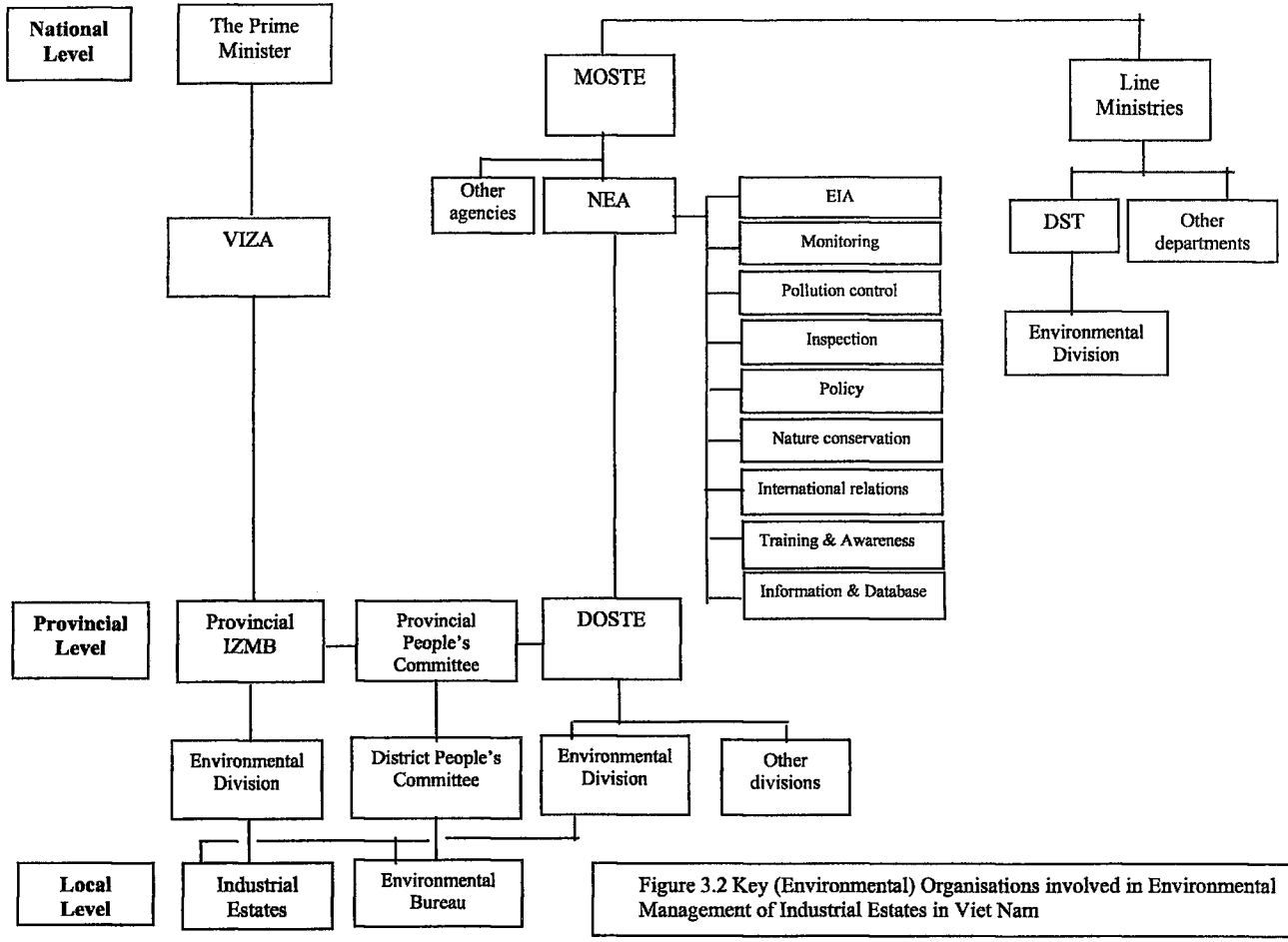

Figure 3.2 Key (Environmental) Organisations involved in Environmental Management of Industrial Estates in Viet Nam

* National Level

National Environmental Agency (NEA)/MOSTE

The 'National Plan on Environment and Sustainable Development 1991-2000' identified the need to establish a central environmental authority. According to this document, its mandate would have to be to develop environmental policies and legislation; to facilitate their implementation; to manage environmental information; and to promote environmental awareness. It was believed that this environmental authority would need a ministerial status and should be a member of the Council of Ministers. Its staff would have to consist of professionals selected both from the ministries involved and from the national experts in different fields of the environment. As a result of the above recommendation, the MOSTE was formed at the National Assembly meeting in 1992. MOSTE's main responsibilities are in the areas of scientific research; technological development; standardisation of equipment; industrial property rights; and environmental protection. With respect to environmental protection, MOSTE has the overall responsibility for the environmental sector and serves as a focal point of all environment-related activities (Nguyen Cong Thanh, 1993).

The NEA, established in 1993, is a part of MOSTE. The NEA is the executive department of MOSTE, with regard to environmental management and protection. In 1993, NEA had five divisions and only 15 staff. In 1996 NEA employed 45 staff members working in seven divisions. The number of employees in NEA increased to 65 in 1999. In 2000, it was increased again to 67 and a proposition was made to expand NEA's staff to approximately 350 persons. (O'Rourke, 1999; Nguyen Ngoc Sinh and Friederich, 1997; Nguyen Ngoc Sinh et al., 1999; NEA, 2000). In 1999, the organisation consisted of a Director who was assisted by two deputies, and nine divisions, namely Policy, Environmental Impact Assessment (EIA), Pollution Control, Inspection, Conservation of Nature, Training and Awareness, Information and Data, Monitoring and International Relations. It was expected that in the year 2000, NEA would be upgraded to Ministry of Environment[6]. However, until 2001 the establishment of a Ministry of Environment is still waiting on paper.

NEA is responsible for environmental policy-making. The formal procedure to formulate an environmental policy involves the NEA drafting a new policy (with the assistance of university researchers) and then sending it to MOSTE for review. Then it is submitted to the Office of the Government to be signed by the Prime Minister. After that it is presented to the National Assembly for approval. A problem is that the formulation of most environmental policies was not based on up-to-date environmental data and current technologies, but on literature and the targets set by the government. This has heavily complicated their implementation[7].

Department of Science and Technology (DST)/Line Ministries

Other state organisations involved in environmental issues are the 23 line ministries. Within these line ministries, Departments of Science, Departments of Science and Technology (DST) and other Departments with a similar designation take care of environmental affairs in a particular field. The number of employees in these Departments is often less than 10, which is too small to adequately carry out environmental tasks. The environmental divisions of some ministries are stronger than those of others. For example, the environmental divisions of the Ministry of Construction, of the Ministry of Agriculture and Rural Development and the Ministry of Planning and Investment are more developed than that of the Ministry of Industry.

In Viet Nam, environmental protection is not considered to be the responsibility of MOSTE alone. Instead, also the line ministries include environmental protection in their mandate. In theory, this mechanism helps to integrate the environmental activities of all sectors and thus helps to release the burden on MOSTE. However, in practice the dispersion of environmental responsibilities over all ministries results in overlap. It also results in competition between ministries and agencies making decisions over environmental planning, EIA reviews and environmental policy formulation. Furthermore, on paper MOSTE is equal to other ministries, but in practice it is weaker than the Ministry of Planning and Investment and the Ministry of Industry, for instance. Consequently, environmental issues do not have a high priority on the political agenda. In the field of industrial pollution control, for example, NEA/MOSTE often does not have the power to close polluting factories, especially not when they are joint-ventures, foreign-owned, or state-owned. In 1995, for instance, NEA suggested a list of 13 polluting firms that should have been closed down. It was clear that these firms caused heavy pollution and there were no indications that they were able to comply with national environmental standards. However, other stronger ministries opposed this idea and in the end none of them was shut down. When issues arise between NEA and state-owned enterprises (SOEs) that belong to other ministries, not the General Director of NEA, but the Minister of Science, Technology and Environment has to discuss with other ministries to solve the problems. As O'Rourke (1999: 142) stated "the dispersal of environmental responsibilities between ministries, without adequate mechanisms to resolve inter-ministerial disputes, remains a problem for many areas within environmental management". It is generally agreed that promoting NEA to Ministry of Environment would remove one layer of mediation. The Ministry of Environment would have more power than the existing NEA/MOSTE in dealing with the line ministries and in advancing environmental concerns up on the political agenda.

Division of Specific Subjects/VIZA

Within VIZA, the Division of Specific Subjects is in charge of environmental issues of industrial estates. In 1999, the environmental task of this division was still not clear.

At the time of the interview (April 1999), this division was drafting environmental regulations for industrial estate to submit the Prime Minister. The drafts were based on recommendations of NEA, environmental agencies and environmental specialists from various environmental institutes. So far, the environmental regulations on industrial estates have not been implemented.

** Provincial Level*

Department of Science, Technology and Environment (DOSTE)

MOSTE has local departments in most provinces and large cities under the name of Department of Science, Technology and Environment (DOSTE). The Division of Environment in DOSTE is in charge of implementing the Law on Environmental Protection, EIA appraisals and environmental licenses. It also has to monitor environmental quality and pollution control and it is in charge of resolving environmental disputes and problems and providing environmental training and awareness programmes. This division is usually staffed with three to 16 persons, depending on the priorities set in the provinces. Each staff member is in charge of one or more districts, hence he or she is also responsible for environmental issues of industrial estates in his or her duty area. As a result, there is little specialisation. There was a proposal to double or triple DOSTE's environmental staff nation-wide, until now nothing has been done with it. In technical issues, the DOSTEs are linked to MOSTE. In political, administrative and financial aspects they are under the Provincial People's Committees.

In the field of environment, the DOSTEs support the City or Provincial People's Committee to implement the state management functions on environmental protection within their boundaries. DOSTEs are supposed to implement national policies developed by NEA, but these policies rarely match the specific local condition as mentioned above. In such a case, some provincial DOSTEs have created a certain pathway to be able to do their job. Dong Nai DOSTE, for instance, works with its own environmental regulations. Ho Chi Minh City DOSTE is very creative in devising strategies to deal with industrial pollution in the city. It was the first DOSTE to establish a black book of the most polluting firms in the city and to create a so-called Industrial Pollution Minimisation Fund (IPMF) to help industries in the city with waste reduction and treatment. Many provinces, and even Hanoi, have learned from the experiences from Ho Chi Minh City DOSTE. Ho Chi Minh City DOSTE also develops a casebook of 'best practice' examples to encourage industries to improve their environmental practices[8].

Another drawback of environmental management in Viet Nam is that the formal links between NEA and the DOSTEs are very weak, which is pointed out by a number of international reports on Viet Nam's environmental institutions (WB, 1994; WB, 1997; UNDP, 1995; UNIDO, 1998). Over the last five years, NEA and the DOSTEs have somewhat diverged in the focus of their policies. NEA policy makers have been

working on developing a proposal for pollution taxes, but most DOSTEs do not believe imposing taxes on pollution is practical at present. The DOSTEs are currently focussing on: responding to communities' complaints; pressuring profitable SOEs to comply with standards; publishing 'black' and 'green' lists; training factory owners and operators in pollution control; and developing loan funds (Roodman, 1999).

Division of Planning and Environment/Industrial Zone Management Board

The Divisions of Planning and Environment are the divisions within provincial Industrial Zone Management Boards that take care of environmental issues of industrial estates. As they are usually staffed with around three persons, the Environmental Units of provincial Industrial Zone Management Boards prove to be very weak in carrying out environmental tasks. Except for lacking in human resources, Environmental Units also lack in knowledge and information, experience, finance, equipment, etc. They usually collaborate with DOSTEs to monitor and inspect the implementation of the Law on Environmental Protection in industrial estates. However, in the field of environmental management of industrial estate, the division of tasks between Industrial Zone Management Board and DOSTE still remains unclear. Should the Industrial Zone Management Board take over the task of DOSTE to control activities related to environmental protection? Should these two organisations continue to collaborate as they are doing now, and if they do collaborate, who should do what? These questions are still subject of debate. Some suggest that Industrial Zone Management Board should take over the tasks of DOSTE, including reviewing EIA reports, issuing environmental licenses, monitoring, inspection, enforcement, etc. to release the burden on DOSTE and to enhance the 'one-window mechanism'. Others argue that Industrial Zone Management Board does not have enough skilled and trained personnel and that they have no experiences in carrying out such tasks.

** District Level*

At the district level, small Environmental Bureaux, which belong to the People's Committees and are linked to the DOSTEs, take care of environmental issues. Their main tasks are resolving disputes and handling complaints about pollution; implementing DOSTE's instructions; dealing with environmental problems in the districts; etc. Environmental problems of industrial estates within the district seem to be left untouched by the district Environmental Bureaux. Disputes or complaints on pollution related to industrial estates are supposed to be dealt with by district Environmental Bureaux, but usually they are transferred to the DOSTEs or People's Committees.

To summarise, one can say that in theory governmental environmental organisations should assist the Council of Ministers and People's Committees at all levels to fulfil their tasks of environmental protection. These governmental environmental organisations are provided with full decision-making powers on all environmental issues.

However, in practice, just like many new environmental agencies in other Asian countries, MOSTE and DOSTEs lack a broad political support (WB, 1995) and their power is limited. In the field of industrial pollution, for example, these organisations are facing difficulties in enforcing the Law on Environmental Protection, especially when dealing with SOEs and foreign companies. The lack of knowledge and information and the lack of equipment and funding are among the most crucial difficulties these environmental organisations face in fulfilling their tasks. Although DOSTEs can receive extra funding for special projects and initiatives[9], the deficit still remains a problem. Current environmental spending is small compared to the pollution costs[10]. In addition to these shortcomings, a lack of human resources also contributes to the problem. Despite the fact that a proposal has been made to expand NEA's staff to approximately 350 persons and to double or triple DOSTE environmental staff nationwide, this will only solve one of the many problems.

Although the institutional structure for environmental protection is in place, there is no clear definition of responsibilities and division of roles, which creates the risk of having multiple responsibilities with inadequate accountability (Nguyen Ngoc Sinh and Friederich, 1997; Tran Thi Thanh Phuong, 1996). This, together with the complexity of the structure in environmental organisations, might be a critical institutional factor in the implementation of environmental policy in Viet Nam. For instance, DOSTEs have no administrative relationship with enterprises in industrial estates, even though they are the main governmental body with legal authority concerning environmental responsibilities. On the other hand, the provincial Industrial Zone Management Boards are the main governmental bodies with administrative relations with industrial estates, but they have no legal environmental function. At present, the major tasks on environmental management and protection in industrial estates belong to the DOSTEs. This enlarges the burden put on the DOSTEs, which are already strained by the large amount of tasks concerning existing industries outside industrial estates, and all non-industry related environmental issues. The staff of the DOSTEs is already too small to adequately fulfil their normal tasks, so it is certainly much too small for their task to be extended to individual industries in industrial estates. The Environmental Units of the recently established Industrial Zone Management Boards could take over some of the tasks of the DOSTEs, but they lack the experience, knowledge, human resources and equipment to carry out these environmental tasks by themselves. In the present situation, DOSTEs and Industrial Zone management Boards collaborate to take action only when complaints are filed by communities, by other factories/enterprises in industrial estates or by Industrial Zone Infrastructure Development Companies, or when they are requested to do so from higher organisations in the governmental hierarchy. Meanwhile, Industrial Zone Infrastructure Development Companies with close relations to the companies in industrial estates have a potential role to play in monitoring and controlling wastes, but they are not assigned to any of these tasks.

2.3 Environmental Legislation

The legislative framework for environmental management of industrial estates in Viet Nam can be divided into three main groups.

First, there are national environmental laws of which the Law on Environmental Protection is the most important one. Promulgated by the National Assembly in 1994, the Law on Environmental Protection provides the legal framework for MOSTE, NEA and DOSTEs and it sets obligations and duties. But, being a framework law, the Law on Environmental Protection is very general on many aspects. This is, to a lesser extent, also the case with other laws. These general provisions are supplemented by a series of regulations.

The second legal category consists of regulatory documents issued by the government. They include resolutions, decrees, and decisions that provide instructions on how to implement national law. Decree 175/CP (dated October 1994) provides guidelines on the implementation of the Law on Environmental Protection. This decree also outlines EIA requirements, including the structure of an EIA report. Decree 26/CP (dated April, 1996) provides regulations on administrative punishment for violation of the Law on Environmental Protection and Directive 199/TTg (dated April, 1997) deals with immediate measures for the management of solid waste in industrial and urban areas. These are among the most important environmental regulatory documents issued by the government.

Finally, there are regulatory documents issued by ministries and provincial people's committees, in order to implement and fine tune national laws according to specific local conditions or to respond to immediate needs at the local level in cases where national legislation does not yet exist. Some examples of these are: various environmental standards (known as TCVN 1995, issued by the MOSTE); Circular No. 490/1998/TT-BKHCNMT (dated April, 1998), which was issued by the MOSTE and includes guidelines on how to carry out and approve EIA reports for new investments in Viet Nam in general and particularly in industrial estates; Inter-ministerial Circular No. 1590/1997-TTLT/BKHCNMT-BXD (dated October, 1997), which was issued by the MOSTE and the Ministry of Construction to provide guidelines for the implementation of the Directive No. 199/TTg; and Regulations on Environmental Protection in Dong Nai Province issued by People's Committee of Dong Nai Province in 1998.

Until 2001, there existed no specific regulations on environmental protection in industrial estates at the national level. In the Southern Key Economic Region, most industrial estates are located along or near Saigon-Dong Nai River system and its canals, but there is no regulation or legal basis to promote collaboration between provinces in the region to protect the river basin. Many problems have arisen in the absence of national regulation. One of these problems is giving a definition of the tasks of environmental

protection in industrial estates. In most of the cases, DOSTEs and Industrial Zone Management Boards have to work together (as mentioned earlier). However, some provinces are very active in developing their own regulations and clear definitions of tasks. Dong Nai Province is such an example. Environmental regulation in Dong Nai Province defines, among others, the environmental responsibilities of each relevant organisation in the province. Accordingly, Dong Nai Industrial Zone Management Board is in charge of environmental protection activities inside industrial estates and Dong Nai DOSTE is responsible for environmental quality outside industrial estates[11]. However, in practice, the Environmental Unit of Dong Nai Industrial Zone Management Board proves not to be capable to carry out their legal tasks in the field of environmental protection activities due to lack of experience and resources.

Recognising the importance and necessity of environmental regulations for industrial estates, and confronted with requests from DOSTEs and Industrial Zone Management Boards, MOSTE has started to work on drafting up national regulations on environmental protection in industrial estates. Due to the rapid development of industrial estates, the promulgation of environmental regulations on environmental protection in industrial estates is becoming more and more necessary. It should be given a high priority to provide guidelines for environmental and other agencies, so that environmental problems related to industrial activities can be prevented.

2.4 Environmental Policy Instruments

Environmental policy in Viet Nam has followed the traditional model of command-and-control, characterised by laws, standards and regulations, and a top-down implementation of legislation. The principal environmental policy instruments used in this model include environmental standards, EIA, monitoring, enforcement, inspections, and education. The following section analyses the achievements and drawbacks of these instruments in Viet Nam.

* *Environmental Standards*

Since the promulgation of the Law on Environmental Protection of Viet Nam (1994), the development of environmental standards has been promoted. In 1995, MOSTE issued the National Environmental Standards for Viet Nam (TCVN 1995). The TCVN 1995 includes three types of standards: environmental quality standards, as also known as ambient standards, emission standards, and technical standards (methods of measuring, collecting, analysing, and treatment of samples). Until 1999, about 200 environmental standards had been developed in Viet Nam. These national standards are the basic legal instruments to carry out EIA, environmental monitoring, enforcement, and inspections.

However, interviews with staff from MOSTE, DOSTEs, factory managers, and environmental experts; and the review of published documents (Nguyen Khac Kinh, 1999; Le Doan Thao and Dang Viet Khoa, 1999; Ministry of Industry, 1999) reveal some drawbacks regarding these standards. First, TCVN-1995 is based on foreign models of environmental standards. Consequently, these standards are considered to be inappropriate in a number of cases because they are too stringent. The standards do not link to existing technologies and investments that would enable industries to comply. This makes compliance to these standards almost impossible for contemporary local industries. Second, TCVN-1995 can be seen as incomplete and thus inadequate, because there are no standards for solid wastes and domestic wastes. This results, in a number of cases, in a shift of air and water pollution to solid wastes. Third, the fact that only the concentration of pollutants is taken into account in TCVN-1995, instead of the pollution load, leads to the situation that polluters dilute their waste to meet the standards. Fourth, some environmental experts claim that it is not logical to impose the same standards in the whole country, without considering the differences in the carrying capacity and thus critical loads of different regions. It might happen that all polluters in a geographical area (an industrial estate for instance) comply with emission standards, while severe deterioration of the environmental quality still continues due to the limited self-purifying capacity of the area. This is of course related to the poor relation between the (dominant) emission standards and the (less used) ambient standards. Fifth, some claim it is impossible to apply uniform standards without considering the different types of industries. Food industry or pulp and paper industry, for instance, face more difficulties in complying to the biochemical oxygen demand (BOD) standard compared to metal industry. Of course this is true, but at the same time it is not good idea to adjust standards to the easiness of compliance, as that might cause the environmental quality to be jeopardised. A strategy of starting with less strict standards first to encourage firms to comply and gradually developing them into more stringent ones seems to be more feasible.

NEA and the Directorate for Standards and Quality (within MOSTE) have planed to revise the existing standards and aim to develop a more comprehensive standard system. According to MOSTE officials, the new environmental standards would be based on geographical, economic, and technological conditions in Viet Nam and attention would be paid to the industry's technical and investment capabilities. Differentiation of standards would be applied with standards for specific industries such as textile and dying, pulp and paper, and food processing. In a similar way, differentiation would have to result in regional air quality standards and water quality standards for specific river basins. However, these refinements of environmental standards require a larger budget and that cannot be met within a short period[12]. A strategy for repairing the main shortcomings of the national environmental standards first (such as implementing the solid waste standard and using total loads instead of concentrations) would be a more feasible and effective strategy.

* *Environmental Impact Assessment (EIA)*

EIA is the process of analysing, evaluating, and forecasting the environmental impacts caused by the implementation of socio-economic development projects, master plans, production units, enterprises, and other significant economic, scientific, technical, health care, security, and defence projects. It includes proposals for appropriate environmental protection measures to minimise the environmental consequences of these projects (Le Thac Can, 1997). Requirement for EIA reports in development projects began appearing in developing countries' legislation during the 1970s, after the United States enacted the National Environmental Policy Act of 1969 (De la Maza, 2001). Similarly, EIA was introduced to most socialist countries during 1970s. In the late 1980s, at the beginning of the process of transition, most of the socialist countries had certain rudimentary EIA elements incorporated in their planning procedures (Cherp, 2001). Theoretically, the EIA process can mitigate environmental impacts of economic development and transitional policies. EIA has become one of the most commonly used environmental policy tools for countries in transition (OECD, 1999). In Viet Nam, EIA was introduced in the mid 1980s to promote environmental protection and sustainable development (Le Trinh, 1997). However, in that experimental phase EIA was not yet officially required during the feasibility study or design phases of development projects. It was only at the passage of the Law on Environmental Protection (1994) that the EIA procedure became compulsory for the approval of major development projects. In Viet Nam, Decree 175/CP (dated October 1994) forms the basic legal framework for EIA. Besides that, MOSTE has issued several documents to guide the implementation of EIA. According to the Vietnamese legal framework for EIA, investment projects are classified into the following three categories: (i) Projects that do not need an EIA, (ii) Projects that need an EIA report appraised by DOSTE (Annex II of the Decree 175/CP), (iii) Projects that need an EIA report appraised by MOSTE (Annex II of the Decree 175/CP).

At the central level, MOSTE is responsible for the appraisal of EIA reports of large sized or high potential impact projects. The members of the appraisal committee at the central level are shown in Figure 3.3. At the provincial level, People's Committees of 61 provinces/cities are in charge of the appraisal of EIA reports of specified projects located in their territories. The members of the appraisal committee at the provincial level are shown in Figure 3.4.

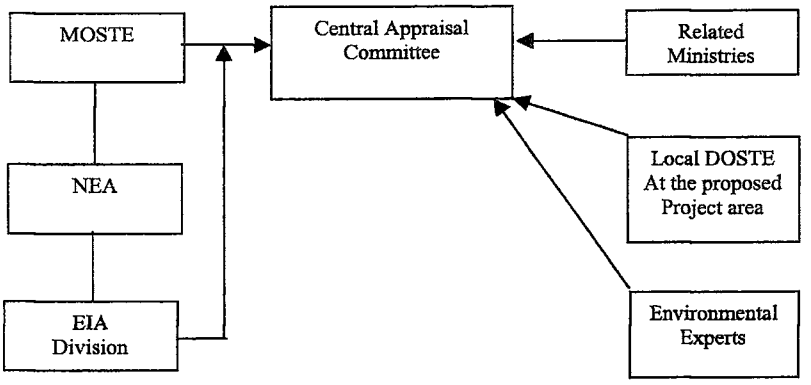

Figure 3.3 Members of EIA Appraisal Committee at Central Level
(Source: Le Trinh, 1997)

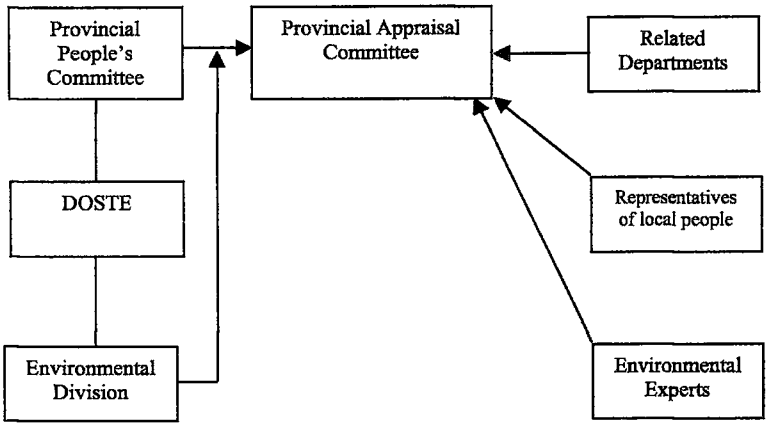

Figure 3.4 Members of EIA Appraisal Committee at Provincial Level
(Source: Le Trinh, 1997)

On behalf of MOSTE and People's Committees respectively NEA and DOSTE proceed the appraisal of the submitted EIA report. In the case of simple EIA reports, there is no need to establish appraisal committee. In such a case, officers of NEA or DOSTE propose the conclusion of the appraisal. In case of important projects, it is necessary to form appraisal committee. For every EIA appraisal a new committee is set up. The appraisal committee proposes the conclusion of the appraisal. In both cases, the conclusion of the appraisal can be:

- The submitted EIA report is accepted and the project is granted an environmental permit. An environmental permit is a necessary requirement for a 'land use permit' and a 'construction permit' to be issued.
- The submitted EIA report is incomplete. The project initiator has to ameliorate and complete the EIA report.
- The environmental impact of the project is too large and the mitigating measures proposed in the EIA report are insufficient. The project is not granted an environmental permit.

In reviewing the EIA reports for new projects in Viet Nam, Le Thac Can (1997) found that a number of projects had to change their production process, input materials, or fuel. Some were requested to invest in pollution control and some were not approved because the project's location or the technological processes involved were considered to be inappropriate. This shows that EIA procedures can be effective. But in other occasions, investors were able to buy EIA reports and appraisals without facing serious evaluations. A more systematic evaluation of the EIA procedures in Viet Nam reveals several factors that contribute to its ineffectiveness. First, in Viet Nam political and business support for EIAs is low. As mentioned in sections 1.1 and 2.2 of this chapter, environmental agencies are virtually powerless compared to economic development agencies and, so far, many important development projects in Viet Nam, including projects which could have major negative environmental impacts, have not gone through any kind of EIA (Le Thac Can, 1997). Although on paper, investors who invest in industrial estates have to submit EIA reports as a requirement for investment licenses, in practice they only started making EIA reports when the construction of the infrastructure has already started. EIA is not considered to be a difficult requirement needed for the investment, but just as a nominal procedure[13]. Second, according to Sikor and O'Rourke (1996), NEA and DOSTEs lack manpower and expertise to evaluate EIAs and control the unfriendly environmental technology/equipment transfer. Third, the implementation phase of the projects is not monitored. In principle all EIA reports of new industrial zones in the study area mention measures for wastewater treatment such as common wastewater treatment plants. But in practice, most investors do not implement the pollution control measures of their EIA reports[14]. Fourth, the lack of appropriate standards (as mentioned above), appropriate equipment, available environmental databases and financial resources are reflected in the EIA procedures as they result in inadequate and inappropriate measures for pollution control. Fifth, most

proposed measures for pollution control mentioned in EIA reports are end-of-pipe technologies. This means it does not encourage polluters to change their behaviour or production processes in order to improve environmental performance. Sixth, for experts who carry out EIA and those who review EIA reports, the avoidance of conflict, disagreement, and controversy results in the fact that most of the projects are approved. Especially since the number of experts in Viet Nam who write and assess EIA reports is quite small. Seventh, there is no quality control in the review of EIA, neither by an independent agency nor by the public. Eighth, there is no compulsory public participation in EIA appraisal and monitoring. The involvement of people who live in the vicinity of the project area can be helpful as they are directly affected and are able to provide adequate data on environmental impacts. Although representatives of local people are included in the EIA appraisal committee at local level on paper, in practice there is little public access to the final EIA. Finally, there is little or no relationship between a firm's environmental performance and approved EIAs. In some cases, firms rely on approved EIAs report as legal proof to explain that they are not the culprits of local pollution even though, in reality, they are[15]. As O'Rourke (1999: 136) stated " EIAs are still required in most provinces, but have largely become money-making ventures rather than environmental initiatives".

According to Circular No. 490/1998/TT-BKHCNMT (dated April 29, 1998), issued by the MOSTE, investment projects of the categories (ii) or (iii), which are located within an industrial zone or an export-processing zone that has been approved based on its EIA report, are not subjected to an EIA procedure, but follow a simpler procedure. These investors first have to fill in the form called 'a registration for securing environmental standards'. This registration form includes the description of the production process; the amount of labour; investment capital; quality and quantity of raw materials, chemicals, energy and equipment; types of wastes and emissions; and the promise to follow the environmental standards of TCVN-1995. This form is submitted to DOSTE, who will decide whether or not the investor has to install waste treatment facilities. If that is deemed necessary, the investor has to design these treatment facilities and submit the design to DOSTE, together with the registration form. DOSTE will then sign the registration form and keep it in a file. Immediately after the factory starts operating, DOSTE will perform an audit on the factory to see if it meets the environmental standards. If it does, DOSTE will issue a certificate to the investor which states that the factory meets the environmental standards according to TCVN-1995. This certificate is valid for a period of two to five years, depending on the size of the factory and type of industry it belongs to. At the end of this period, the firm is required to repeat the procedure in order to extent the certificate. The aim of this circular is to simplify the investment procedure for investors who want to invest in industrial estates. But it also entails a risk: Without strict pollution control at estate level, an EIA procedure for an individual industry in an industrial estate can not ensure the protection of the environment. The certificate procedure, which is even less strict than an EIA procedure, has an even smaller chance of succeeding. An even greater risk for the

environment is related to the fact that in practice, many investors completely ignore this procedure because there is no mechanism to force them to register. With a full EIA procedure investors have to submit an EIA report as one of the requirements to obtain an investment license, on paper, at least. With the certificate procedure, such a mechanism is totally absent. Consequently, this procedure discourages industry to take any responsibility in environmental protection activities, leaving most of these tasks to estate managers and governmental environmental agencies.

* *Monitoring*

Adequate monitoring of both emissions and the environmental quality is crucial to set standards; to develop adequate strategies and measures; to control the behaviour of producers and polluters; and to assess the effectiveness of specific policies and programmes. At national level, NEA is in charge of the monitoring system. On a regional basis, three institutions have the task of providing technical support to the national monitoring programme: CEETIA (Hanoi Civil Engineering University) is responsible for monitoring in Northern Viet Nam; the Environmental Protection Centre (EPC) for Central and parts of Southern Viet Nam; and the Institute for Natural Resources and Environment for the Mekong Delta. Unfortunately, limited budget results in lack of equipment for the monitoring stations. Consequently, only a few locations are monitored, limited number of samples on few parameters are taken in each location, and only ambient quality of air and water is monitored. Recently, efforts have been made to upgrade this environmental monitoring network. The number of monitoring stations throughout the country has increased from five stations in 1994 to 19 stations in 1999. In addition, 12 local monitoring stations were established beside the national monitoring stations (Nguyen Ngoc Sinh et al., 1999). However, the monitoring system still falls short in providing an adequate database on the state-of-the art of the environmental quality. A logical step would be to force industrial producers to monitor their emissions on a regular basis and report back to environmental authorities, but at the moment industrial producers cannot be forced legally to monitor their wastes and send adequate data to governmental agencies.

* *Enforcement*

Together with monitoring, enforcement is another central precondition for effective environmental policy-making. The central government and the provincial People's Committee, which are the executive bodies, are responsible for enforcing the Law on Environmental Protection. MOSTE and its affiliated offices at the corresponding levels are the agencies in charge of the technical aspects of enforcement. In Viet Nam, just like in many other developing countries, the environmental law is often not strictly enforced. Although Viet Nam has developed a number of environmental laws, regulations, decrees and directives, the fact that they are rarely enforced allows the industry to ignore them. Enforcement falls short in Viet Nam for many obvious reasons: a lack

of man power; other priorities set within environmental agencies; failing knowledge and experience on administrative enforcement within the responsible governmental agencies; and a lack of tradition on enforcement and control in environmental management (Frijns et al., 2000). In addition, administrative enforcement based on fines is not very effective because fines are usually too low and are eroded by inflation. This discourages industries to change their production process or install treatment facilities, also because other enforcement measures, such as closure, are rarely used and others, such as criminal punishment, are never used. This failure to enforce compliance occurs often when foreign or joint-venture companies and SOEs are involved. In many cases, provincial DOSTEs remain powerless in face of these firms[16]. DOSTEs fail in forcing them to submit EIA reports and carry out the environmental protection measures or to let DOSTE's officials carry out environmental inspections.

* *Inspection*

In order to be effective, environmental inspections have to be carried out periodically, but due to a lack of resources, MOSTE only inspects enterprises when there are continuing complaints from the communities through the DOSTEs, wide mass media attention, or on the request of the DOSTEs. At provincial level, DOSTEs are in charge of environmental inspection. There are three kinds of inspection: regular inspection; sudden inspection; and complaint-based inspection. However, often DOSTEs only carry out inspection when there are complaints from communities or firms in the neighbourhood. The increase in the number of complaint letters[17] shows that public awareness on environmental issues is rising. Governmental agencies have encouraged this by taking measures in response to complaints. With the weakness of the current monitoring system, this mechanism of complaints seems to be helpful and effective, up to a certain extent (O'Rourke, 1999, and chapter 7 in this book).

In case of environmental inspection in industrial zones, staff from the Division of Planning and Environment of Industrial Zone Management Boards has to accompany staff from the DOSTEs in every inspection team. There also are three kinds of environmental inspection in industrial zones, but interviews with firms in industrial zones revealed that some have not had any inspection since the time they started their operation.

Sometimes co-operated inspections take place on a nation-wide basis. On May 6, 1997 MOSTE issued Directive 513/VP to organise a large-scale environmental inspection wave throughout the country. Production units that had no EIA reports and heavily polluting industries were the main targets of the national inspection. In the summer of 1997 over 5,000 major manufacturing plants were inspected countrywide. Of these, 46% were fined a total of 82,000 USD (which is on average less than 40 USD per plant) and 30% were ordered to stop production or relocate their establishments be-

cause of severe violations of environmental protection laws (Bich Ngoc, 1997), but the continuation of these intensified inspections seems to be questionable.

* *Environmental Education and Training*

Raising public environmental awareness is another major task that MOSTE has to fulfil. In collaboration with the mass media and a number of mass organisations, MOSTE can disseminate environmental knowledge on laws and regulations to all people. DOSTEs, in collaboration with social organisations such as the Youth Union and the Women's Association, have carried out various environmental campaigns. However, these activities are only related to health and sanitation. There have been hardly any environmental campaign related to industrial pollution.

MOSTE co-operates with the Ministry of Education to integrate environmental sciences into the curricula of schools at all levels. Faculties of Environment, Departments of Environment and Environmental Research Institutes have been established within universities. It is the scientists and the results of their studies that contribute significantly in sending an alarm signal on environmental degradation and finding solutions to Viet Nam's environmental problems.

MOSTE also collaborates with universities, environmental institutes, sometimes funded by international organisations such as UNEP, UNDP, and UNIDO, to organise workshops and training courses on EIA, environmental management and technology, and economics for governmental or provincial environmental staffs, for managers of companies, etc. Recently, workshops and training courses have been organised for industrial managers to promote cleaner production and the ISO 9000 and ISO 14000 standards.

3. Evaluation on Environmental Policy-Making and Management in Viet Nam

One must acknowledge that in a relative short period of less than 10 years, important initiatives have been carried out in Viet Nam to cope with environmental problems. Some of these important advances in setting up an institutional and legislative framework for environmental protection have been the establishment of MOSTE and its affiliated network at the provincial level (DOSTEs); the promulgation of the Law on Environmental Protection in 1994; the start of the development of a network for information gathering; and the introduction of a system for appraisal of EIA.

Although the fundaments of a system of environmental policy, legislation, and management are in place, in practice its functioning and implementation have had limited successes until now. Some of the causes are: high economic priority; conflicts of interests and poor collaboration among governmental agencies; unclear definitions and divisions of tasks and responsibilities between environmental agencies and organisa-

tions; inadequate monitoring and enforcement; lack of financial, human and technical resources. In addition, the current system of EIAs and inspections seems to create very few incentives to comply. These are major weaknesses of existing environmental policy-making in Viet Nam. Viet Nam is still on its way to construct an effective environmental policy-making system.

A better environmental management system of industrial estates requires first of all, clear policies, strategies, legislation and regulations. These should be derived from the environmental conditions in Viet Nam and the capacity of the regulated party to comply. It also requires a clear definition and division of duties/tasks between agencies involved in environmental management of industrial estates to avoid overlap and competition. However, the state itself does not have enough resources to fulfil its tasks. Sharing tasks with other non-state actors and creating incentives for industry to improve their environmental performance is necessary to overcome the constraints of budget deficits; weak monitoring and control; irregular inspections; lack of environmental databases; etc. In the next chapter I will elaborate upon the potential strategies to improve environmental management of industrial estates in Viet Nam by sharing tasks among different actors in the society.

Notes

[1] According to the Decision No. 969/TTg (dated December 28, 1996) by the Prime Minister on the establishment of VIZA. Additional information from interview with Dr. Phan Van Hoa, who works in the Division of Specific Subject/VIZA and is responsible for environmental issues of industrial estates.

[2] Interview Dr. Phan Van Hoa (VIZA) (April 3, 1999).

[3] Industrial Estate Authority of Thailand (IEAT), established in 1972, is a specialised, semi-public government agency under the jurisdiction of the Ministry of Industry. It is responsible for the development and management of industrial estates. Environmental management of industrial estates in Thailand is organised under the supervision of IEAT. IEAT has its own environmental policy for industrial estates. The IEAT carries out government policy, its own pollution control and environmental management, including monitoring system for industrial estates. Environmental policy of IEAT includes: implementation of a clean and green programme, joint implementation with other communities and business partners, adoption of advanced environmental technologies, support for waste minimisation and auditing, environmental training of staff, etc. (UNEP, 1997).

[4] Interview Industrial Zone Management Boards of Ba Ria-Vung Tau Province, Binh Duong Province, Dong Nai Province, and Ho Chi Minh City.

[5] Interview Mr. Tran Quang Thoa, the Head of Environmental Section (SONADEZI) (April 8, 1999).

[6] Interview Ms. Chu Thi Sang, EIA Division (NEA/MOSTE) (April 2, 1999).

[7] Interview Dr. Tran Hong Ha, Deputy Head of the Policy Division (NEA/MOSTE) (April 2, 1999).

[8] Ho Chi Minh City DOSTE has carried out an industrial reduction programme from August 1993 to June 1994 to identify major sources of industrial pollution; to determine the pollution load of each industrial sector; to find out measures to reduce industrial wastes. Through this programme 87 among 600 factories/enterprises of all scale have been recognised to be the most polluting and the major source of industrial pollution. These are listed in a black book. In 2001, 21 factories are listed in the casebook of best practice. The lists of these factories/enterprises are made publicly known via the mass media.

[9] Extra funds were allocated to provincial DOSTEs in 1993 in order to enable them to prepare 1994 state of environment reports. In 1995, NEA/MOSTE provided basic environmental monitoring equipment to several DOSTEs (CIDA, 1995).

[10] According to the World Bank (1997), economic cost of health impacts due to industrial pollution in Viet Nam was approximately 0.3% of GDP in 1997 and it was increasing fast. It was estimated further that health cost of pollution would be 1.2% of GDP by 2001. Meanwhile the state only spends about 0.5% of GDP/ year on all environmental issues (Ministry of Industry, 1999) and the ultimate target is 1% of GDP (SRV, 1995).

[11] Interview Mr. Phan Van Het, Environmental Division (Dong Nai DOSTE) (September 18, 1999).
[12] Interview Dr. Tran Hong Ha, Deputy Head of the Policy Division (NEA/MOSTE) (April 2, 1999).
[13] Interview Ms. Chu Thi Sang, EIA Division (NEA/MOSTE) (April 2, 1999).
[14]Interview DOSTEs of Binh Duong Province, Dong Nai Province, and Ho Chi Minh City.
[15] For instance, local people complained on local environmental damage caused by Binh Duong Sugar Cane Factory (fish die, loss of vegetables and fruit due to soil contamination, etc.). Following the community complaints, Binh Duong DOSTE came to check. But the factory refused to let Binh Duong DOSTE have an inspection and take samples, relying on the fact that based on the EIA report, the factory has no environmental impact.
[16] The Binh Duong Sugar Cane Factory in Binh Duong Province, Vedan Company in Dong Nai Province, Lam Thao Fertiliser Factory in Phu Tho Rural Area, Ba Nhat Chemical Factory in Hanoi are among the striking evidence on the powerlessness of DOSTEs in facing foreign companies and SOEs.
[17] Dong Nai DOSTE, for instance, received approximately 60 complaints on pollution problems per year between 1994 and 1996. In 1997, the DOSTE inspection division received more than 100 complaints in six months. Ho Chi Minh City DOSTE received 229, 199, and 260 complaints on industrial pollution in 1998, 1999, and 2000 respectively.

CHAPTER 4

TECHNOLOGICAL INNOVATION CLEANER PRODUCTION IN THE DEVELOPMENT OF INDUSTRIAL ECOLOGY

This chapter is divided into two main parts: the literature review on cleaner production and waste exchange practices, and the application of cleaner production and waste exchange in Viet Nam. The first section presents the concept of cleaner production at company level and reviews its benefits and barriers in practice. The second section analyses the linkage between cleaner production and industrial ecology and reviews the application of industrial ecology in practice in specific terms of waste exchange at industrial estate level. In the third section, the current practices of cleaner production in Viet Nam are presented. This is followed by an analysis of the constraints and/or opportunities to promote cleaner production in Viet Nam in the fourth section. The fifth section outlines some possibilities to promote cleaner production. The last three sections deal with the current practices of waste exchange in Viet Nam, constraints and opportunities, and possibilities to promote waste exchange in Viet Nam.

1. Cleaner Production

1.1 Introduction to Cleaner Production

Over the years, the interactions between industrial polluters, regulatory agencies and civil society have led to the development of four strategies to cope with industrial wastes.

In the first strategy, both polluters and regulators did not pay any attention to wastes, leaving the task of treatment to the self-purification ability of nature. This was only possible under the conditions that the amount of waste was limited and the self-purification capacity of nature was high. The second strategy developed when the public began to recognise the environmental impact of in-

dustrial wastes and tried to force polluters to be responsible with their wastes. Under the pressure of public campaigns and increasing protests against pollution, environmental institutions were established and regulations were formulated. Polluters then were forced into new strategies to 'treat' their wastes by diluting them. This only helped to reduce the concentration of waste while the volume and pollution load remained the same or, in most cases, increased. Subsequently, the pollution assimilative capacity of the receiving environment became exhausted and polluters were forced to deal with wastes by other means than simple dilution. With the invention of environmental technologies, a third strategy emerged in which wastes could be treated in different ways. This strategy of pollution control has come to be known as 'end-of-pipe' or 'add-on' technologies. Despite the availability of these technologies, polluters often tried to avoid installing treatment facilities due to the high cost involved. Moreover, end-of-pipe technologies often proved to solve one problem while creating another. For example, sludge from wastewater treatment systems and dusts from filter facilities also need to be treated or disposed. Finally, with the increase of societal demand for green and clean industry and green products, and the emergence of more stringent regulations of regulators, the reactive approach in pollution control is no longer seen as adequate or sufficient. Regulators and polluters have to seek more proactive or preventive approaches to reduce wastes at the source instead of treating them at the end. Cleaner production emerged in the 1980s (Baas, 1998) as a dominant concept that reflects this fourth strategy.

In the literature, one can find various definitions of 'cleaner production' (see for example Berkel, 1996; Berkel et al., 1997; Frijns et al., 1997; UNEP, 1997; Baas, 1998). In this study, cleaner production is defined as the continuous application of an integrated preventative environmental strategy to production processes, in order to prevent waste and emission at the source, to conserve energy and input of raw materials, to eliminate the use of toxic materials, and to improve working conditions for the labourers. Cleaner production takes into account the principle of pollution prevention, and as such it illustrates the shifting role of science and technology in ecological reforms as described in Ecological Modernisation Theory. With the focus on reducing the volume and toxicity of all emissions and waste streams, cleaner production differs from end-of-pipe treatment. The latter only focuses on dealing with wastes and emissions at the end of production process, once they have already been created. In practice, this meant building and operating wastewater treatment plants, air scrubbers, waste incinerators, detoxification facilities and secure landfills. This strategy often creates a significant expense. By contrast, cleaner production focuses on preventing or minimising the generation of wastes and emissions. It offers a wide range of measures, which vary from relatively easy and simple measures with only minor adjustments, to complex measures encompassing systemic change. The following types of cleaner production measures can be

distinguished: First, good housekeeping refers to changes in existing practices or the introduction of new ways of operating and maintaining equipment in the most ecologically efficient manner. Examples are the maintenance of taps leading to reduced spillage; repairing leakage; turning off taps when not in use; reducing material handling losses; etc. In addition, it also encompasses better process control by training the operators, monitoring and keeping records. Good housekeeping options are normally inexpensive with short payback period and can reduce pollution. A second type of cleaner production is recycling. After segregation, some waste streams can be recycled, either on-site (reuse in the same or different production process, e.g. condensation recovery and reuse in boiler house) or off-site (reuse as by-product, e.g. use of cloth rags for mattress making). The third measure, material substitution, includes a change in raw materials and input materials to less polluting alternatives, e.g. a shift to environmentally preferable energy sources like solar energy, or low-sulphur fossil fuels; replacement of organic solvent-based inks, paints, or cleaning fluids by water-based ones. This offers the prospect of eliminating a given pollution problem. Fourth, production process change entails changes in production processes towards more efficient energy use, less raw material usage, and less pollution. This includes equipment modification and technology change. Equipment modification includes small changes in existing equipment. Technology change is the replacement of technology and processing sequences in order to minimise waste and emissions during production processes, e.g. replacement of chemical processes with mechanical ones; replacement of single-pass processes with closed loop processes. Finally, product modification reflects the insight that products have to be produced that reduce environmental impacts during the entire life cycle, from raw material extraction to ultimate disposal. This can be done through environmental product design and product chain management. Examples of this are production of unbleached cloth and biodegradable detergent.

1.2 Benefits of Cleaner Production

Several authors list the benefits of cleaner production, often strongly – but not exclusively – from a Western perspective (UNEP, 1997; UNEP, 2000; Leuenberger, 2001). Cleaner production helps to increase the product output and decrease the output of waste per unit of raw material input. Cleaner production also helps to overcome constraints caused by scarcity, or increasingly costly raw materials, chemicals, water and energy, as it includes measures to prevent loss and increase efficient use. Hence, it leads to a more efficient production. Through cleaner production, the amount of waste and emissions that need to be treated is reduced. Consequently, the cost of treatment is reduced. Especially in cases where treatment involves high cost, this results in significant financial advantages. With the increase in environmental awareness and the growing

costs related to environmental risks and accidents, financial institutions are more and more concerned about environmental criteria in any financial aid or credit proposal. Cleaner production then helps to improve the environmental image of the borrower and hence facilitates the accessibility to finance. With respect to market opportunities, increasing consumer awareness of environmental issues requires that companies have to demonstrate good environmental performance, particularly in the international market. By adopting cleaner production measures, companies can meet many of the market requirements and hence get better opportunities in competition. This varies very much from market to market. Regarding health and safety, by keeping the work-floor clean and free of waste, cleaner production measures can improve working conditions, hence reduce the health and safety risks of workers. By minimising the amount and toxicity of wastes and emissions, cleaner production measures can reduce the pollution load in the environment and help to improve environmental quality. Cleaner production measures can help to minimise or eliminate the causes of wastes and emissions. This makes it easier to meet environmental regulations and standards. Last but not least, cleaner production, being a positive pro-active approach to environmental management, demonstrates the company's environmental responsibility and promotes confidence of companies against non-governmental organisations (NGOs), pressure groups and the media.

These benefits make it understandable that, to some extent, cleaner production has become a regular practice in industries in Western countries and is gaining importance in the rapidly industrialising countries of Asia (Sakurai, 1995). The Dutch PRISMA Project, the World Bank funded China Cleaner Production Project, and the Indian DESIRE Project sponsored by UNIDO are examples of experiences with cleaner production in small and large industries across various industrial sectors, in developed and developing countries (Frijns et al., 1997).

Given these benefits, why then are not all industries convinced that cleaner production is beneficial for their business? Many industries seem to drag their feet applying such practices.

1.3 Barriers and Constraints to Cleaner Production

Various authors have analysed the barriers for adoption of cleaner production (see for example Huisingh, 1989; Hon, 1992; Christie and Rolfe, 1995; Sakurai, 1995; Berkel, 1996; Frijns and Malombe, 1997; Frijns et al., 1997; Anonymous, 1998a; Anonymous, 1998b; Ruihe, 1998). These barriers are classified as conceptual, attitudinal, organisational, systemic, economic, technical and governmental constraints. Conceptual constraints refer to the conception such as 'environment always costs money' or 'prevention is a costly and/or

long term affair'. This kind of thinking has inhibited industries to invest in technological innovation towards preventive technologies to improve their environmental performance. Besides, many people in industry are too comfortable with 'business as usual' and resist change. They are not convinced that cleaner production will be economically beneficial for their business. Attitudinal constraints relate to the fact that most company managers and workers are indifferent towards good housekeeping and environmental affairs in general. Organisational constraints relate to the problem that environmental tasks are often assigned to staff with limited authority. It is difficult to get commitment among members of the management board. Systemic constraints usually relate to small and medium enterprises that lack professional management skills, fall short of adequate and effective management systems, have low quality production records, or lack know-how and technical development capacity. All these factors are essential for advancing cleaner production. Economic constraints can be formed by a lack of finances or hindered investment in technological innovation. Low disposal and treatment fees, which impede cleaner production activities, form another economic constraint. Technical constraints are caused by external and internal factors. External factors relate to the fact that practical data about cleaner production is not always available. Internal factors refer to companies that have limited trained manpower, lack monitoring facilities, and are equipped with out-of-date machines. These companies will face difficulties in adopting cleaner production. Finally, governmental constraints refer to prevailing regulations that often lack incentives for cleaner production.

2. From Cleaner Production to Industrial Ecology

2.1 The Common Denominator between Cleaner Production and Industrial Ecology

The terms 'cleaner production', 'industrial ecology' and other similar terms such as 'clean technology', 'low-and-non-waste technology', 'waste minimisation and reduction' and 'pollution prevention' are frequently used to indicate the same thing. Although clean technology and low-and-non-waste technology have a stronger focus on technological change, all these concepts can be grouped together under the umbrella of the pollution prevention approach, against the conventional reactive approach. According to Karamanos (1995), the industrial ecology concept is closely linked to that of cleaner production. Both ideas involve preventing pollution to protect the environment and increasing economic efficiency. Where they differ is that cleaner production focuses on waste reduction while in industrial ecology the emphasis is on recycling unavoidably produced wastes, especially between companies. According to Erkman and Ramaswamy (2001), cleaner production equals pollution prevention practices at the company level and industrial ecology means pollution

prevention practices at the system level. Cleaner production is practised within the boundary of the individual company with measures such as good housekeeping, recycling on-site, material substitution, production process change, and product modification. Cleaner production between companies (recycling off-site or waste exchange) is completely in line with the ideas of the industrial ecology concept (closed loop of material and energy) (see chapter 2).

2.2 Closing the Loops of Material and Energy at Estate Level: International Experiences

As mentioned in section 1.1, one of the cleaner production measures is waste recycling, either on-site or off-site. When waste is recycled off-site, then the distance between the waste producer and waste processor is one of the critical factors. Industrial estates with their concentration of industries offer an interesting place to practice waste exchange following ideas of an industrial ecosystem. Since the late 1980s when the concept of industrial ecology was first developed, several 'industrial symbiosis' or 'eco-parks' have been designed and operated.

** Denmark*

The best known example of an industrial symbiosis is Kalundborg, located roughly 75 miles from Copenhagen in Denmark.

Participants in the industrial symbiosis of Kalundborg are Asnaes (electric power plant), Statoil (oil refinery), Gyroc (plaster board factory), and Novo Nordisk (pharmaceutical plant). Kalundborg Industrial Symbiosis began when the Asnaes electric power plant modified its operation so as to produce process heat in the form of steam that could be sent to the nearby Statoil refinery. Besides that, the power plant could also sell steam to a pharmaceutical plant, and hot water to greenhouses, local homes and its own fish farm. Asnaes power plant started to sell fly ash for roadbuilding and cement production; gypsum (calcium sulphate) recovered from sulphurous dioxide scrubber is supplied to Gyroc plasterboard factory. It now also receives surplus gas, cooling water and treated wastewater from Statoil. Statoil refinery produces ethane and methane for Gyroc's drying ovens and for the power station's boilers; residue from Statoil's sulphurous scrubbers is used in the production of sulphuric acid. Nutrient-rich sludge from Novo Nordisk pharmaceutical plant is piped to the surrounding farms to be used as fertiliser. For Novo Nordisk, this is the cheapest way to comply with regulations prohibiting dumping of such sludge at sea.

Obviously most of the components of an industrial symbiosis are present in Kalundborg, from the primary producers to the equivalent of the decay organ-

ism. This model of an industrial symbiosis in Kalundborg has helped to reduce air, water, and soil pollution and reduce resource consumption at the same time. From an investment of 60 million USD over a period of time in infrastructure to transport materials and energy, participating companies have generated 129 million USD in revenues from by-product exchanges and additional cost saving from business efficiency improvements (UNEP, 1997). In terms of environmental quality, with such an exchange of wastes, Kalundborg Industrial Symbiosis can reduce emission of 3,700 tonnes/year of SO_2; 175,000 tonnes/year of CO_2; and 600,000 m^3/ year of wastewater (Gertler, 1995). Large savings have been achieved in consumption of raw materials, too. Annual oil consumption is reduced by 45,000 tonnes; and coal consumption by 15,000 tonnes (Karamanos, 1995).

* *The United States*

In the United States, being interested in applying the ecological concept in industrial activities, former President Clinton's Council on Sustainable Development chose four communities as demonstration sites for eco-parks (1994): Baltimore, Maryland; Cape Charles, Virginia; Brownsville, Texas; and Chattanooga, Tennessee. The design principles are based on an industrial ecosystem framework, with possibilities of creating waste exchange and the idea to look for greater interconnection between suppliers, producers, and customers for high quality environmental performance.

Fairfield Industrial Estates in Baltimore is one of the examples for the design of eco-parks in the United States. It consists primarily of producers with processes based on petroleum and organic chemicals (e.g. asphalt manufacturing and distribution, oil and chemical companies) and smaller companies which are related to or assist the larger producers (e.g. trucking, tire retreating and box manufacturing). Fairfield has been described as a 'carbon-based economy'. This specialisation of companies in the industrial estate creates a great opportunity for further cycling of organic compounds. The Fairfield Eco-Park was designed to retrofit industrial ecology principles to existing companies, and to recruit companies that fit into the carbon-based economy. The strategy is to welcome the following types of enterprises: manufacturing that fits with the current 'ecology' (e.g. chemical companies, film/photo companies); environmental technology companies; recyclers and waste exchangers (Rosenthal, 1996). Currently, there are many exchanges already going on, including one that involved a multi-million dollar investment to process the Patapsco Treatment Plant's sludge into a palletised fertiliser (http://www.buildfairfield.com/pages/-facts_vision.htm November 11, 2001).

* *Canada*

A group at Dalhousie University, Nova Scotia, Canada has been studying ways to apply ecological concepts to the design and operation of industrial estates. Burnside Industrial Estate in Dartmouth was chosen for the purpose of converting an existing, traditional estate into an eco-park. The industrial estate was selected as a working laboratory for eco-park largely because of its diversity. In an initial study, a research team identified a number of strategies, guidelines, potential symbiotic relationships and support systems, which would facilitate the transformation of Burnside. In order to convert Burnside into an eco-park, collaboration and networking is required and has occurred at different levels: (i) the university and the municipality co-operated in the study and application of industrial ecology to an industrial estate; (ii) the university, the private electric utility company and governments have joined hands in the creation of the Eco-Efficiency Centre; (iii) material exchanges have occurred between two or more companies; (iv) new companies have been established in the industrial estate to take advantage of opportunities in reuse, repair, remanufacturing and recycling. From the Burnside project it is concluded that while interest in eco-park and willingness to participate are important to launch projects, the main success factor is a continuing commitment by a group of partners from government, industry, academia, and community organisations. Eco-parks are no short-term initiatives. Without this long term, continuing commitment, such projects can not be successful and sustained (Côté, 2001).

* *The Netherlands*

In the Netherlands, the industrial area in Rotterdam (the largest port in the world) covers about 700 km^2 with 69 companies consisting of mixed industries such as refineries, petrochemical, industrial services, inorganic chemicals, mass goods, storage and transport. In this industrial area, an industrial ecosystem project (INES) was carried out to search for the possibilities for companies to reuse waste streams, by-products and energy from each other. The project was implemented in phases. Information dissemination and preliminary investigation of some material flows took place in the first phase. The result of this phase was the identification of 15 waste exchange options. In the second phase, pre-feasibility studies were performed for all options. Three of the 15 options were selected and designs for the implementation were made in the third phase. One of the conclusions that can be drawn from this project is that the willingness to co-operate between different stakeholders such as industry, local government, scientists, cultural and societal organisations is crucial for the development of an industrial ecology project (Baas, 1997).

** Thailand*

The Industrial Estate Authority of Thailand has recently started a project on the implementation of the industrial ecology concept at Map Ta Phut Industrial Estate. Map Ta Phut Industrial Estate is located in the west of Rayong City, in the Rayong Province, which is on the Eastern Shore of the gulf of Thailand. It is a large gas-related and heavy industrial complex. Most industries that have invested in this area are petrochemical plants, chemical and fertiliser plants, steel plants, electricity, steam, gas plants, and oil refinery plants. The eco-park project in this area aims to develop a closed loop between industries in this area and promote the clean and green industrial development concept, maximise the benefits from utilisation of natural resources and minimise the pollution problems, and to create co-operation among industries, local communities and regulators. In this project, waste auditing will be carried out to identify waste streams. On the basis of information on waste streams, possibilities for waste exchange will be investigated and designed for implementation (IEAT, 2001).

After having outlined the general ideas of cleaner production and waste exchange, the benefits and potential barriers in applying cleaner production and waste exchange, I now turn to the experiences of Viet Nam in introducing and promoting cleaner production and waste exchange.

3. Current Practices of Cleaner Production in Viet Nam

According to the Ministry of Science, Technology and Environment (MOSTE), in Viet Nam many factories/enterprises are operating with obsolete equipment, out-of-date technologies, and at a low efficiency. This results in a low productivity and heavy pollution. For many reasons, these factories/enterprises have not been closed down or forced to implement expensive 'end-of-pipe' measures. In such cases, cleaner production, which may lead to win-win solutions benefiting the industry as well as meeting the required environmental regulations cost-effectively, would offer an alternative. And indeed, recently, cleaner production has been an area of interest in Viet Nam. The Viet Nam National Cleaner Production Centre established in 1998 in Hanoi is seen as a starting point for the institutionalisation of cleaner production in Viet Nam. Viet Nam National Cleaner Production Centre is expected to play a catalytic role in building nation-wide capacity in cleaner production, to create awareness among key national stakeholders on the advantages of cleaner production and support them in taking action to promote the application of cleaner production in industry. In 1999, among the first activities of the Viet Nam National Cleaner Production Centre was the training courses on cleaner production in Hanoi. These training courses are seen as a means of capacity building for the Department of Science, Technology and Environment (DOSTE) staff on cleaner pro-

duction, so that they can convince and stimulate industries to move towards cleaner production options. Beside DOSTE staff, lecturers from universities, researchers, and employees from environmental service companies in different provinces were also included in the training courses. After the training courses, these trainees have carried out pilot projects on cleaner production in different industrial sectors. So far, cleaner production pilot projects have been carried out in paper, food processing, and textile sectors.

In Ho Chi Minh City, DOSTE, Department of Industry, Department of Agriculture and Rural Development, and the National University of Ho Chi Minh City have established a co-operative programme called 'Co-operation programme to develop products and technologies'. This programme, in operation since April 1998, focuses on food processing, textile and pulp and paper industries. It emphasises product and technology renovations based on the co-operation between the 'enterprise-universities/institutes-state management agency triangle'. At present, the programme does not explicitly focus on cleaner production. However, if adequately strengthened, the programme may bring about innovations in terms of cleaner manufacturing processes as well as environmental friendly design of products (HCMC DOSTE, 1998).

Before the establishment of Viet Nam National Cleaner Production Centre, pilot projects on cleaner production have been carried out in some provinces and large city such as Viet Tri Province, Dong Nai Province, Binh Duong Province, and Ho Chi Minh City. These projects were carried out under the financial and technical support from Swedish International Development Agency, the government of Australia, the Canadian Government, and UNDP in 1996 and 1997. Initial achievements were obtained such as reduction of water usage and reduction of waste and emissions with low cost measures. From these pilot projects it proved that the private enterprises were very interested in implementing cleaner production measures and very active to continue cleaner production programmes. The state-owned enterprises (SOEs) also showed their interest in cleaner production, and they have implemented some simple measures without or with little investment[1]. However, due to the lack of power of these SOEs to decide on finances, continuation of the cleaner production programme is uncertain. Nevertheless, also with simple measures, cleaner production has brought about environmental and economic benefits to the participating factories (Gupta et al., 2000).

So far, there is no pilot project on cleaner production at industrial estate level. Interviews with different factories/enterprises in industrial zones in the Southern Key Economic Region with various types of ownership, scale, and market for products, showed that cleaner production is not a popular practice in industries. Some factories are satisfied with their treatment facilities and see no ur-

gency to invest in cleaner production. Others are still making efforts to establish end-of-pipe treatment facilities to fulfil regulatory requirements. Some of them even do not have any idea about cleaner production. Only few firms adopt clean technologies and these are usually multinational companies or joint-venture companies. Fujitsu Company (belongs to Fujitsu Corporation, Japan), for instance, recycles cooling water, and uses advanced technology that consumes less energy. Tae Kwang Company (belongs to Nike, the United States) replaced lipid-based solvent by water-based solvent, and modified equipment to reduce 50% of wastes. Not only foreign companies but also some SOEs are interested in cleaner production. Long Thanh Factory, which produces fertilisers in Go Dau Industrial Zone (Dong Nai Province), for example, reuses fluorine gas (F_2) to produce sodium fluorosilicate (Na_2SiF_6). Sodium fluorosilicate is then sold to Water Supply Company. This factory has recently switched to utilising a better catalyst that can increase the efficiency of the conversion of sulphur dioxide into sulphur trioxide in the production of sulphuric acid. Thanks to this chemical substitution, the factory can reduce air pollution caused by oxide of sulphur. Dong Nai Paper Company (in Bien Hoa I Industrial Zone) is another example. Recycling 'white water' from the paper mill, reusing waste fibres, installing chemical recovery system, and partial replacing chlorine (Cl_2) by hydrogen peroxide (H_2O_2) for bleaching are among the cleaner production options applied in this company. In this way, the company has reduced their waste generation to a certain extent. VICACO Chemical Factory in Bien Hoa I Industrial Zone (Dong Nai Province) recovered salt in the sludge. Consequently, the volume of sludge to be handled and the demand for salt as raw material decreased significantly. The fact that these SOEs applied cleaner production on a voluntary basis is worth considering. Most of these enterprises are known as polluting factories facing budget constraints to comply with environmental regulations.

In order to promote cleaner production, an analysis on its major constraints and opportunities in Viet Nam will be helpful. On the basis of this analysis, suggestions can be made.

4. Constraints and Opportunities for Cleaner Production in Viet Nam

This section aims to analyse the constraints to cleaner production in Viet Nam and opportunities to promote cleaner production under current conditions. Through interviews with factories and experiences from the demonstration projects on cleaner production in Ho Chi Minh City, Dong Nai Province and Viet Tri Province, one can summarises the major constraints and opportunities to cleaner production in Viet Nam (Dang Xuan Toan, 1999; Nguyen Thanh Hung, 2000; Gupta et al., 2000).

4.1 Constraints

Similar to other countries, in Viet Nam the introduction and promotion of cleaner production also faces conceptual, attitudinal, organisational, technical, economic, and governmental constraints. In addition, market constraint also plays a role in hampering cleaner production.

The difficulty met in changing attitudes (attitudinal constraint) is a fundamental barrier to introduce cleaner production. More precisely, attitudinal constraints can further be classified as a lack of interest and commitment to cleaner production by managers; the ignorance of environmental issues at all levels of the enterprises; barriers related to creativity, due to the lack of motivation of employees to create ideas and innovations that form a prerequisite for cleaner production programmes; the resistance to change due to the potential threat of disturbing the organisational culture and hierarchy; the fear of failures and uncertainties about the environmental improvements and economic benefits that cleaner production can bring about; the fear to leak information on business, production process and especially environmental indicators; and the indifference towards good housekeeping.

The organisational structure of a company is sometimes found to be a constraint in implementing cleaner production, particularly in SOEs due to their centralised decision-making structure. In SOEs, decision-making usually rests with the top management. Employees must seek approval from the top management even for small modifications that require financial inputs. In the absence of decision-making responsibility, factory managers may lack the initiative to take cleaner production. A second category of organisational constraints is related to inadequate and ineffective management systems. Normally, there is no environmental or safety division within a company. Lack of regular training of employees and ad-hoc production schedules hamper the systematic data collection and compilation necessary for cleaner production assessment. Waste auditing, which is the basic step in cleaner production, is not popular among factories. A third constraint is that most enterprises in Viet Nam lack enterprise-level technical expertise and they are not able to form stable cleaner production teams with long-term programmes. This limits the ability of enterprises to work on those cleaner production measures that require deeper and longer involvement of employees. In cases where the factories are owned by many shareholders, it is often difficult to get consensus of different shareholders for environmental investments. This also presents another type of organisational constraint, particularly of relevance for shareholder companies.

Technical constraints refer to the fact that most factories in Viet Nam lack monitoring facilities, have limited maintenance facilities, and limited access to technical information.

There are three kinds of market constraints to cleaner production in Viet Nam. On the supply side, unreliable supply of high quality materials results in the difficulty to control the production process and the product quality. Frequent changes of products and production results in the difficulty to collect and compile the baseline data needed for cleaner production assessment and to establish past and current performance indicators and trends[2]. On the demand side, the lack of a green domestic market to encourage cleaner production and unfamiliarity with eco-labelling of Vietnamese customers and consumers are among the major market constraints.

A major economic constraint is the lack of capital, especially for implementing more costly cleaner production measures with a longer payback period. At a national level, so far there is limited financial assistance for implementing cleaner production. The financial institutions are not keen on providing funds to long term turnover project such as specific cleaner production. In addition, the benefits from reduced pollution costs are often not accounted for on routine basis. This failure to include the savings derived from environmental measures in economic analysis is unfavourable for the acceptance of cleaner production.

From the government side, there is no incentive policy to encourage the investment in cleaner production. The existing environmental regulations focus only on end-of-pipe technologies. In addition, low resource pricing and non-existing pollution fees are among the major regulatory constraints to promote cleaner production.

Different opinions exist on to which barriers are believed to be crucial in preventing cleaner production to take off. Some see attitudinal barriers as the most important factor to the success of the introduction and promotion of cleaner production. Economic and technical barriers are not considered vital, because demonstration projects showed that with good housekeeping measures alone, enterprises can save 15% to 30% of materials. These measures require little or no financial or technical investments[3]. Others, however, argue that lack of governmental incentives and limited or non-available in-house or local trained manpower are the key barriers to cleaner production promotion[4]. In addition, one could argue that as Viet Nam is in the process of a transition to a market oriented economy, markets becomes more and more important to industry. Therefore, to foster the application of cleaner production, economic incentives seem to be a key driving force. In Viet Nam, the lack of green markets and governmental policies, which provide economic incentives, seems to be critical

to cleaner production implementation. Most likely, there is no single critical barrier that blocks cleaner production at the moment. Consequently, no simple solution can be found in the take off of cleaner production in Viet Nam.

4.2 Opportunities

Notwithstanding the constraints to adopt cleaner production mentioned above, there are also some favourable conditions and potential opportunities that may help in the penetration of cleaner production in Viet Nam.

First, the Law on Environmental Protection (1994), Chapter II, Article 11 states that "the government encourages individuals and organisations to use and exploit natural resources reasonably, to apply advanced technologies, clean technologies, reuse wastes, save materials, use renewable energy, ... in scientific research, production and consumption". This forms a solid legal basis for the application of cleaner production.

Second, increasing foreign direct investment and the increasing involvement of Vietnamese producers in the global economy might offer opportunities to the application of cleaner production. According to Rock (2000, 2001), openness to trade and investment alongside late industrialisation might offer opportunities to firms to take advantage of newer and cleaner technologies imported from Japan and other Western industrialised countries. In Viet Nam, the growing number of foreign direct investments in industrial estates might help to modernise the industrial system, since in general new and modern production processes are moved in. If these industrial investments are also modern in environmental terms, some environmental reform in the production system might ensue. Together with the foreign investments, multinational corporations might carry their home-countries' environmentally advanced practices with them when they establish production facilities in Viet Nam. According to Wallace (1996), foreign industrial investments in general have a better environmental performance than the national industries of Viet Nam. This is confirmed by interviews with policy-makers and the survey in industrial zones in the Southern Key Economic Region. However, it is usually true with industries from Organisation for Economic Co-operation Development (OECD) countries, but not always with industries from industrialising countries in the region. In addition, international supply chains can encourage suppliers in developing countries to adopt cleaner production as one of the requirements to enter the global market. In Viet Nam it is expected that with the increase in the demand for environmental criteria in the global market, Vietnamese companies in export sectors will adopt cleaner production. In the supply chain, foreign companies might also induce local suppliers of natural resources and semi-manufactured products to ecologise their products.

Third, with the increase in bi-and multilateral aid on environment, the provincial DOSTEs of some provinces and cities have carried out demonstration projects on cleaner production as indicated above. The experience of these projects will be multiplied to other factories. In Ho Chi Minh City, for instance, demonstration projects have been developed through two phases. The experiences in the first phase were copied to other factories in the second phase, and now the third phase has just begun. Six factories participated in the first phase and 15 in the second phase of the cleaner production projects. The number of participators in cleaner production projects is expected to increase further in the third phase. These demonstration projects serve a dual purpose: demonstrating the potentials and possibilities for cleaner production in Viet Nam, and providing at least basic knowledge and technical support. The first goal might help to overcome some of the attitudinal constraints such as 'caring for environment will always cost money', 'cleaner production is impossible in the short term', and 'not me first'. The second purpose is instrumental in providing the know-how on cleaner production without foreign assistance.

Fourth, with the establishment of the Viet Nam National Cleaner Production Centre, cleaner production will be disseminated among industries. This might help to overcome the lack of widespread awareness of the importance of cleaner production, and the lack of technical information on cleaner production.

Fifth, the ongoing economic reform policies such as resource pricing, the implementation of waste disposal fees, the removal of subsidies and the introduction of economic instruments, e.g. environmental funds, user charges, might change the behaviour of industries and make them seek for preventive options instead of relying on reactive measures. This might provide strong incentives for Vietnamese industry to adopt cleaner production (see also chapter 6).

Last but not least, in the promotion of cleaner production, Viet Nam's effort does not stand alone. A number of international projects support cleaner production investments in developing countries including Viet Nam. Viet Nam can benefit from these projects (see Box 4.1).

Box 4. 1 Strategies and Mechanisms for Promoting Cleaner Production Investments in Developing Countries.

There is a new three-year project funded by Norway to overcome barriers to cleaner production in developing countries. The project will facilitate financing of cleaner production options that go beyond no-and low-cost options (good housekeeping). The project will demonstrate how to initiate and finance cleaner production investments in three priority industrial sectors in five developing countries: Viet Nam, Guatemala, Nicaragua, Tanzania and Zimbabwe.

Source: UNEP, 1998a

5. Possibilities to Promote Cleaner Production in Viet Nam

The Japanese experience showed that it has advantages to incorporate cleaner production when new plants are set up or during plant/process renovation. This implies that in economies in transition, involved in the accelerated setting up of new plants and plant/process renovation, technological decisions in favour of cleaner production are relative easy and inexpensive to adopt (Sakurai, 1995). With that in mind, the adoption of cleaner production in industrial estates in Viet Nam, where most of the factories just started their operation or will do so in the near future, might have good opportunities. The experience of other Asian countries will be valuable for Viet Nam to promote cleaner production in industrial estates, but one should bear in mind that, given the economic and cultural diversity of the Asian Region, there is certainly no single universal formula that can be applied for the development and use of cleaner production in Asian countries.

5.1 Overcome Conceptual Constraints

For cleaner production to be disseminated, education and training are especially important at the first phase to introduce and familiarise industry with the new approach. Experiences from China and India suggested that education and training on cleaner production should not be restricted to industrialists, but also focus on bureaucrats and decision-makers (Cheung, 1995; Chandak et al., 1995). In this respect, the role of universities is important. Since universities in Viet Nam have started organising short-term courses on environmental issues for policy-makers and decision-makers, cleaner production can be integrated into these programmes. There are various methods of disseminating information on cleaner production among industries. In Hong Kong, booklets on cleaner production were provided to the relevant industries, as well as videos were distributed to show cleaner production in action (Lin 1995). Ho Chi Minh City DOSTE has adopted similar measure to a certain extent by providing booklets on cleaner production and the cleaner production demonstration projects. The dissemination of cleaner production can also be done through seminars, workshops, and development of campaign programmes. It is hopeful that

the establishment of Viet Nam Cleaner Production Centre will enhance the dissemination of information on cleaner production[5].

5.2 Overcome Attitudinal Constraints

According to the experiences in Hong Kong, changing management attitudes towards the adoption of cleaner production is a very important but difficult task. The formation of managers' cleaner production clubs for factories that have adopted or are interested in cleaner production can provide a useful forum for the exchange of information and experience, as well as for increasing industry confidence in cleaner production (Lin, 1995). In Viet Nam, the Saigon Times Magazine has initiated a so-called 'Club for Companies' on the request of some companies. So far, the club has organised seminars on international organisation for standardisation (ISO) 9000. It is expected that this club will further enhance the dissemination on cleaner production. In addition, it is also argued that demonstration projects, information exchange, and cleaner production literature can help to change the indifference towards cleaner production. Firms in need of cleaner production and with promising potential for adopting cleaner production should be identified to participate in cleaner production projects. Polluting firms that are under regulatory and community pressure can be a good target group for demonstration projects[6].

Enabling measures such as workshops/seminars/clubs on cleaner production seem easier to apply for factories located in industrial estates compared to those scattered around. The concentration of factories within industrial estates is an advantage to disseminate information, and to organise workshops/seminars/clubs on cleaner production.

5.3 Overcome Organisational Constraints

In order to support cleaner production adoption in industry, the establishment of environmental and safety divisions within companies, and routine training of employees and workers are necessary. At industrial estate level, training of staff of environmental sections and the establishment of information desks within Industrial Zone Infrastructure Development Companies is recommended to facilitate the adoption of cleaner production.

5.4 Overcome Technical Constraints

According to Bakary (1986), subsidising of research in the field of clean technologies proves to be beneficial. Sakurai (1995) suggested that the publication of cleaner production technical manuals, the dissemination of knowledge on well-established cleaner production measures/techniques, and the organisation

of workshops/seminars are useful media for disseminating cleaner production technologies. The suggestions of Bakary and Sakurai provide good options for Viet Nam. In addition, there is a need to standardise the practice of cleaner production technologies within industries. These standardised technologies should then be dispensed to companies by intermediary organisations such as research institutes, universities, DOSTEs, or Industrial Zone Management Boards, etc. The Viet Nam Cleaner Production Centre should collaborate with these organisations to disseminate cleaner production technologies. It should also review the availability of techniques/technologies, both indigenously and globally, assess the technical and capital requirements, collaborate with universities and research institutes on the research and development of feasible and available cleaner production technologies for local companies and set up a cleaner production databank to collect and provide information on cleaner production technologies.

5.5 Overcome Economic Constraints

It was proven in Taiwan, India, and Indonesia that financial instruments such as fiscal subsidies, soft loans and special schemes giving benefits on taxes may help to make cleaner production attractive (Rock, 1996;Chandak et al., 1995; Roestamsjah et al., 1995). In Viet Nam, environmental funds with preferential interest rate that have been established recently in Ho Chi Minh City and Hanoi could help to facilitate the implementation of cleaner production (Tran Van Nhan, 2001). Furthermore, companies should start with cost-effective low and no-cost cleaner production options, which are easy to implement. The savings from the application of low or no-cost cleaner production options could then be used to fund the implementation of medium-cost options.

5.6 The Role of the Government

Hong Kong experience shows that without government intervention, it is unlikely that factories will change their operation and reduce pollution (Lin, 1995). In some Asian countries, with stringent effluent standards and pollution charges, companies find it beneficial to adopt cleaner production (Sakurai, 1995). In China, low water price caused by government subsidies and low effluent and waste discharge fees discouraged enterprises to implement cleaner production (Shi Han, 2002). On the other hand, in India higher electricity tariffs for industries encourages them to take up cleaner production measures to reduce electricity consumption (Chandak et al., 1995). In the early 1990s, in Korea, the government applied a diversity of policy instruments to support cleaner production. Among these were awards for cleaner production, an eco-labelling system, information and technical assistance and shorter patent procedures for pollution prevention technology (Chung, 1996). According to Sakurai (1995),

cleaner production should be built into the government's policies on industrialisation. For instance, cleaner production performance could be taken as a criterion for preferential support to new industries/expansions. In addition, public disclosure on environmental performance and cleaner production awards might induce competition among industries and indirectly promote the use and development of cleaner production (Bakary, 1986; WB, 2000). Any governmental programme to promote cleaner production should take this potential dynamic into account. According to Shi Han (2002), government proactive and appropriate initiatives are essential to the widespread dissemination of cleaner production in situations where the industry lacks environmental awareness and management capacity. This is especially true in China and Viet Nam, due to the virtually non-existence of a market for cleaner production. In the case of Viet Nam, key governmental measures to take into account for promoting cleaner production are: appropriate pricing of natural resources and materials; removing subsidies for water and energy supply and waste collection services; building cleaner production in the regulatory system; developing financial schemes that give priority to cleaner production over end-of-pipe proposals; designing appropriate charge schemes; providing technical support and public disclosure on environmental performance and cleaner production awards.

6. Current Practices of Waste Exchange in Viet Nam

In my study area, a number of factories/enterprises use waste materials as input in their production processes. For instance, Serrano VN Company in Viet Nam-Singapore Industrial Zone (Binh Duong Province) uses, among others, bagasse, sawdust, and pieces of wood as raw material to produce fine arts. In Bien Hoa II Industrial Zone (Dong Nai Province), Technopia VN Company, a Malaysian company, uses sawdust, pieces of wood, and coconut fibre to produce mosquito coils (a kind of insecticides). CP VN Company, a joint-venture company with Thailand, and Cargill Company, an American company, both use, among others, oyster-shells and bones in the production of animal food. Some factories have to switch into waste materials because virgin raw materials are in deficit, or because they have to reduce the production cost in order to remain competitive. In Bien Hoa I Industrial Zone (Dong Nai Province), VICASA Steel Factory, an SOE, used steel scrap to replace virgin raw material. Similarly, Dong Nai Paper Company supplements wood and bamboo with bagasse, waste jute, and waste paper.

In my survey, I found that a variety of factories/enterprises sell their wastes. Some factories sell their wastes to comply with the environmental policies of their parent companies such as Fujitsu Electronic Company, and Tae Kwang Vina Footwear Company (Bien Hoa II Industrial Zone, Dong Nai Province). Others get profit from selling wastes. Hualon Textile Corporation VN in Nhon

Trach Industrial Zone (Dong Nai Province) sells waste fibres that are then reused for making pillows and mattresses. LIDOVIT Company, which produces spare parts for cars and motorbikes (Bình Chieu Industrial Zone, Ho Chi Minh City), sells steel scrap. Minh Tu Rubber Enterprise in Le Minh Xuan Industrial Zone (Ho Chi Minh City) sells waste rubber. Some factories claim that their wastes have potential to be reused or recycled but at present a market is still lacking. For instance, the small amount of magnesium hydroxide [$Mg(OH)_2$], barium sulphate [$BaSO_4$], and calcium carbonate [$CaCO_3$] in the sludge of VICACO Chemical Factory in Bien Hoa I Industrial Zone could be reused. Similarly, the amount of aluminium in the sludge of wastewater treatment system of VIJALCO Aluminium Electroplating Factory in Binh Chieu Industrial Zone could be reused.

In most of the cases, waste producers and buyers work through middlemen in the informal sector. These middlemen travel from place to place, even from province to province, buying, transporting and selling wastes. They can buy wastes from factories or from scavengers. In limited cases, waste exchange takes place directly between waste producers and buyers. Dong Nai Paper Company and Concrete Company exchange 'black liquor'. Sugar Cane Factory and Dong Nai Paper Company exchange bagasse. Dong Nai Paper Company sells waste fibres to Dong Hiep Paper Company. These companies are all located in Ben Hoa I Industrial Zone. These factories exchange wastes on a voluntary basis, but the unbalance between supply and demand makes waste exchange less efficient than expected. Black liquor generated from Paper Company is higher than the demand of Concrete Company. Similarly, Sugar Cane Factory generates more bagasse than is demanded by Paper Company. As a result, the waste sellers can not rely completely on the waste buyers to handle their wastes.

There are a number of potentials to exchange wastes between factories located in the same industrial zones. For instance, the sugar cane factory, the canned fruit factory, and the milk factory could exchange waste with the animal feed factory and the fossil fuel power plant with the chemical factory (all are in Bien Hoa I Industrial Zone). Similarly, in Bien Hoa II Industrial Zone, food processing factories could exchange waste with animal feed factories. But until now, waste exchange does not exist between these companies. Reasons for that seem to be a lack of demand for material substitution, the fear for changes of product quality, and the lack of knowledge and/or information on material substitution.

In brief, until now a number of waste exchange practices can be found, either within or outside industrial zones, but these practices are carried out on an ad-hoc basis. There is no systematic organisation to link waste producers and

waste buyers. The lack of mechanisms or incentives to promote waste exchange results in the fact that potentials for waste exchange are not exploited.

7. Constraints and Opportunities to Waste Exchange Practices in Viet Nam

In Viet Nam, although waste exchange already exists, further development of waste exchange is necessary to support the establishment of eco-parks. This will encounter some constraints, but it does not mean there are no opportunities.

7.1 Constraints

Some constraints do exist, which can explain why waste exchange is not being developed as expected. The most obvious constraint is that Viet Nam has not yet implemented any specific policies to encourage the reuse/recycling of wastes. The existing pricing system of industrial raw materials actually discourages waste reuse/recycling. The price does not reflect the 'real' value of raw materials, because it does not internalise the externalities or environmental damage cost. As the result, the price of virgin raw materials is, in general, lower than the 'real' price and industries have no incentive to use secondary materials.

Waste users, who participate in waste exchange, will have to rely on waste producers for the quantity and quality of the exchanged waste, as such resource inflexibility might present a problem. In addition, in order to carry out waste exchanges some producers must accept unfamiliar inputs (converted wastes) rather than traditional raw materials. In some cases, they have to invest a large sum of money to create new processing facilities; at the same time, consumers have to change their behaviour to accept new kinds of products produced from 'waste'. Meanwhile, in Viet Nam, the price and the quality of the products are the most important to consumers. There is not much attention paid to ecological criteria. Products produced from 'waste' are not welcomed if similar products made from virgin material are available.

The application of waste exchange also meets problems in terms of information exchange. There is no monitoring system and no obligation to list the amount and content of waste by companies. This results in a lack of information between waste producers and waste buyers. Especially waste producers do not want to voluntarily reveal the kind of waste and its amount to the public for fear of being accused as polluter.

Regarding recycling, most of the recycling activities are carried out in the informal sector. Recyclers are individual or family owned small enterprises intermingled in residential areas. They apply simple techniques that are usually related to pollution problems (Rekha et al., 1994; Pham Ngoc Anh, 2000). The development of these recycler enterprises might have problems because of their environmental impact. There is no systematic recycling sector that is developed well enough to close the loop of the material cycle (Rekha et al., 1994). Another problem might exist in the industrialisation process if the informal recycling sector disappears while no new formal recycling sector appears to take over their role.

In the specific case of export-processing companies, difficulties emerge in selling wastes due to the existing regulations related to export-processing companies. Export-processing companies can only have economic relations with companies that have an import-export license and recyclers, who are often to be found in the informal sector, do not.

7.2 Opportunities

The opportunities for a further development of waste exchange in Viet Nam are related to legislation, organisation, and technology.

In terms of legislation, similar to the application of cleaner production, the Law on Environmental Protection (1994), Chapter II, Article 11 forms the legal basis for the application of reuse/recycling and exchange of wastes in Viet Nam.

Regarding organisation, some opportunities can be identified. First, the establishment of dozens of industrial estates under the management of Industrial Zone Infrastructure Development Companies with the diversity of industrial sectors is one of the opportunities to practice waste exchange. Half-empty industrial estates that can be filled according to waste exchange criteria present another opportunity, as new industries can be recruited to complement the existing businesses and enhance the waste exchange. Second, some cities and provinces have implemented policies to relocate factories/enterprises from the inner city to industrial zones. The relocation of small and medium sized enterprises, especially if they are recycling enterprises, to newly established industrial zones might also offer an opportunity to promote waste exchange. The relocation of recycling enterprises to industrial zones could help to close the loop of material in an eco-park. At the same time, an industrial zone designed according to industrial ecology principle might be attractive for small and medium enterprises to relocate to. Since small and medium enterprises usually lack capital, their participation in the closed loop programmes in eco-parks can provide these enterprises opportunities to save money on selling or buying by-

products. They may also benefit from the economies-of-scale in waste treatment facilities in industrial zones. Third, recently, the Viet Nam Cleaner Production Centre has been established, as a starting point to introduce cleaner production and the pollution prevention approach. Waste exchange can be integrated in the activities of this organisation[7]. Finally, international organisations such as UNDP and UNEP are expected to help Viet Nam to carry out pilot project on waste exchange as an initiative to develop Eco-Industrial Networking in Asia[8]. As such, the success of the pilot project of waste exchange might provide opportunities for further expansion of the programme.

With respect to access to technology, Viet Nam can benefit from the available re-use technologies from other countries (see for example Rosenthal, 1996; UNEP, 1997; Ayres, 1996). A variety of wastes such as paper, rubber, glass, food wastes, cloth wastes, etc. have been reused in many ways in Viet Nam (Tran Kim Qui, 1979). In addition, several other forms of industrial wastes have been studied with respect to new recycling possibilities (see Box 4.2). In practice a number of factories/enterprises use waste materials for their input of the production processes. Other factories/enterprises sell their wastes instead of throwing it away. This proves that waste exchange is not unknown by factories/enterprises operating in Viet Nam.

Box 4.2. Examples of Research on Waste Reuse in Viet Nam

- The reuse of industrial wastes for construction materials, such as waste metal from metal processing industries; black liquor from pulp and paper industries; waste wool from rug producing industries and waste jute from jute packaging industries, were carried out by Vo Thoi Trung (1990).
- The enzyme bromelin extracted from pineapple can be used in the production of fish sauce (Pham Thi Tran Chau et al., 1981).
- The enzyme protease extracted from food processing wastes can be used for treatment of worm silk to replace imported chemicals (Lam Thi Kim Chau et al., 2000).
- Hoang Dong Nam and Nguyen Van Phuoc (2000) have successfully recovered Zinc from solid waste disposed by Zinc-Covered Sheet Iron Factory.
- Tran Ngoc Anh Tuan and Nguyen Van Phuoc (2000) produced colouring agents from the sludge of a chemical factory.

As a general conclusion, it can be stated that the ideas and technologies of cleaner production and waste exchange do exist in Viet Nam. However, there are still inadequate structures and supporting mechanisms that put good experiences in wider and more systematic application. The issue of economic feasibility does hamper this wide penetration, but at the moment that does not seem to be the major issue in Viet Nam, given the fact that the ongoing process of pricing environmental goods will only enhance the economic feasibility of waste recycling and reuse. The major issue has to be the questions on how to organise and institutionalise cleaner production and waste exchange in industrial and environmental policy and management.

8. Possibilities to Promote Waste Exchange

As stated earlier, a lack of information on the quantity and quality of waste streams in industries is one of the main barriers for waste exchange in Viet Nam. It is clear that material and energy exchanges among firms require a clear understanding of the inputs and outputs of these firms. The first step in putting waste exchange into practice is to reveal the material and energy flows. Waste auditing is well suited for providing that information. Erkman and Ramaswamy (2001) state that waste auditing forms one of the critical elements in the planning process for industrial ecology. Dong Nai DOSTE, Binh Duong DOSTE and Ho Chi Minh City DOSTE have, to a certain extent and with the help of UNIDO, carried out waste audits in some factories. By extending this to factories in industrial zones this can form a starting point for a waste exchange programme and the design of eco-parks.

In Viet Nam, at present production processes and especially recycling technologies are rather obsolete. Consequently, recycling processes usually cause a lot of pollution. It is necessary to invest more in research to improve the production processes, and to use more of the available technologies to facilitate waste exchange practices. Research funds for the study on reuse/recycling technologies are indispensable. It is necessary to enhance collaboration between universities/research institutes and factories/enterprises in the research and application of waste reuse/recycling to fill the gap between research and practice.

Similar to cleaner production, the industrial ecology concept should be disseminated and familiarised among policy-makers, decision-makers and industry to make a wide application of waste exchange possible. This can be done through workshops, seminars, and training. At the same time, increasing environmental awareness of consumers is necessary to support the introduction of ecological criteria into consumption behaviour. The dissemination of ecological criteria to consumers can be done through the curricula of schools and the mass media. Training, workshops, seminars, and increased environmental awareness are not sufficient to change the behaviour of industry and consumers. In addition, the prospect of a green market is still absent, even with the increase in environmental awareness. Nevertheless, workshops, seminars, training, education, and information exchange are indispensable to familiarise industry and customers with the concept and to remove the attitudinal and conceptual barriers.

In order to encourage industries to participate in waste exchanges, the government should create economic incentives, such as tax reduction or soft loans, for factories/enterprises that apply waste reuse/recycling. The government should

also adjust the price distortion (internalisation of environmental damage cost into the price of raw materials). It is also recommended that the government apply a mix of different environmental policy instruments and approaches to support waste exchange (see chapter 6). In addition, to facilitate current waste exchange practices of export-processing companies, it is necessary to adjust the existing trade regulations.

For wide and continued application of waste exchange, it is recommended that a waste exchange programme be established[9] through which the lists of wastes and by-products will be published. Waste buyers and waste sellers will get a chance to meet each other. It is recommended that a demonstration project on waste exchange be carried out in an industrial zone with a high potential for success. The results of such a project can be multiplied for other industrial zones[10]. As existing industrial zones usually lack some components to close the loop of materials, the relocation policy can be integrated into the waste exchange programme in order to match waste producers, recyclers, and waste consumers within the same industrial zone.

9. Conclusion

The promotion of cleaner production at company level and waste exchange at estate level in Viet Nam is hampered by a lack of specific policies to encourage these practices; a lack of market incentives and information; and limited access to technology. These are crucial barriers. In addition, cleaner production also encounters the lack of widespread awareness and several other barriers that can be classified as attitudinal, organisational, and economic constraints. Meanwhile, waste exchange practices are carried out through informal mechanisms without any guarantee for neither continuation nor any further development. However, there are a number of opportunities to promote and further extend these practices. The Law on Environmental Protection provides a legal framework to promote cleaner production and waste exchange. The ongoing price reforms and the introduction of economic instruments may provide incentives for cleaner production and waste exchange. The establishment of the Viet Nam Cleaner Production Centre is a good starting point for the dissemination and implementation of cleaner production and waste exchange. In the beginning, industrial zones can be experimental areas for these practices.

It is expected that widespread application of preventive technologies might contribute to environmental reforms in Viet Nam. However, the environmental reforms will fail if the emphasis is solely put on the role of technology while neglecting the need for the simultaneous modernisation of the institutional setting in which the new technologies are put to work. My analysis on the barriers and opportunities for cleaner production and waste exchange in Viet Nam point at the major importance of non-technological factors in introducing technologi-

cal innovations. Just like in China, where numerous environmental technologies have been imported from developed countries, the industry can only improve parts of the industrial process because the organisational reforms needed to support their functioning are not implemented (Wang and Ke, 1992). It is therefore, that Ecological Modernisation Theory does not only emphasise the role of technology, but also the role of the state, economic actors and mechanism and civil society in the ecological transformation to modernise the production process. The following three chapters will analyse the economic reforms, political modernisation, and the social dynamics and reforms that are so essential to supplement technological innovation in order to ecologically modernise industrial estates in Viet Nam.

Notes

[1] Interview Nguyen Phan Duy Nguyen, environmental expert, responsible for cleaner production programme in Ho Chi Minh City (Ho Chi Minh City DOSTE) (January 30, 1999).

[2] In Viet Nam, some factories have to change the products seasonally due to the lack of raw material. Sugar cane factories, for instance, produce candies and cookies instead of sugar when sugar cane supply is in deficit. Similarly, seafood-processing factories switches to seasoning production.

[3] Interview Ms. Loan, Information Section of Viet Nam Cleaner Production Centre (August 21, 2001). Her opinion is based on the experience from the cleaner production demonstration projects with SOEs in Northern Viet Nam.

[4] Interview Ms. Thanh My, one of the members of cleaner production consultant team of the cleaner production demonstration projects in Southern Viet Nam (August 25, 2001).

[5] Viet Nam Cleaner Production Centre has trained and certified 39 cleaner production trainees during the period of 1999-2000. These trainees will work as cleaner production consultants. In addition, Viet Nam Cleaner Production Centre has organised 13 seminars on cleaner production for more than 550 people from government agencies, research institutes and industries (Tran Van Nhan, 2001).

[6] In Ho Chi Minh City, demonstration projects on cleaner production have been carried out with polluting firms on the black list in three industrial sectors (food processing, textile, and paper). These are under the regulatory pressure to improve their environmental performance or they will be closed. Some of them are also under the pressure of community' complaints. One private enterprise on the black list of Ho Chi Minh City DOSTE has moved from place to place due to the pressure of the community. After receiving support from UNIDO in the demonstration project on cleaner production, the firm continues to invest in other cleaner production options by its own budget. The result is an improvement of both economic efficiency and environmental performance of the firm. The firm nowadays is no longer on the black list, has a better public image, and gets economic benefits from saving energy and material (interviews with firms in the cleaner production demonstration projects in Ho Chi Minh City).

[7] Being establish in 1995, Burnside Cleaner Production Centre (Canada), plays a significant role in providing information on waste reduction and prevention, and cleaner production; and in studying the possibilities to apply industrial ecology concept into existing industrial estates (Smolenaars, 1996).

[8] UNEP is promoting the idea of eco-park under the name 'Environmental Management of Industrial Estates'. UNEP has supported China in the development of eco-park in four pilot areas: Dalian Development Zone, Tianjin Development Zone, Yantai Development Zone, and the Suzhou New Zone. Within the framework of eco-industrial development, UNDP has initiated and funded the PRIME project in the Philippines. One of the modules of PRIME is industrial ecology, in which principles of industrial ecology are applied in industrial estates through a pilot project (information from the International Conference and Workshop on New Strategies for Industrial Development, in April 3-6, 2001, in Manila, the Philippines).

[9] See for experiences on waste exchange programme in the Philippines (Favilla, 1994).

[10] Asian Countries such as the Philippines, Thailand, China, and Indonesia apply the industrial ecology principle to industrial estate using pilot projects as starting point (information from the International Conference and Workshop on New Strategies for Industrial Development, in April 3-6, 2001, in Manila, the Philippines).

CHAPTER 5

INDUSTRY AND OTHER ECONOMIC AGENTS IN INDUSTRIAL ECOLOGY

The occupants of any industrial estate include industrial firms, companies, factories, and enterprises, all of which play a vital role in the economic and environmental performance of industrial estates. A governmental strategy for industrial estates, which seeks to achieve environmental goals without impeding economic purposes, requires the collaboration of these actors. This chapter analyses firms in industrial estates and other economic agents involved in industrial development to see how they can and do play a role in improving the environmental performance of their host industrial estates. This analysis is based on the economic network that is outlined in Figure 5.1.

1. Introduction

In the Western world, the environmental crisis that became visible in the 1960s has resulted in placing industrial firms under pressure. This pressure comes from many sides. Regulatory pressure from the government; credibility pressure comes from the public; market pressure comes from the customers/consumers; and financial pressure comes from investors and insurance companies. The intensity of these pressures varies by country, industry, sector, and firm. Industrial firms have to respond in order to survive and to ensure their future access to scarce resources; their public and political legitimacy; their profitability; and their financial viability. With respect to environmental management, Schot and Fisher (1993) divide the responses of firms to these pressures into three phases.

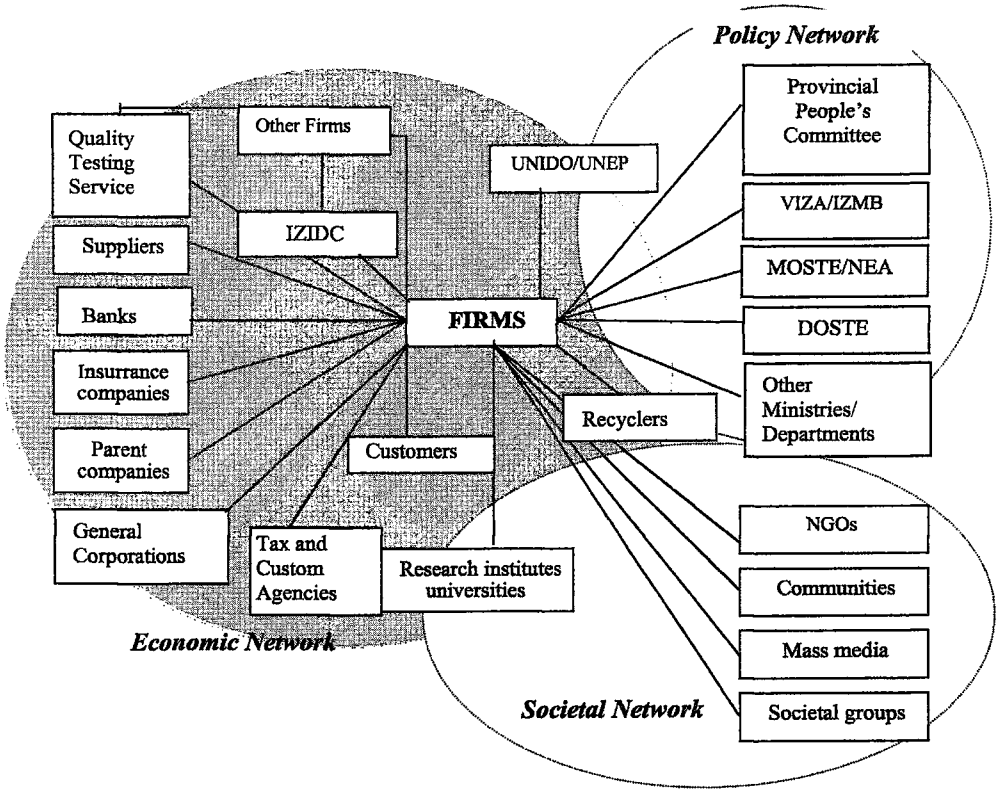

Figure 5.1 Economic Network Relevant to Firms in Industrial Estates

In the period between 1970 and 1984 industrial firms in the developed countries resisted adaptation to regulatory and public pressures. Firms were not willing to internalise environmental issues and they did not develop their own environmental policies. The nature of the reaction was highly fragmented. No strong corporate policies were in place.

From 1984 to1992, major industrial accidents occurred, including the accident at Bhopal (1984) and at the Sandoz plant (1986). This strengthened the emerging pressure on industrial firms from customers/consumers, investors and insurance companies. These new economic agents acted – albeit not alone – as catalysts for a new cycle of business environmental reform. Industrial firms started defining environmental problems as their own responsibilities. They began to realise that they could no longer ignore environmental problems because that would threaten their existence in the long run. In this period, a minority of firms developed an environmentally innovative strategy focusing on waste and emission reduction at source as a practice of continuous improvement.

From 1992 onwards, many countries and regions started to institutionalise these pro-active environmental strategies by developing requirements for industrial environmental management systems. But these systems varied between countries and regions, and sometimes even between industrial sectors. There was a lack of a single standard to help to avoid conflicts between regional interpretations of good environmental practice, essential in a period of growing international trade and competition. As a result, the International Organisation for Standardisation (ISO) developed a series of global standards for systematic environmental management, the ISO 14000 series (see Box 5.1). The institutionalisation of environmental management thus came into force and began to work.

Box 5.1 ISO 14000 Series

- Environmental Management Systems (14001, 14002, 14004)
- Environmental Auditing (14010, 14011, 14012)
- Evaluation of Environmental Performance (14031)
- Environmental Labeling (14020, 14021, 14022, 14023, 14024, 14025)
- Life Cycle Assessment (14040, 14041, 14042, 14043)

Source: http://www.trst.com/iso2a.htm (October 11, 2001)

In brief, the context of company environmental management systems lies in the fact that to industrial firms the environment increasingly presents risks as well as opportunities. Environmental risks can come to a company via the contamination of a product to the extent that it becomes unacceptable to foreign markets; the injury or illness of workers or local communities; or a pollution problem which undermine the position of the enterprise in the national or global market. Environmental opportunities are related to the reduction of energy and resource consumption and therefore costs of production; to the reduction of pollution or the recycling wastes; or to the production for environmentally-defined niche markets. Industrial firms throughout the world have adopted a range of responses to these environmental challenges: from doing nothing, to crisis response, to the integration of environmental management in the enterprise via a well defined environmental management system that manages environmental risks and opportunities systematically and efficiently. The more strongly these environment-induced risks and opportunities are felt, the larger is the need for implementing systematic company environmental management practices.

2. Environmental Management Systems

2.1 ISO 14000 Environmental Management System

Under ISO 14001 an environmental management system (EMS) is defined as 'the part of the overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy' (Chapman, 1997).

The major elements of an ISO 14001 EMS include an environmental policy statement; environmental planning; implementation and operation of that environmental plan; checking and corrective actions; and management review of this whole process. An environmental policy statement expresses the commitment of senior management to appropriate environmental management, both within the company and in relation to the outside world. An environmental plan translates the environmental policies of a firm into objectives and targets and identifies the activities to achieve them. It also defines employee responsibilities and commits the necessary human and financial resources for implementation of these activities. In implementation and operation, environmental management is integrated into business operations. Monitoring, measurement and record keeping procedures aim to document and monitor both the results of specific actions and programmes and the overall effects of improvements on environmental performance. Corrective actions are necessary to eliminate causes of actual or potential non-conformance to objectives, targets, and criteria. The management review is a formal evaluation by senior management of the status and adequacy of the EMS. These elements are drawn together into a cyclical process, aimed at ensuring the continual improvement of company's environmental activities. The model of an ISO 14001 Environmental Management System is shown in Figure 5.2.

One should bear in mind that ISO 14001 is a management standard, but it neither sets requirements for environmental compliance with governmental environmental policies, nor provides for specific levels of pollution prevention or performance. Instead, it offers a general framework and methodology for guiding environmental management in companies, but the companies themselves decide how to formulate their own environmental policies and to take their own environmental measures to bring their existing operations into conformance with ISO standard. Different companies may adopt different implementation trajectories and may show differing performance, although each may still comply with the environmental management standard.

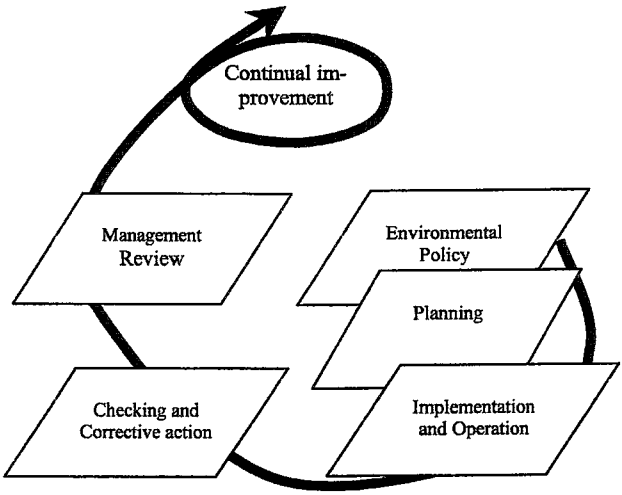

Figure 5.2 ISO 14001 Environmental Management System Model
(Source: Chapman, 1997)

According to Chapman (1997) an effective ISO 14000 (EMS) serves to:

- Facilitate proactive environmental measures and systematic integration of environmental issues into business management;
- Translate a company's environmental policy statement into objectives, principles, standards, and action plans, by bringing together and co-ordinating existing environmental activities, and integrating these within an existing health and safety management system;
- Give appropriate and proactive training and education to the staff;
- Measure and monitor the environmental performance of different production units and the plant as a whole;
- Identify and manage risks;
- Ensure a more effective relationship between the company and regulatory authorities.

The major benefits of an EMS are related to its contribution to the improvement of environmental quality and the conservation of natural resources; its role in increasing production efficiency and environmental management efficiency; and its function in limiting liabilities and facilitating compliance with regulations. At the same time, the existence of an EMS within a company may enhance the company's environmental image; play a role in maintaining good public and community relations; secure access to international markets and

(potentially) be crucial to fulfilling investment criteria and improving access to capital. (see Sayre, 1996; Clements, 1996; Dixon, 1997; Evangelinos, 2000; Hillary, 2000). In short, the benefits are related to better management of risks and opportunities that in relation to the growing importance of environmental considerations and interests in production and consumption.

2.2 Relationship between ISO 14000 (EMS) and Cleaner Production

Cleaner production and ISO 14000 (EMS) are considered to be part of a preventive approach and have become widely recognised as part of any alternative to the traditional reactive approach. Both ISO 14000 (EMS) and cleaner production have common points of departure in addressing environmental challenges. Industrial firms that apply ISO 14000 (EMS) will most likely improve their environmental performance via waste reduction, reuse, and recycling and might even increase their economic efficiency. This comes very close to the central idea behind the concept of cleaner production, as outlined in chapter 4. The implementation of an ISO 14000 (EMS) differs from that of cleaner production options in that the former involves a certification process. In enhancing a continuing reduction of environmental impacts and improvement of environmental performance, ISO14001 applies periodic auditing and regular review for (re)certification of the system. There is no such mechanism to ensure the continuous application of cleaner production options to improve environmental performance. A second difference is in the stronger emphasis with ISO14001 on organisational, procedural and management improvement as a way to strengthen the effect of technological changes. With cleaner production, there is a stronger emphasis on technology, although the concepts do not at all rule out more organisational and procedural options.

In practice, the application of cleaner production enhances the application of ISO 14000 (EMS) and vice versa. In countries such as Indonesia, cleaner production programmes are considered to be among the basic approaches to ISO 14000 implementation (Wasti, 1997). In Thailand, ISO 14000 (EMS) is believed to provide an opportunity to expand and maintain the continual adoption of cleaner technologies through promotion of cleaner production as integral part of an ISO 14000-EMS certification process (Bunyagidj and Greason, 1996). The adoption of an EMS is then considered to be a key step in the evolution of more efficient and cleaner industrial production (Terasart et al., 1999). Fresner (2000) reports that there are more than 20 companies in Australia, Hungary and the Czech Republic that have introduced an ISO14000 (EMS) while focusing on cleaner production as an active and preventive approach to deal with environmental effects. Based on this 'integrated cleaner production and EMS model', effective EMSs have been designed and implemented with both environmental and economic benefits.

3. ISO 14000 (EMS) in Asian Developing Countries

In Western countries, the ISO 14000 series has recently become subject to debate. On the one hand, there exists broad agreement that the ISO 14000 series are crucial tools towards sustainable industrial development. This is especially believed to be true due to the emphasis of ISO 14000 on pollution prevention, cleaner technologies, and continuous improvement of environmental performance. On the other hand, there is criticism on the ISO 14000 series, especially focusing on its lack of transparency, credibility and accountability[1] and on the failure to involve non-industrial actors in the design of these standards[2].

3.1 ISO 14000 (EMS) and Developing Countries

With respect to developing countries, one additional line of criticism deserves mention. The ISO 14000 series has been criticised for the limited participation of developing countries in designing these standards. Consequently, the existing ISO 14000 series do not fully reflect the economic, cultural, social and business contexts typical in many developing countries. With the growing relation between ISO standards and world trade regulations, this issue becomes of increasing importance. Some scholars state that ISO 14001 could impose significant trade costs on developing countries without securing any economic or environmental advantages (APO, 1997; Krut and Gleckman, 1998; Barber, 1998).

Despite this criticism on the applicability of ISO 14000 (EMS) in developing countries, Asian governments generally see ISO 14000 (EMS) as an alternative to existing regulations. EMS plays a role in promoting self-regulation among industries, and thus helps in counteracting the weaknesses and lack of effectiveness of existing enforcement and inspection systems. From the side of industry, a growing number of companies in Asia realise ISO 14000 (EMS) will become a requirement to compete in – or even to secure access to – the global market. Consequently, many efforts have been and are made to apply ISO 14000 (EMS) in Asian developing countries. For instance, the Hong Kong Productivity Council has organised a large-scale ISO 14001 pilot programme to promote ISO 14000 (EMS) in Hong Kong (Lin, 1997; Ching, 1997). In Malaysia the concept of ISO 14000 (EMS) is rather new to local companies. Up until recently ISO 14000 (EMS) had been implemented mainly by large multinationals who were guided by their parent companies in Japan and the United States. Many attempts have made to encourage domestic Malaysian industrial firms to implement ISO 14001. For instance the Standards and Industrial Research Institute of Malaysia (SIRIM) has started a pilot scheme on EMS with the participation of 32 domestic companies from five different industrial sectors. At the end of 1996 some large companies indicated their readiness for certification

(Koh, 1997). In Thailand the ISO 14001 (EMS) was introduced to Thai industry in 1996. The Thai government encouraged firms to adopt it by offering guidance, seminars and other forms of support. Many projects have been developed to assist industry with the implementation of the ISO14001 standard and enhance environmental competencies. The Thai Industrial Standards Institute (TISI), Thailand Environment Institute (TEI), and Thailand Productivity Institute (TPI) are instrumental in promoting the adoption of this standard. Until March 1999 about 127 companies achieved ISO 14001 certification, and the number of industries applying for and achieving certification continues to increase. (Thetsidaeng, 1997; Terasart et al., 1999). In Indonesia, Wasti (1997) reports that efforts to implement ISO 14000 (EMS) include intensive meetings of all parties involved in environmental management system promotion and an open invitations to environmental professionals, institutions and laboratories to take part in ISO 14000 implementation. Figure 5.3 presents a number of ISO 14000 certifications in Asian developing countries.

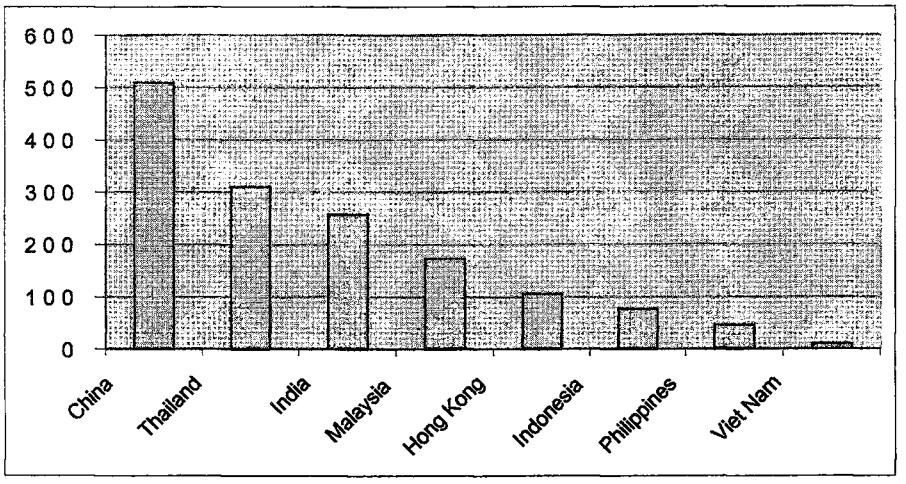

Figure 5.3 ISO 14000 Certifications in Asian Countries in December 2000
(Source: http://www.iso.ch (December 13, 2001))

Although these figures are not impressive compared to those in developed countries such as Japan, Germany, United Kingdom, Sweden, USA, the Netherlands, France, etc., they do provide evidence that it is possible to apply ISO 14000 (EMS) in Asian developing countries.

One might conclude that even though ISO 14001 is considered to be a voluntary standard, without state intervention and support industrial firms in Asian developing countries most likely do not implement ISO 14001 on a voluntary basis, with the exception of multinational corporations. The role of the state

seems to be still crucial in promoting the adoption of ISO 14001 in the domestic industries of Asian developing countries.

3.2 ISO 14000 (EMS) in Viet Nam

In Viet Nam, like ISO 9000, the application of ISO14000 is optional and happens on a voluntary basis. Until March 1999, 33 factories/companies in Viet Nam had received an ISO 9000 certificate, and that number is still growing. Meanwhile the number of industrial firms that received an ISO 14000 certificate is negligible. Up until 2000, more than 23 firms applied for ISO 14001 certification[3], but as of December 2000 only nine of them had been certified (http://www.iso.ch, December 13, 2001). These companies are all foreign investment companies or joint-ventures. So far, no local domestic company has managed to receive an ISO 14001 certification. This is an illustration of a more general finding that environmental management practices in the industrial sectors in Viet Nam are weak, especially compared to industries and industrial sectors in more developed parts of the world. The introduction of more systematic company environmental management, without any ISO certification, is also severely underdeveloped in domestic Vietnamese firms, as became clear throughout the interviews with Vietnamese firms for this study. Specifications of environmental responsibilities, environmental reporting within the company, systematic and regular environmental monitoring of substance flows and emissions, and the institutional presence of an environmental division or unit were often entirely missing – or functioning only marginally. There were also very limited instances of allocation of personnel and resources for fulfilling environmental tasks.

But in a more historical perspective, ISO 14000 (EMS) in Viet Nam – as in other developing countries in Asia – is enjoying growing interest and attention. Increasingly a major issue on the agenda of foreign-owned companies, it is still rather new to domestic companies, especially for those producing only for the local market.

4. Constraints in the Development of ISO 14000 (EMS) in Viet Nam

This section considers main causes behind this stagnating introduction of ISO 14000 (EMS) in Viet Nam. This analysis of the major constraints in the development of ISO 14000 (EMS) in Viet Nam focuses on both internal and external factors. Internal factors relate to the ambitions and capabilities of firms to apply for ISO 14000 (EMS) certification. External factors come into play since industrial firms are not isolated entities, but operate within societies and economic structures, and under specific political contexts. The adoption of ISO 14000 (EMS) is driven not only by the firms themselves but may relate to a

perceived pressure from the market and other economic agents. The presence or absence of government intervention may also represent an essential constraint in the development and implementation of ISO 14000 (EMS) in Viet Nam. Before analysing these internal (4.2) and external constraints (4.3 and 4.4), I will introduce a model on the various stages in the development of EMS, which helps us to understand the situation in Viet Nam.

4.1 A Three-Stage Model on Strategic Environmental Management

In the hypotheses of ecological modernisation theorists, companies are evolving from a purely reactive approach to environmental regulations, towards a more innovative approach. They tend to become actors that are more important in environmental reform, rather than merely reacting on the pressures in their social environment. Therefore, it becomes increasingly important to understand the company perspective on environmental management. Van Koppen and Hagelaar (1998) have developed a model on the development stages of strategic environmental management in companies, which aims to clarify the variation in environmental strategies among companies, as well as indicating feasible trajectories for improving company environmental management under different conditions (see Box 5.2).

Box 5.2 The Three-Stage Model

Van Koppen and Hagelaar (1998) have developed a model of the development of strategic environmental management in companies. According to the model, three stages in company environmental strategy can be distinguished

The first stage is called ***crisis-oriented.*** In this stage, the company is oriented to control the most urgent environmental problems, usually by means of waste treatment facilities. The control measures are typically end-of-pipe solutions. Its aim is to react to environmental regulations.

The second stage is called ***process-oriented.*** Here, the company deals with its environmental problems in a more systematic way, by analysing its production process as a whole, and striving for an effective and cost-efficient control of all relevant environmental issues. This stage is characterised by initiatives for waste and emission prevention and for the development of an internal environmental management system.

The third stage is called ***chain-oriented.*** In this stage the company extends its environmental management beyond its own production process, to the whole product chain. It analyses the environmental impacts of the entire life cycle of its products (including raw material extraction, manufacture, retail, consumption and waste disposal), and aims at reducing the total of these impacts, for instance by better product design.

Source: Van Koppen and Hagelaar (1998)

According to Van Koppen and Hagelaar, any stage of environmental management is dependent on three sets of factors: the ambition level of the senior management, the internal situation of the company (budget, technology, and information), and the external situation (market opportunities and environmental risks). Advancing from one stage to another implies changing the company in several ways and often requires technical improvements as well as organisational learning.

The three-stage model helps to identify what feasible options a company has for improvement. Companies in an early stage of environmental management will generally be motivated by considerations of compliance to government regulation. When such a company generates substantial environmental risks and has no environmental know-how and very limited financial budget for environmental investments, it makes little sense to aim at a chain-oriented strategy. Such a company should, at least in the short term, moderate its ambition level and aim at a crisis-oriented strategy, focusing on the elimination of major environmental risks. On the other hand, when a company has good opportunities for marketing green products or has good options for cost-effective waste and emission prevention, it would be an unwise strategy to restrict the ambition level to compliance.

The model also makes clear that companies in different stages need to be stimulated towards improvements in different ways. For companies in the crisis-oriented stage, direct government regulation will be the main drive to change their environmental performance. In the process-oriented stage, the pricing of energy, materials and waste processing becomes a central factor in the company environmental behaviour. In the chain-oriented stage, it is the image of the company and its products that is the vital asset to be protected. By bringing these dynamics together, the model lays a foundation for a diversified approach for environmental improvement in industry. It provides us with a better understanding of the relation between ambition level, firm capabilities and the various external push-and-pull factors that affect the organisation of company environmental management.

4.2 Firms' Capability and Ambition Level

As has become clear in the preceding chapters, the environmental performance of most industrial firms in Viet Nam is still weak. This places most firms in the first stage of the model, or even in a situation where there is no environmental management at all. Only few – multinational or foreign direct investment – firms are in the second stage[4]. In sum, these firms face major internal constraints in implementing EMS. The common environmental attitude of both employees and the top management in most firms in Viet Nam is rather weak,

neither generating nor supporting high environmental ambition levels. Weak knowledge on EMS and its potential economic and environmental benefits, as well as uncertainties on the market benefits of EMS, prevent firms from adopting ISO 14000 (EMS). Any staff person with an interest in developing ISO 14000 (EMS) at whatever place in the firm is likely to meet a lack of technical support, and limited financial and human resources. In addition, lack of expertise and the absence of a specialised division on environment are common characteristics of Vietnamese firms; it is often in these institutional areas that an interest in and knowledge on EMS is born.

Moreover, EMS involves a complicated documentation procedure. Most firms are unfamiliar with modern management practices involving corporate (environmental) policy formulation, systematic monitoring and reporting, generating creativity and participation at various levels, etc, and thus they lack a comprehensive system to start with. This complex of internal factors related to ambition levels and capabilities contribute to the low rate of incorporation of EMS into the business strategy of Vietnamese firms.

4.3 Lack of Pressure from External Economic Agents

The economic networks of Vietnamese industries consist of customers/consumers, recyclers, General Corporations, banks, insurance companies, tax agencies, etc. In their various interactions and exchanges with Vietnamese industries, these actors play a potential role in the adoption of ISO 14000 (EMS) into firms' business strategies. Yet, from the analysis below it appears that is true only to a very limited extent.

* *Customers*

In Viet Nam, the few ISO certified firms (largely multinational corporations) mention that market demand has been their main driving force for the development and implementation of an ISO 14000 (EMS). These firms export their products to the European Union, Japan, or North America. Under the (existing or expected) pressure of this market, these firms realise that ISO 14001 certification is beneficial for their competitive position in the world market. By contrast, most purely Vietnamese firms (state-owned enterprises, private-owned enterprises, as well as small and medium sized enterprises) state that they do not consider developing any kind of EMS according to ISO 14001, because there is no demand from customers, nor do they seriously expect that such demand will emerge in the near future.

In the past, before the economic reforms, factory managers of state-owned enterprises (SOEs) were mainly motivated to focus on meeting production tar-

gets; profits were never a critical factor in production decisions; and environmental performance was rarely included in decision-making. For these firms, the rule 'The customer is king' was totally inapplicable, and market pressure was negligible. In the transition to a market economy, customers become more important, also for SOEs. A transition from output preoccupation to a stronger focus on quality and profitability is recognised among SOEs. However, so far there is no serious demand for environmentally sound products in the Vietnamese domestic market and the environmental performance of producers is not taken into consideration by customers in selecting their suppliers.

** Recyclers*

Recyclers form a special category of 'customers' of Vietnamese industries, as these customers buy 'waste' instead of products. After the reunion in 1975, when most raw materials for industry were in deficit, the number of recyclers and recycling activities increased sharply; their numbers started to decrease when raw materials became more widely available after the economic reform policy took effect (Rekha et al., 1994). As mentioned in chapter 4, re-use/recycling processes are usually causing pollution problems and therefore, recyclers are often under pressure from local environmental agencies and communities. In some cases, this makes the continuation of these informal recycling activities uncertain. In addition, the ongoing industrialisation process with increasing economic development may result in the disappearance of the informal recycling sector, while it remains to be seen to what extent new formal recycling companies are entering the recycling market to take over. A declining recycling sector impedes the application of cleaner production and ISO 14000 (EMS), since proper waste recycling is one of the central elements of cleaner production and a requirement for ISO 14001 certification.

** General Corporations*

Since 1994, most centrally run SOEs have been restructured into General Corporations[5]. The aim of General Corporations was primarily to form larger groupings of enterprises that would be more competitive on a domestic and international basis. This was to be achieved by more favourable economies-of-scale; raising capital; and co-ordinating marketing, sales and purchases within the group. After this restructuring, the General Corporations now decide on allocation of resources and most of the company decision-making belongs to these General Corporations. Some member enterprises enjoy certain economic advantages of belonging to a General Corporation (e.g. the possibility to buy in a bulk and to obtain large-scale contracts). Very few corporations seem to be able to assist the member enterprises in capital mobilisation and market development. However, there exists severe criticism on the inefficient economic per-

formance of SOEs[6] and this also applies to SOEs belonging to General Corporations. One other criticism is that the General Corporations reduce the efficiency of many members by lowering their flexibility and autonomy and hindering the enterprise's ability to operate on a fully commercial basis in a number of ways (UNIDO and DSI, 1999). From an environmental perspective, so far, this structure cannot be considered to be effective. Environmental innovations in SOE belonging to General Corporations are not encouraged, because any change will relate to cumbersome administrative procedures. In my interviews with firms in cleaner production demonstration projects in Ho Chi Minh City, factory managers of SOEs claimed that they planned to adopt other options of cleaner production than the approved projects had identified, but without the approval of the General Corporation the implementation of these cleaner production options is impossible, leading to much delay and frustration. The adoption of ISO 14000 (EMS) in SOEs faces the same problems. As such, most SOEs cannot decide by themselves to adopt cleaner production measures or to apply for EMS, without decisions from the central level.

* *Banks*

In order to run their business, most firms have to rely on banks for credits. In Viet Nam, banks only provide credit with short payback periods. As most of the more costly investments in cleaner production or ISO 14000 (EMS) do not generate economic benefits over the short term, firms often face difficulties in getting loans from banks for such investments. This impedes the application of cleaner production measures that are more costly, as well as hindering application of ISO 14000 (EMS).

* *Insurance Companies*

Insurance companies have emerged only recently as a new phenomenon in Viet Nam. Most insurance products relate to health insurance, accident insurance, life insurance, and education insurance. Risk insurance for industries is rarely found and not many firms have contacts with insurance companies. I found no environmental criteria or preconditions to be incorporated in the requirements for insurance among the scarce forms of risk insurance that exist. Hence no incentives exist for firms to invest in preventive environmental protection measures such as cleaner production and ISO 14000 (EMS).

* *Tax Agencies*

At present the tax system does not provide any incentive for firms to apply cleaner production measures or ISO 14000 (EMS). There are no economic in-

centives such as tax exemption or tax reduction for firms that invest in cleaner production measures or apply for ISO 14000 (EMS).

4.4 Lack of Governmental Regulations and Actions

The three-stage model hypothesises that firms in the fist stage are not so much motivated by internal factors or market demand, but rather by compliance to governmental regulations. Even though the application of EMS is an optional and voluntary approach, experiences from other Asian developing countries show that without government intervention firms do not take initiatives to develop an EMS or apply for ISO 14001 certification (see section 3 in this chapter). Unfortunately, in Viet Nam so far there is no specific regulation to promote ISO 14000 (EMS), and governmental supportive actions, such as guidance, seminars, EMS pilot programme, and financial support, are still limited. Compared to the – still small – governmental initiatives and support on cleaner production, government intervention promoting ISO 14000 (EMS) is negligible.

According to Clements (1996), in general three major external forces push a company to develop an EMS. These are market demand, governmental regulation, and the sensitiveness of the public to environmental issue. In Viet Nam, market demand and public image (often abroad) can be identified as driving forces for multinational corporations, while governmental regulation has played no role up until now. All of this can explain why the application of ISO 14000 (EMS) in Vietnamese firms is still limited.

4.5 Islands of Hope: Opportunities

The analysis thus far may lead us to the conclusion that the development of ISO 14000 (EMS) in Viet Nam is only faced with difficulties and constraints. However, among the sea of constraints, islands of opportunities can be identified. First, a number of companies are already certified according to ISO 9000. From that position, the steps towards an EMS might be smooth as these firms already have experience with the necessary internal organisation and reporting and with accreditation procedures (Magno, 2001). Second, ISO 14000 (EMS) was first introduced in Viet Nam via foreign investments, and some expect that further increase in the adoption of ISO 14000 will follows with growing exports and further economic integration in the regional and world economy (Mol and Oosterveer, 2002). Indeed, it was found in interview that some Vietnamese companies within the export sector are starting to consider ISO 14000 (EMS) as part of their business strategy. Third, in the supply chain, many domestic enterprises produce spare-parts or semi-manufactured products for large do-

mestic companies or multinational corporations. The latter might increasingly act as driving force for enterprises in Viet Nam to take EMS into account[7].

Finally, in Southern Viet Nam, Quatest III[8] has taken the initiative to organise introduction courses on ISO 14000 (EMS) for industries and governmental agencies. This can be seen as a starting point for the dissemination of ISO 14000 (EMS).

5. Possibilities to Improve Firms' Environmental Performance

Based on the above analysis, it is clear that both internal and external factors are important constraints and driving forces for firms in improving their environmental management and consequently their environmental performance. Thus, efforts to develop ISO 14000 (EMS) must come from both sides, industry itself and external agents such as the government and other economic actors.

5.1 Industry

As most industrial firms in Viet Nam are neither familiar with a business plan nor comfortable with documentation procedures, it is difficult for them to start with an ISO 14000 (EMS). In such cases, a waste audit is usually considered to be a useful first step, as it shows the company their financial losses in discharging waste and it familiarises firm managers with the documentation processes. The subsequent introduction of carefully selected cleaner production measures will prove that pollution prevention at source is an efficient way to reduce environmental impact and save money as well. Such measures will also be able to generate support and change attitudes among employees in firms, if they are involved from the beginning. When firm managers are familiar with cleaner production practices and recognises the benefits cleaner production can bring to their business, it is easier to introduce EMS[9]. Then EMS, in turn, helps to stimulate a continual identification and application of new cleaner production options. The establishment of an environment division within the firm and training and involvement of employees are a crucial precondition to implement ISO 14000 (EMS).

5.2 Government and Economic Agents

* *Government*

As government involvement and regulations are crucial in the promotion of ISO 14000 (EMS), it is important that ISO 14000 is incorporated into Viet Nam's environmental policy framework[10]. More specifically, the government

can provide economic incentives such as tax exemption or tax reduction to encourage the adoption of ISO 14000 (EMS). It can also become more actively engaged in providing information and technical support, and starting pilot projects in General Corporations, which can be linked to dissemination activities. The most logical sector to start with would be the exporting sector, as here the incentives to develop and introduce ISO 14000 (EMS) are largest. Most firms in the export sector are indeed SOE, often part of General Corporations.

** Credit Institutions*

Experiences from Western countries show that in the process of environmental reform, banks embed environmental criteria as one requirement for credits and loans. Companies with poor environmental performance may have difficulties in gaining access to credits. As such, this mechanism encourages firms to adopt cleaner production and ISO 14000.

In Viet Nam, such mechanisms are totally absent. By contrast, banks provide no loans for environmental investment. But Ho Chi Minh City Department of Science, Technology and Environment (DOSTE) has recently created a small fund for waste reduction. With this fund, firms can borrow interest-free money to invest in waste reduction and pollution prevention measures. In principle this helps to develop investments in cleaner production and ISO 14000 (EMS). However, up until the present this fund has not been being used effectively: few firms have been successful in obtaining loans from this fund, in part because the application procedure is too complicated (Frijns, 2002). Currently, Ho Chi Minh City DOSTE is revising the application procedure for loans in order to facilitate the loan application process. This kind of initiative should be replicated in other provinces to facilitate and enable the adoption of ISO 14000 (EMS) and cleaner production among firms. For firms in industrial estates, the creation of a so-called environmental fund in each industrial estate may be an alternative.

** Industrial Zone Infrastructure Development Companies*

There are many reasons for the current limited success in environmental protection activities carried out by Industrial Zone Infrastructure Development Companies. These include: lack of concrete regulations on environmental management of industrial estates; lack of clear definition of responsibilities between different organisations; lack of information; and lack of human and financial resources. Nevertheless, these Industrial Zone Infrastructure Development Companies have a potential role to play in the promotion of ISO 14000 (EMS) and cleaner production measures. For instance, the environmental section of the Industrial Zone Infrastructure Development Company of Bien Hoa

II Industrial Zone has invested heavily in the construction of common wastewater treatment system, and have been appointed to be responsible for the provincial hazardous waste treatment system. Staff from the environmental section of Le Minh Xuan Industrial Zone Infrastructure Development Company has provided information and technical support to firms on the subject of on-site treatment facilities. They also provide guidance and facilities for on-site industrial solid waste segregation practices.

Once the staff of Industrial Zone Infrastructure Development Companies has become equipped to disseminate more information and knowledge on waste reduction and prevention, this organisation can play a major role in the development of cleaner production and ISO 14000 (EMS). As there is intense competition to attract and keep investments, there is a need for an Industrial Zone Infrastructure Development Company to provide environmental services that differentiate it from its competitors. An Industrial Zone Infrastructure Development Company can do this by providing information on pollution control/prevention; assisting firms with low-cost compliance to environmental regulations; creating a positive environmental image of the estate; and providing incentives for investment in waste reduction/prevention. In order to achieve this, Industrial Zone Infrastructure Development Companies should first, develop training programmes for environmental staff to up-date their knowledge, to better enable them to assist firms in improving environmental management and performance. Second, the environmental section of an Industrial Zone Infrastructure Development Company should act as an information desk, providing firms with up-to-date environmental, technological and economic information on topics such as waste treatment, waste management, waste reduction and minimisation, energy conservation, industrial safety technology, etc. Third, the creation of an environmental fund within an industrial estate is necessary to provide financial possibilities and incentives for firms to invest in pollution prevention measures such as cleaner production and ISO 14000 (EMS). Income sources to create the fund may include wastewater fees, and/or land lease fees.

** Quacert/Quatest*

Quacert is the Vietnamese organisation that is in charge of certification for ISO 9000[11]. With respect to ISO 14000, so far there is no Vietnamese certification organisation. Quacert might be a qualified candidate to develop into a certification institution for ISO 14000. The establishment of such a certification institution in Viet Nam might also stimulate the further implementation of ISO 14000 (EMS). In addition, Quatest III has taken the initiative to invite foreign experts for introduction courses on ISO 14001. In developing into an expert institution on ISO 14000 and in stimulating EMS in Viet Nam there exist two strategies Quatest may adopt in the short term. In the first strategy, Quatest will

invite foreign experts to conduct training programmes for its staff to equip them with relevant expertise. These trainees then can act as local experts in assisting ISO 14001 certification. In the second strategy, Quatest will invite foreign expert to conduct training programmes for industrial firms. These trainees can help themselves in preparing the relevant changes and documentation required for ISO 14001 certification. Consequently, in both cases firms will only rely on foreign experts in evaluation and certification. These strategies are expected to encourage firms to apply for ISO certification.

* *Universities*

Vietnamese scientists have contributed significantly in raising environmental awareness, and environmental issues have now become part of high school and university curricula. Nevertheless, environmental education in Viet Nam is still in an early stage of development. End-of-pipe subjects still dominate the environment-related curricula of universities. In general, cleaner production, ISO 14000, and other environmental management tools and approaches have not become part of the university curricula. However, the Viet Nam Cleaner Production Centre is now developing a programme to integrate cleaner production into the curricula of universities[12]. It is recommended that ISO 14000 be also included in the university curricula.

6. Conclusion

In order to develop a green industrial estate based on the concept of industrial ecology, each firm resident in that industrial estate has to become a green manufacturing unit. Firms having good environmental practice are seen as indispensable building blocks for the construction of any ecologically sound industrial estate.

The question is then: how and what should be done to improve environmental performance of firms in industrial estates? Firms' environmental performance can be greatly improved via the introduction of a more systematic environmental management system. Many firms in Viet Nam face significant constraints to improve environmental performance and adopt an ISO 14000 (EMS). Lack of environmental awareness; budget deficits; limited access to technology and information are major internal factors that explain the limited application of ISO 14000 (EMS) and the related issue of the poor environmental performance of most Vietnamese firms. In the absence of strong internal ambitions to improve environmental performance, external forces may be essential.

In spite of this, up until the present, market pressures and governmental interventions have had a limited effect in triggering environmental management systems in Viet Nam. Governmental authorities, Quacert/Quatest, and Industrial Zone Infrastructure Development Companies, can play significant roles in stimulating the development and implementation of environmental management systems. As is the case in other Asian developing countries, the role of the Vietnamese state can be considered crucial in promoting the adoption of the ISO 14000 (EMS). The role of the state in the development of green industrial estates will be further discussed in the next chapter.

Notes

[1] While ISO 14000 series set standards for environmental management systems, they do not stipulate how the EMS should be implemented. ISO 14000 series do not require the publication of environmental impacts and the public is not made aware of audit results. While ISO 14000 may indeed improve environmental conditions in some areas, it can also mislead the public into thinking that certified companies are performing well when in actually they continue to harm the environment and threaten public health and safety. ISO cannot be credible if rogue companies can misuse it (Barber, 1998).

[2] Various NGOs comment on the lack of any NGO involvement in the development of the standards. Industry and consultants dominated the drafting committee for the ISO 14000 series; environmental groups have not brought into the process. Invitations to participate in the initial negotiations were extended for too late for NGOs to effectively participate (Barber, 1998).

[3] Interview Mrs. Diep Thi Lan, technical staff, Department of Training and Consultant (Quatest III/ Quacert) (May 27, 1999 and May 25, 2001).

[4] This conclusion is also strengthen by the research of Le Van Khoa and Boot (1998) and Nguyen Nhu Dung (2000).

[5] There are 18 General Corporations for oil, coal, textiles, chemicals, paper, steel, cement, machinery, telecommunications, air transport, etc.

[6] In 1997, for instance, approximately 60% of the SOEs were loss-making or only marginally profitable even though they have preferential access to lending from state-owned banks and state guarantees have secured them well over half the available formal credit (IMF, 1999).

[7] According to Rock (2001), there is growing evidence that newly industrialising economies are facing mounting international market pressures. Sometimes new environmental market access requirements take the form of environmental certification, such as ISO 14000 certification and eco-labelling of products for sale in OECD markets. Sometimes they take the form of international environmental supply chain requirements by multi-national buying groups on their developing country suppliers.

[8] In Viet Nam, within MOSTE there is the Directorate for Standards and Quality (Quacert) that is responsible for quality assurance, standardisation of equipment, and testing of products produced in Viet Nam. Quacert has three branches: one in the North (Quatest I), one in the Centre (Quatest II) and one in the South (Quatest III).

[9] This argument is strengthened by Leuenberger (2001).

[10] This suggestion is in line with policy recommendations presented to Vietnamese trade and environmental authorities by UNDP (UNDP, 2000).

[11] Firms in Viet Nam can choose either Quacert or foreign organisations such as BVQI (United Kingdom), AFAQ (France), TUV (Germany), QMS (Australia), ABS Quality (the United States), SGS (Canada), etc. for consultancy and certification for ISO 9000 (interview Ms. Diep Thi Lan, Quatest III, May 27, 1999).

[12] Interview Ms Loan, Information Section of Viet Nam Cleaner Production Centre, (August 21, 2001).

CHAPTER 6

POLITICAL MODERNISATION FOR INDUSTRIAL ECOLOGY

The Vietnamese governmental authorities have a crucial role to play to advance the development of industrial ecology in the industrial estates in Viet Nam. In order for the authorities to fulfil this role, the political and environmental policy-making system needs to be modernised. Within the ecological modernisation school of thought this has become known as 'political modernisation'. This chapter starts with the introduction of the idea of political modernisation.

The discussion on various environmental policy models together with their advantages and disadvantages follows, with a focus on understanding how the process of political modernisation takes place. Within this section is an analysis of the use of these models in the development of industrial ecology. The third section discusses the application of these models in environmental protection in Viet Nam, and identifies the barriers to political modernisation. The last section presents a discussion on the opportunities for political modernisation in Viet Nam, based on the principles of Ecological Modernisation Theory.

1. Political Modernisation

Ecological Modernisation Theory does not deny the role of the state in radical environmental reforms, as some of its critics claim, but rather emphasises the role of science and technology, economic agents and market mechanisms, and social movements and non-governmental organisations (NGOs) in environmental reforms.

In fact, the emphasis of ecological modernisation scholars is strongly on the changing role of the state in environmental management and policy-making, in two ways. First, some tasks and responsibilities in environmental management shift from the state to the market. In other words, market dynamics and economic actors play an increasing role in environmental reform. Second, the

'style' of state intervention in environmental policy shows relative changes from curative and reactive to more preventive and proactive; from centralised to decentralised; from hierarchical to more consensual; from closed policy-making to participatory policy-making, based on negotiations and intensive consultations. This changing role of the state in environmental reform is often referred to as political modernisation[1].

The achievement of political modernisation requires the development of new relationships between state-industry and state-non governmental actors, with a more decentralised, flexible and consensus-oriented governance style. The emergence of economic and communicative approaches in environmental policy-making is an indication of this changing role of the state and state policy. The movement away from command-and-control regulations and towards market-based and more voluntary forms of environmental policy reflects the growing understanding that the state cannot prescribe through legislation the kind of innovative responses needed from the business community to meet environmental goals while continuing the pursuit of economic growth.

2. Environmental Policy Instruments

According to economists, environmental degradation is caused by so-called 'market failure', when prices do not adequately reflect environmental values of goods, or when goods have no markets at all. Market failure also leads to production inefficiency. Ideally, such market failure should be corrected by governmental action. However, incorrect governmental intervention, which is called policy or state failure, does not repair the market failures and even lead to environmental damage. State failure refers to the fact that governments have shown themselves to be imperfect guardians of the national interest, and have often intervened in markets to make situations worse (e.g. when the government creates incentives for environmentally damaging activities by intervening through subsidies, price controls, etc.) (Panayotou, 1992). According to Brandon and Ramankuty (1993), state and market failures are among the causes of environmental degradation in Asia.

Since the seventies, when the environment became an issue on the political agenda, policy-makers have been searching for effective and efficient strategies to solve environmental problems. Generally, environmental policy approaches or instruments are divided in three different categories: direct regulation or regulatory instruments (command-and-control), economic instruments, and communicative instruments (Verbruggen, 1994).

2.1 Command-and-Control

One of the most established strategies for policy-making is the command-and-control strategy, which is characterised by hierarchy and bureaucracy. Within this strategy, laws, standards and regulations are characteristic instruments to directly influence the behaviour of the relevant actors. The government prescribes uniform environmental standards, mandates the abatement methods required to meet such standards, issues licenses, and assures compliance through monitoring and sanctions. The main advantage of command-and-control instruments is that there is longstanding experience with them. In addition, rules and regulations set clear limits about acceptable and unacceptable behaviour. The drafting and implementation of legislation generally follows a clear process and it guarantees uniform waste treatment. This approach provides more security than other instruments that environmental policy objectives will be met (as long as enforcement and implementation is adequate) which is considered especially important for toxic and hazardous waste streams (Barde, 1994). In many countries, from North to South, from East to West, environmental agencies have been relying heavily on traditional regulations to address environmental problems.

However, the command-and-control approach to environmental policy is often believed to have many drawbacks. These drawbacks fall into four categories: economic inefficiency, environmental ineffectiveness, no incentive for innovation, and democratic illegitimacy (see Tietenberg, 1988; Eckersley, 1995).

Ecological modernisation scholars have also evaluated the drawbacks and potential disadvantages of a command-and-control strategy. According to Huber (1991), although the command-and-control strategy has been successful in the past in dealing with the initial problems in the field of environmental policy, this strategy will be found not sufficient to do so in the future.

2.2 Economic Instruments

As early as the 1970s, environmental economists already entered a plea for the use of economic instruments in environmental policy. Ever since the 1984 Organisation for Economic Co-operation and Development (OECD) Conference on Environment and Economics, the OECD has actively encouraged the use of economic instruments in environmental policy (OECD, 1996). In 1989, the OECD formulated a set of guidelines for the application of economic instruments in environmental policy (Montalvo, 1995). By the late 1980s and especially in the 1990s, the use of economic instruments in national environmental policy was increasing.

The aim of economic instruments is to make the market function in areas where it did not work previously. Administrative charges, effluent or emission charges, user charges, product charges, environmental funds, subsidies, tradable permits, and deposit-refund systems are examples of economic instruments used in pollution control (Box 6.1).

Box 6.1 Major Types of Economic Instruments in Pollution Control

Administrative Charges or Fees: Administrative charges or fees are generally designed to help fund licensing or license monitoring systems (e.g. The charge is levied when registering new chemical products).

Effluent or Emission Charges or Taxes (Pollution Charges/Taxes): Effluent and emission charges are charges on the discharge of pollutants into water, air or on the soil and on the generation of noise. Charges are calculated based on the quantity and quality of the pollutants.

User Charge: A user charge has been defined as a payment for the cost of collective or public treatment of a certain effluent. User charges have a revenue-raising purpose. Effluent or emission charges and user charges have been used widely in OECD countries, in particular in the fields of water and waste, and to a lesser extent, in air management and noise abatement.

Product Charges or Taxes and Tax Differentiation: A product charge is charge levied on products that are harmful to the environment at the point that they are used in production processes; consumed; or disposed of. They can be applied to products that cause environmental problems either because of their volume; as a consequence of their toxicity; or due to certain harmful contents, such as heavy metals, PVC, CFCs, halogenated hydrocarbons, nitrogen and phosphorus. Tax differentiation modifies the relative price of products by penalising those that are harmful to the environment.

Environmental Fund: The revenues deposited in an environmental fund can come from a variety of sources, but a large part generally are from pollution charges. The fund can be used for various purposes. By their very nature such funds involve earmarking of revenues for environmental uses. Principal uses include compensation for pollution victims, financing of public pollution control infrastructure, subsidies to individual polluters to invest in pollution control measures, etc.

Subsidies: Subsidies can take the form of grants, soft loans and tax allowances, all of which may be used to encourage environmentally friendly behaviour. In many cases subsidies are considered state failure, in particular when these create overexploitation of resources or overuse of toxic substances (e.g. pesticides, herbicides, etc.). As a general rule, these are incompatible with the polluter pays principle (PPP). However, subsidies remain a type of economic instrument which can be effective in certain situations, e.g. as payments for positive externalities, cleaning up of derelict sites, or catching up on a pollution backlog. It is also generally accepted that the revenue from pollution charges is earmarked to achieve environmental protection goals. Therefore references will be made to subsidies in some specific cases.

Tradable Permits or Marketable Permits: Tradable permits or marketable permits are environmental quotas, allowances, or ceilings on pollution levels that, once initially allocated by the appropriate authority, can be traded subject to a set of prescribed rules. Their primarily advantage is that they can reduce the cost of compliance; the prescribed rules are those necessary to ensure attainment of the environmental goals as the trades occur. Trades of permits can be external (between different firms) or internal (between different plants or products of the same firm).

Deposit Refund systems: In deposit-refund systems, a deposit is paid on potentially polluting products. This is reimbursed if the product is returned for treatment or recycling. These are mainly used to encourage reuse and/or more environmentally friendly disposal. Deposit-refund systems have been operated for a long time in the field of beverage containers. Their origin is purely economical. But environmental economists see more than one reason to apply deposit-refund system for environmental benefits. These benefits are reduction of waste volume, prevention of the release of toxic substances into the environment, for instance from disposal of batteries, or from incineration of plastics or residuals from pesticide containers. Presently there is a wide variety of applications of deposit-refund system in OECD countries, on products such as containers, batteries, car hulks, tyres.

Source: OECD, 1991; Barde, 1994

According to the technical guideline of UNEP (1997) on environmental management of industrial estates, economic instruments have not yet been widely used at estate level. However, their potential should be considered. Economic instruments can include incentives (+) and penalties (-). Some of the instruments that have the potential to be applied to industrial estates are: development impact fees (-); depletion charges on resource use (-); user charges for use of sewers and disposal of solid waste (-); deposit-refund systems to encourage reuse and recycling of containers; and lower rental fees for conservation and efficiency (+). Other economic instruments that can be applied in co-operation with national government include: soft loans for new environmental technologies (+); emission/effluent charges (-); product charges (-); and tradable permits based on the total permitted pollution load (+).

An advantage of an 'economic strategy' in environmental policy-making is the direct economic link between the polluter and the environmental problem: a polluter is forced to pay for his actions. This is in accordance with one of the major principles of environmental policy, the PPP. The literature on pollution prevention identifies the following advantages of economic instruments: potential to raise revenue; natural resource conservation, providing incentives for pollution prevention and environmentally sound behaviour; cost-effectiveness; and (except with subsidies) giving economic actors the freedom to choose how to respond to the instrument applied (Barde, 1994; Steele and Pearce, 1994; OECD, 1996). Major weaknesses of economic instruments are considered to include inadequate in dealing with toxic wastes; uncertainty in meeting environmental goals; and possibly uneven distributive effects. In addition, environmentalists and the public at large often perceive economic instruments as implying the 'right to pollute', which presents an obstacle to their introduction (Rahim, 1994; Barron, 1994; OECD, 1996).

However, it is important to remember that economic instruments are seldom used in isolation. There are many cases where they are implemented in combination with other types of instruments, commonly regulation. In most OECD countries, long-established regulatory instruments are increasingly being complemented by economic instruments (O'Connor, 1995). A complete shift from a command-and-control model towards economic instruments is unlikely to occur, but a development towards the combined utilisation of both instruments is in progress (Montalvo, 1995). Within economic instruments, the choice for use should be carefully considered in order to achieve both economic and environmental goals (Box 6.2).

Box 6.2 Criteria for Choice of Instruments

When developing new policies, the choice of environmental policy instruments needs to be assessed on a case by case basis, addressing in which circumstances and in which forms economic instruments would be most appropriate. Choices can be made against the background of five sets of criteria:

- Environmental effectiveness: The environmental effectiveness of economic instruments is mainly determined by the ability of polluters to react. Economic instruments will yield greater environmental effectiveness if they can provide a permanent incentive to pollution abatement and technical innovation.
- Economic efficiency: The instrument should attain its goals with optimal allocation of resources.
- Equity: It is essential to determine who is going to be affected by the implementation of a particular instrument, and if those who actually pay are really the ones who are meant to carry the costs.
- Administrative feasibility: It is necessary to consider whether the use of the instrument is practicable in terms of information requirements, administrative demands and political feasibility.
- Acceptability: It is of crucial importance that target groups accept the economic instruments imposed on them. Major resistance will render the instrument inefficient.

Source: OECD, 1991

Given the advantages of economic instruments, countries around the world have implemented a number of these instruments to protect the environment and control pollution (e.g. OECD, 1994a; O'Connor, 1994a; O'Connor, 1994b; O'Connor, 1995). Initially, economic instruments were seen to be especially fitting into more neo-liberal (so-called deregulatory) environmental policies. But this has changed completely. Nowadays, economic instruments are being used in all kinds of economic systems and political programmes, although the design of the economic instruments differs according to the national context and political programme[2].

2.3 Communicative Instruments

Communicative instruments are relatively new in environmental policy. These instruments are being presented as a 'third' model of environmental policy-making, alongside the traditional instruments of direct regulation, and the use of financial carrots and sticks in the form of economic instruments. Van de Peppel and Herweijer (1994) defined two kinds of communicative policy: one-sided and two-sided instruments. One-sided communicative policy involves a one-way flow of information from policy-makers to target groups or polluters. Education and extension are examples of this policy. The two target categories of one-sided communicative policy are consumers and producers. According to Van de Peppel and Herweijer, consumers are subject to two types of information flows: campaigns and product labelling. Producers may also be subject to campaigns, in which they are informed about best available technologies or clean technologies.

Two-or more-sided communicative policies are characterised by dialogue, consensus, and information exchange between policy-makers and regulated actors. This form of policy is also referred to as joint environmental policy-making or voluntary agreements (Mol et al., 2000). Examples of joint policy-making are covenants, contracts and negotiated rule-making. Voluntary agreements and voluntary standards (ISO 14000 series) are placed under the umbrella of voluntary initiatives. These are often used in the context of responsible entrepreneurship to improve companies' environmental performance (UNEP, 1998b). The central idea behind voluntary agreements is that the design and implementation of environmental policy goals is only possible in close collaboration with and with the agreement of those actors that are to be regulated.

The lesson learnt with command-and- control instruments is that environmental policy fails if the polluters are strongly opposing the standards and measures developed by the state environmental authorities. Consequently, such an environmental policy is not very effective. By discussing and negotiating in an early phase of environmental policy-making between regulators and polluters on the means, concrete measures and time frames, opposition will be decreased during policy implementation. In this form of communicative instruments government and target groups agree to reach certain environmental objectives within a defined time-frame. In cases of non-compliance, the government can still impose regulations or other coercive measures. The key feature is that the government allows the target groups to take care of solving their own environmental problems that is, to be self-regulated. There is far less government intervention, and what there are focuses mainly on goal formulation, and dealing with non-compliance. Notwithstanding all the debates on the successes of voluntary agreements, experience is that some kind of state intervention will always be necessary in the field of environmental policy because of the very nature of environmental problems. Voluntary agreements cannot exist without regulations. So these kinds of instruments should be seen as complementary to other policy instruments.

The advantages of voluntary agreements for industry include transparency in the policy-making process; greater flexibility concerning ways of reaching targets; more influence on time-frames, priorities, strategies and means; and the opportunity to present a better public image. Environmental authorities can use the information and expertise base of industry towards its own production processes, products, emissions, and emission reduction potentials, a basis which is usually much more extensive than that of authorities, who have neither the time nor the money to become experts in every specialised area. Voluntary agreements promote a dialogue between the state and industry, and raise industry managers' environmental awareness. They can serve as tools to push industry's environmental performance and resource productivity beyond prevailing stan-

dards. As such, voluntary agreements can promote innovation and limit enforcement costs (Koopman, 1996; UNEP, 1998c). With such an advantage, more than 300 voluntary agreements have been recorded in the European Union (EU). These agreements have attracted considerable interest, and many different forms of voluntary agreements have been implemented (Barde, 1998; Mol et al., 2000). According to an International Energy Agency study, there are roughly 250 voluntary agreements in OECD countries serving the purpose of greenhouse gas abatement (Kabelitz, 1998). Asian countries like Japan and Indonesia are also reported to have pollution prevention agreements as part of their efforts to cope with pollution problems (O'Connor, 1994b).

But like other instruments, voluntary agreements also have drawbacks. A voluntary agreement is a weak form of sanction; has a disputable legal character; often sets targets at a less ambitious level; presents difficulties in dealing with free-riders; and is ill-equipped to address non-point and mobile pollution sources (O'Connor, 1994a). So one should not be too surprised to find that communicative instruments are intended to be complementary to other environmental policy instruments (regulations, economic instruments), rather than to replace these instruments.

2.4 Environmental Policy for the Development of Industrial Ecology

It is widely acknowledged that operationalising the idea of industrial ecology through the creation of industrial symbiosis or eco-parks requires a major shift in thought and action. The need for change only comes about by changing the awareness and behaviour of different stakeholders. Appropriate environmental policy instruments, among other factors, are necessary to induce change in favour of eco-park promotion.

Reliance on a command-and-control model that specifies the type of technology to be used, rather than allowing firms the flexibility how to meet set emission or effluent standards, has been shown in the past to impede innovation (Giannini-Spohn, 2001). In contrast, a cleaner production approach requires goal setting and performance standards, and should be encouraged by governmental technical assistance and financial incentives. An environmental policy framework that rewards firms for cleaner production, and forces polluters to internalise the costs they currently transfer to the public at large, enhances the promotion of industrial ecology. Consequently, the design for eco-parks cannot be based solely on a command-and-control model.

Economic instruments such as charges, environmental funds, and subsidies provide the economic disincentives and incentives for polluters to change their behaviour towards more environmentally sound manufacturing. In responding

to incentives, polluters seek to adopt more cost-effective measures in pollution control. A deposit-refund system is another type of economic instrument that promotes reuse/recycling, contributing to closing the loop of materials. It has been observed that as environmental policies move in the direction of pollution prevention and away from cleaning up existing pollution damage, economic instruments are likely to become more important (OECD, 1996).

Beside economic instruments, communicative instruments are also necessary to support the development of eco-parks. According to the OECD (1994b), a shift towards pollution prevention as a policy approach requires governments to use communicative approaches such as negotiation with stakeholders and joint agreements. In a detailed study on environmental policy-making in six OECD countries (the United States, the Netherlands, Denmark, France, Germany, and Japan), Wallace (1995), concluded that the function of negotiated agreements in environmental policy-making is to formalise a high level of dialogue and trust between industry and the regulator, thereby promoting the adoption of innovative strategies such as cleaner production measures. Similarly, the development of eco-parks requires the involvement of many stakeholders; the linkages between firms to co-ordinate the flows of energy and materials for maximum efficiency and the flows of information on wastes and/or by-products that can be exchanged. It also requires the development of trust; the availability of technologies; etc. These can be achieved through conversations, dialogues, contracts, and covenants. Education, training, and workshops can play a vital role in providing information on cleaner production, waste exchange and industrial ecology, which are necessary for an eco-park project.

Although the idea of an eco-park cannot be planned or enforced via regulatory measures alone, regulations still have an important role. Legal descriptions, for instance, can be used to create incentives such as lower tariff schedules for products with higher percentage of recycled content. Legislation can also assist in ensuring that a sufficient supply of reusable and recycled waste is available to support a market for wastes through mechanism such as deposit-refund system. Banning toxic substances; incorporation of reuse/recycling and pollution prevention obligations in permits are other means to promote industrial ecology via legal instruments.

In the literature, emphasis is put on the combination of different environmental policy instruments and approaches in environmental policy-making to promote industrial ecology (see for instance Richards et al., 1994; Allenby, 1999), and to promote eco-park (Lowe, 2001). This is also what is found in practice: policy development in favour of industrial ecology implementation is a mixture of regulatory, market-based and communicative approaches (Durney, 1997; Andrews et al., 2001). Experiences from countries where industrial ecology has

been adopted for industrial estates show a combination of various environmental policy instruments, rather than solely command-and-control. Enforcement of standards and regulations is accompanied by economic incentives, training, workshops, development of information centres, promotion of dialogues between stakeholders, etc. in order to facilitate the development of eco-parks (Côté, 2001; Duan, 2001; Chavanich, 2001; UNDP, 2001).

3. Political Modernisation and its Limitations in Contemporary Viet Nam

3.1 Failure of Command-and-Control Approach in Viet Nam

As discussed in chapter 3, environmental policy in Viet Nam has followed the command-and-control model, which has been unable to keep pace with contemporary industrial growth. There are reasons why command-and-control does not work well in Viet Nam – as is true for the majority of developing countries. First, non-compliance or violation of environmental regulations will be fined or imprisoned. However, for cultural reasons, in many developing societies, especially in Asia, courts are used as a last resort, which means they are rarely used. Second, in the case of developing countries, command-and-control instruments are ineffective due to lack of financial, human and technical resources; inadequate monitoring; and weak enforcement. Third, the low degree of devolution of authority and taxation to representative local government reduces the ability and increases the cost of regulation, monitoring, and enforcement. Fourth, the fines are usually set too low to deter violators: fines remain unchanged in nominal terms for years, and become eroded by inflation. The fifth and most damaging reason for their failure is the "rent-seeking behaviour" of the enforcement officials (Panayotou, 1992). Yet another reason is that in Viet Nam – as well as in most developing countries – the adoption of industrialised countries' regulations regardless of their particularities makes regulations too hard to comply with (Montalvo, 1995).

The Vietnamese state holds a strong position in economic and societal development. The state plays a leading role in planning and prioritising economic development in the process of industrialisation. On the one hand, this 'strong developmental state', seems a crucial factor in the economic success of the Southeast Asian tiger economies, and Viet Nam is not an exception (Frijns et al., 2000). On the other hand, this strong state prevents the incorporation of economic actors and mechanisms into a process of environmental restructuring. This is particularly true whenever, as I have argued in chapter 5, the fostering of pollution prevention activities and the development of eco-parks in Viet Nam demands the involvement of different stakeholders. The role of the state is still crucial, but it should be changed. The state must move beyond being only a regulator and become also a leader, educator, facilitator, supporter, innovator

and partner as well. It is for this reason that political modernisation is necessary. In the following sections I will present current application and constraints to apply economic and communicative approaches in environmental policy-making in Viet Nam.

3.2 Economic Approach

Economic instruments offer a new approach for Viet Nam to enable better pollution control. First, they can achieve the desired effect at the least possible cost, which is vital to Viet Nam with its limited resources and its need to maintain competitiveness in world markets. Second, some economic instruments (e.g. deposit refund systems, marketable permits) present fewer opportunities for rent-seeking behaviour than others, so that they are likely to be both more effective and more equitable. Third, economic instruments generate revenues which should be welcomed by countries like Viet Nam and other developing countries facing budgetary deficits (Panayotou, 1992).

Environmental taxes and environmental funds[3] have been designed by the Ministry of Science, Technology and Environment (MOSTE) as the first step to introduce economic instruments in environmental policy. In fact, some types of economic instruments for pollution control have been used in Viet Nam, including tax reduction for imports and for the installation of clean technologies; and the VINACOAL environmental fund[4]. Ho Chi Minh City Department of Science, Technology and Environment (DOSTE) has created a so-called Industrial Pollution Minimisation Fund to support industries in Ho Chi Minh City in waste reduction and treatment. Recently, user charges have being developed for common wastewater treatment systems in industrial zones and export-processing zones.

Deposit-refund systems have been in place for quite a long time, but this system is only applied for beverage containers. In Hanoi, a 10 percent surcharge is added to the water bill to help meet the costs of sewerage and pollution control. The actual revenues from this surcharge are small, but at least the principle has been established (ADB, 1996). Some studies on pollution charge schemes have been carried out for food processing industries (Do Thi Huyen et al., 1999), and for industries in industrial zones (Tran Vo Hung Son, 1999). However, up till now experiences with other kinds of economic instruments such as subsidies for pollution control and prevention measures; product charges, marketable permits, development impact fees, depletion charges on resource use, etc. are still lacking in Viet Nam.

In separate research conducted in northern and southern parts of Viet Nam by Hoang Hai (2000) and Phung Thuy Phuong (2002) respectively, it was

concluded that there is still limited use of economic instruments to create incentives to recover/recycle wastes/by-products in production processes. This presents one of the obstacles to the introduction and application of industrial ecology in Viet Nam.

There are a considerable number of obstacles preventing the widespread application of economic instruments in Vietnamese environmental policy. One practical constraint is the lack of knowledge on how to design and implement economic instruments, and to predict their impact on growth and income distribution. Another factor limiting the application of economic instruments is the fear that economic instruments will raise the costs of production and make local industries less competitive in the world market. An inadequate legal framework for environmental management (in case of industrial estates); weak institutional capability and power of environmental agency; and lack of collaboration between agencies are impediments to full application of economic incentives. For instance, in order for industries to select appropriate cost-effective measures for pollution control, transparency and predictability of policies are important factors. But in Viet Nam both are often found lacking, industries frequently face institutional confusion, arbitrary enforcement and unpredictable policy. Collaboration between MOSTE and the Finance Ministry in designing and applying environmental taxes is not an easy task. In addition, many economic instruments work better in an economic environment where polluters are familiar with economic choices. Tradable permits, for instance, will be implemented more easily in countries that have experience with formal trading systems such as the stock market, or auction systems for import-export quota. Until now these systems have been largely absent in Viet Nam.

3.3 Communicative Approach

The one-sided communicative instruments and approaches have been applied in Viet Nam for years. MOSTE has conducted a number of activities to raise public awareness in collaboration with other ministries, the news and broadcasting authorities and a variety of mass organisations (Nguyen Ngoc Sinh and Friederich, 1997). MOSTE, together with organisations of culture, information and fine arts, has repeatedly organised national contests on the environment with active public participation. At the provincial level, DOSTEs in many provinces and cities have organised campaigns on environmental sanitation. At schools, colleges, and universities, environmental issues have become part of the curriculum (SRV, 1992). However, these communication activities focus more on the green environment (natural conservation, biodiversity, sanitation, etc.), and households, and not so much on industry, leaving the grey issues of the environment aside.

Only recently training courses, seminars, workshops, and conferences on industrial pollution, clean technologies and cleaner production, ISO 14000, and the like have been carried out. But communications on eco-labels, green products, environmental friendly behaviour of green consumers and the like are still absent. Much more can be done, and Nguyen Ngoc Sinh and Friederich (1997) have identified this as a priority area for the National Environmental Agency (NEA) to tackle. Regarding two-sided communicative instruments, there is limited experience in Viet Nam on voluntary agreement and negotiated policy-making.

In an attempt to identify the barriers to apply voluntary agreements and negotiated policy-making, the Dutch model is used as a reference. The Dutch experience on voluntary agreements and target-group approach is internationally recognised as an effective and powerful model for co-operation between industry and government. Based on the Dutch experience, the following factors are regarded as essential for effective voluntary agreements:

- There should be a basic level of environmental regulation including compliance and enforcement;
- Industry and government should have a shared vision of longer term environmental targets;
- Companies need a sufficient level of environmental management capacity to be able to implement the agreement;
- Government should be able to deal effectively with free-riders and develop alternatives to 'voluntary' initiatives that are unattractive to industry;
- Monitoring and reporting should be transparent and public;
- Public awareness and pressure on industry needs to be sufficient to improve environmental performance.

When these conditions are met, environmental agreements may also work in other countries (De Hoog, 1998).

The stimulation and implementation of voluntary agreements and voluntary approaches in environmental reform in Viet Nam will encounter difficulties from three sides. First, most Vietnamese companies are not very well informed and hardly know how to put forward and implement their own environmental goals, strategies and improvements. In general, they are not ready to move to more self-regulative approaches; this limits the chances of using voluntary agreements and the like. Second, governmental and state-related barriers prevent a rapid and easy application of voluntary approaches in environmental reform. These barriers relate to the prevailing policy style and culture in Viet Nam, and to the authorities' historic 'need' to be in control and to have a sense of authoritarian power. Indeed, the government continues to prefer a strong cen-

tralised state, directing environmental policy (and other aspects of governance). Not only the recent history of a central planning and a command economy, but also the heritage of the traditional monarchy (which strongly influenced the culture of hierarchical behaviour) and the lack of experience in negotiations and joint policy-making, are unfavourable to a switch to more public and/or private participation in policy-making. Other barriers to more voluntary approaches in environmental policy-making relate to the fact that environmental monitoring and enforcement fall short (see chapter 3); and that there is no clear definition of responsibilities and division of roles among different governmental organisations in environmental protection (see also chapter 3). Third, voluntary instruments and approaches such as eco-labels or annual environmental reports depend on green consumer demand, or active public pressure. However, the demand for eco-products is insignificant (see chapter 5), and there are no environmental NGOs that could effectively mobilise public pressure (see chapter 7). These form crucial barriers to effective voluntary agreements.

4. Future Opportunities for Political Modernisation in Viet Nam

Despite of the fact that there are a number of barriers to apply economic and communicative approaches in Viet Nam, some opportunities can be identified to modernise the state interventions in environmental policy-making. This section discusses the opportunities for political modernisation in Viet Nam, looking at economic instruments and a market-based approach, communicative instruments and approach, and at new modes of governance. In addition, international influence is also taken into account as a kind of driving force for political modernisation.

4.1 Economic Instruments and Market-based Approach

Some opportunities for the use of economic instruments and a market-based approach in Viet Nam can be identified. First, where the Law on Environmental Protection (Article 7, Chapter I) seeks to apply the PPP, economic instruments have been considered an appropriate policy approach by the Vietnamese government. Second, as Viet Nam moves from a command economy to an open, market-oriented economy, market-based approaches for pollution control are promising. As Tran Thi Thanh Phuong (1996: 5) puts it: 'the transition to a market-based economy and the expansion of the private sector are good conditions for applying economic instruments in environmental management in Viet Nam'. Third, Viet Nam can enjoy certain advantages associated with being late in the industrialising process. Among the advantages is the opportunity to learn from the experiences of others (see O'Connor, 1994a; 1994b; 1995; Von Amsberg, 1995 for review).

At industrial estates, development impact fees, environmental funds, land rental fee differentiation, marketable permits and charges are identified as potential instruments for pollution control. However, a discussion on marketable permits and charges is worth considering.

In industrial estates, where the cumulative effects of pollutants in small areas may cause severe problems, individual emission standards, applied without considering their collective effect, are not appropriate. In such a case, tradable permits might be a better solution. Given its complexity, the limited experience with the application of this instrument in developing countries[5], and the lack of experience in financial trading in Viet Nam, the development of this kind of instrument might be difficult. However, Vietnamese policy-makers and environmental economists have begun to pay attention to the potential use of this instrument in Viet Nam[6]. In addition, Thailand and Malaysia are in the process of studying the use of this instrument (Le Thi Thanh My, 1999). Thailand in particular is very interested in the application of tradable permits for pollution control in industrial estates[7]. This might offer valuable experiences for Viet Nam to build upon.

There are at least two issues to be considered in the application of charges for pollution control in Vietnamese industrial estates. First, while in theory economic instruments may effectively promote research, and implementation of cleaner technologies, in practice experiences in France, Germany, the Netherlands, and Japan have revealed that both charges and subsidies lead primarily to the application of end-of-pipe technologies and not so much to the introduction of preventive technologies (Cramer et al., 1990; Skou Andersen, 1994). A review on the application of economic instruments in OECD and Asian countries shows that these instruments mainly increase revenues, which are earmarked for environmental expenditure, but provides less incentives for pollution prevention practices in industry (Barde, 1994; O'Connor, 1994a). These experiences suggest that attention should be paid to the rate of charges. These charges should not be so high as to affect business, or too low to discourage polluters to change their behaviour. Second, if industries in industrial estates are subject to many kinds of charges, they might loose their interest to invest in industrial estates. This suggests that for fair competition, the charge system should be applied to all kinds of industries, both within and outside of industrial estates. In addition, a tax-plus-subsidy scheme which combines 'carrots' and 'sticks' (e.g. a kind of environmental fund combined with charge scheme) should be applied to achieve environmental goals (O'Connor, 1994a; Wang and Chen, 1999).

As the Industrial Zone Infrastructure Development Company of each industrial estate is already in charge of collecting land rental fees from factories, their tasks can be extended to collecting charges[8], allocating environmental funds,

and allocating the trade in marketable permits. The administrative costs of the charge system will be low because they can be incorporated into the existing fee system of industrial estates. In addition, with the co-ordination of the Industrial Zone Infrastructure Development Company in regulating tradable permits between factories in an industrial estate, the environmental quality of industrial estates could be improved on the one hand, and the burden of DOSTE could be relieved on the other. A study on an effluent charge scheme for industrial wastewater control in industrial estates has been carried out recently. A new institutional arrangement, in which state authorities, environmental agencies, para-statal organisations, and industry co-operate has been suggested in that study to implement an effluent charge scheme in one industrial zone (Duong Quoc Vinh, 2000). This means a transfer of political power or policy-making from state to para-statal organisations or even to the market.

4.2 Communicative Instruments and Approach

At first sight, communicative approaches and more specific voluntary agreements do not seem very relevant in improving Vietnamese environmental management. Experiments with such instruments and approaches could best start with foreign investment companies, or joint-venture companies, which have had some experience in dealing with these innovative approaches in their home countries and have – or can mobilise – considerable environmental knowledge, which is essential to some form of 'self-regulation'. Industry associations, which play a bridging role in negotiations, consultations, consensus building and information exchange between government and individual companies in West European countries (Jacek, 1991), hardly exist in Viet Nam. But an Industrial Zone Infrastructure Development Company seems an appropriate Vietnamese alternative to fill the gap. These companies have better access to, knowledge of and trust among individual enterprises than any other governmental agency. While able to represent to some extent the economic interests of enterprises in industrial estates towards the environmental agencies, they do have sufficient distance to incorporate economic interests beyond the immediate short-term, narrowly defined profitability. Moreover, industrial estates are a good setting for disseminating information and experiences with foreign investment companies on new regulation strategies, so that initial experiences with foreign companies can be replicated in other, similar companies in the same industrial estate. An information desk should then be created for each industrial estate, so that companies, Industrial Zone Infrastructure Development Companies, Industrial Zone Management Boards, and state environmental agencies can exchange their experiences with improving environmental performance within and between industrial estates.

In addition, the introduction of ISO 14000 standards might trigger a voluntary approach. As companies follow ISO14000 standards, this will have a self-regulation effect, one of the preconditions for the success of voluntary agreements. It is suggested that measures to promote the application of ISO 14000 standards be taken into account in environmental policies to pave a way for voluntary agreements.

In any case, education, training, seminars, etc. are very important for the development of environmental policy. These activities should be one of the foci of the government in the process of environmental reform. Such a one-sided communicative policy should be taken prior to two-or-more-sided communicative or voluntary approaches.

Although economic and communicative instruments could be developed to supplement regulatory instruments, this should not mean lowering the 'regulatory burden,' as some claim, but rather should serve as an additional tool to facilitate the implementation of regulation.

4.3 New Arrangements

In Viet Nam, it is clear that environmental protection appears to be solely a state responsibility, other stakeholders seem to have no role – or only a minor (passive) one – to play. Yet the state does not have enough budget and manpower to fulfil its tasks. In addition, environmental policy is implemented on a top-down basis and the responsibility and division of tasks in environmental protection among different governmental agencies is not clear. Enforcement of environmental legislation falls short, especially in the case of state-owned enterprises (SOEs) when the state is both polluter and regulator. This leads to ineffective environmental management of industrial estates. In order to improve the existing regulatory system, new arrangements such as decentralisation, redefining state-market relation and privatisation seem to be necessary.

According to Brandon and Ramankuty (1993) decentralisation of monitoring and enforcement authority for the urban environment and industrial pollution can be positive for the environment, but only if local agencies have adequate resources, central support, and local accountability for achieving their mandates. In addition, it often appears that economic and communicative policy instruments operate more effectively at a decentralised level. Decentralisation can provide new mechanisms in financing environmental policy. Local environmental administrative bodies that have the authority to enforce pollution control and use the revenues of pollution fees for their own administration and monitoring activities, are more likely to perform satisfactorily than a centralised system of environmental policy. As decentralisation is a well-established

trend in Asia, the decentralisation trend may be expected to emerge as well in Viet Nam. One step already taken towards decentralisation of environmental policy in Viet Nam is that local environmental agencies can, to some extent, design their own environmental regulations specific for their local area, provided they are not in conflict with national regulation[9]. Some DOSTEs, particularly Ho Chi Minh City DOSTE, are making their own policy innovations to improve environmental quality in their territory (see chapter 3). Provinces that share the Dong Nai watershed – including Ho Chi Minh City, Dong Nai, Binh Duong, Binh Phuoc, and Ba Ria Vung Tau – have jointly proposed to MOSTE to create an inter-province commission to manage the basin of the Dong Nai River, which is both a key source of water for the region and a major sink for pollution.

Together with decentralisation, it is also necessary to have a clear division of tasks between different stakeholders. With respect to industrial estate management, for instance, the Industrial Zone Infrastructure Development Companies could take over some of the tasks that currently come under the environmental responsibility of the provincial or local governmental agencies[10]. Provincial DOSTE (or in some cases the national MOSTE) should without any doubt remain in control of the final responsibilities: setting standards, issuing licenses inspection, and the final approval of environmental impact assessment (EIA) reports. But monitoring, environmental advice and information exchange, collection of fees and fines, etc. could very well be delegated to the Industrial Zone Infrastructure Development Companies. That would considerably lighten the tasks of the understaffed DOSTEs, which could then concentrate on the core governmental tasks. Since many local Industrial Zone Infrastructure Development Companies and even some environmental agencies lack skills and knowledge in environmental matters, capacity building is then critical. Of course, such a rearrangement of tasks will not happen overnight, as it requires institutional transformations and a re-organisation of state-market relations, both in the sphere of economic production and in the sphere of environmental regulation. However, as environmental regulation for industrial estates is now being drafted, such rearrangement of tasks can be incorporated in the new regulations.

Another issue worth considering in the policy field relates to the process of privatisation. With *Doi Moi* Policy, Viet Nam is moving towards a market-oriented economy and the industrial sector has started to become more privately oriented[11]. Private sector activity, particularly services and trading, has grown rapidly in recent years. Between 1986 and 1990 the private sector share of trade rose from 45.6 to 64.1 percent[12]. By the mid-1990s, private firms in the formal industrial sector had grown and their number exceeded SOEs by a factor of three (Irvin, 1996). This presents an opportunity for environmental reform.

According to Hettige et al. (1996), the current wave of privatisation in South and Southeast Asia makes pollution-intensive public enterprises less significant[13]. In Viet Nam, privatisation might separate the production from the state administration, so that the state is no longer both polluter and controller of pollution. Experiences from cleaner production demonstration projects showed that private enterprises are more active in the adoption of cleaner production compared to SOEs (see chapter 4).

4.4 International Embeddedness of National Environmental Policy-Making

In the era of globalisation, countries, or nation-states are no longer entirely free to develop their own environmental policy but have, to a certain extent, to orient themselves to international environmental policy (see Mol and Oosterveer, 2002 for review). There is growing evidence that newly industrialising countries are facing mounting international environmental pressures – through international organisations, international environmental movements, international treaties, international aid donors, and international conferences – that are provoking environmental policy responses (Rock, 2001). In the same way, in Viet Nam, international environmental treaties are to some extent triggering environmental improvements[14]. In the global view that all nations share the responsibility to protect the environment under the same sky, facing the same global environmental problems, and seeking solutions for transboundary threats, many governments and international organisations (UNEP, UNDP, etc.), have extended their support for Viet Nam in capacity-building, financial help or technical assistance. The introduction, design and implementation of new environmental policy approaches and instruments is often heavily supported and subsidised through these bi-and multilateral assistant programmes[15]. Numerous international reports have given recommendations for the future direction of environmental policy in Viet Nam, some of which have already been incorporated by Vietnamese policy-makers (World Bank, 1994; World Bank; 1997; UNDP, 1995; Roodman, 1999). It is via this mechanism that the political modernisation of environmental policy arrangements in Viet Nam may come to be stimulated. But these intentionally supported experiments need to be institutionalised in Vietnamese institutions, which is far from consistently the case.

5. Conclusion

In interpreting the Vietnamese state as a developmental state, it is emphasised that the state still holds a central role in the responsibilities for development of the country, including responsibility for environmental quality. However, the state alone can not fulfil its tasks without the support of other actors in economic and societal spheres. In order to mobilise these actors to participate in environmental protection, there is a need for political modernisation. In coun-

tries such as Colombia, Japan, and the Netherlands, strong relationships between government and industry in environmental protection have helped both sides to save money while reducing pollution (Roodman, 1999). Several authors have pointed to the slow but steady changes in state strategies towards political modernisation that have been observed recently in several newly industrialising countries in the Southeast Asian region. Their governments previously relied on hierarchical, closed environmental policy styles, but have begun to experiment with a range of alternative approaches to deal with environmental problems, using economic and communicative instruments; decentralisation; and the involvement of economic actors to complement their state regulatory efforts (Geping, 1993; O'Connor, 1994a; Markandya and Shibli, 1995; Rock, 1996; Chung, 1996; Zhang and Chen, 2001; etc.). With that in mind, Viet Nam should pay attention to new institutional arrangements, which change the role of the state and can mobilise different actors to engage in activities leading to environmental protection. In addition, the specific potential actions using the combination of economic and communicative approaches with command-and-control strategies to improve the environmental management system should be identified. Command-and-control still holds an important position and will continue to do so in the coming years. But economic dynamics and mechanisms, and communicative approaches can be used to complement the weakness of this conventional regulatory approach.

Although the introduction and implementation of new approaches in environmental policy in Viet Nam will encounter barriers, there also exist opportunities. The fear of change; the lack of knowledge on how to design and implement new environmental policy instruments; the weak capacity to respond to new environmental policy from regulated groups; and the lack of a local market for green products are major challenges. However, experiences of other developing countries and international environmental policies can help to redirect Vietnamese environmental policy. The ongoing decentralisation and privatisation processes may foster the development of economic and communicative approaches in environmental policy in Viet Nam. It is especially the industrial estates that can be best suited to become experimental sites for some types of policy innovation with respect to economic instruments (e.g. development impact fees, tradable permits and/or charges, land rental fee differentiation, and environmental funds), communicative instruments (e.g. training, seminars, and voluntary agreements), decentralisation, and changing state-market relations.

Notes

[1] Political modernisation refers to the inadequacy of traditional state intervention. Instead of a rolling back of the state, more fundamental changes in state intervention strategies and in the relation between state, market, and society are suggested. As far as the environmental field is concerned, the process of

political modernisation can be regarded as the political component of a more general process of ecological modernisation (Liefferink et al., 2000).

[2] Up until the late 1980s, environmental policy in centrally planned economies was based mainly on administrative measures. However, these fell short of expectation. For those reasons, economists in centrally planned economies have put forward a number of proposals for using economic mechanisms in environmental policy such as valuation and pricing. However, valuation and pricing are not seen so much as an alternative to administrative measures, but rather as complementary. A mixture of economic and administrative measures was proposed (and is functioning) in both market and centrally planned economies for the distribution of natural resources and the preservation of the environment (Mol and Opschoor, 1989).

[3] MOSTE has designed a system for levying environmental taxes. These taxes will be charged on all commercial or industrial activities that involve pollution and environmental damage. The contribution to the environmental fund will be from environmental tax revenue and fines for violating the Law on Environmental Protection, from domestic funding through the Ministry of Finance, from oversea development assistance and international bank loans, and from private sources (Nguyen Ngoc Sinh and Friederich, 1997).

[4] The Prime Minister's Decision No. 98/TTG on 'Approval of General Master Plan for Coal Sector Development up to the Year 2010' authorised the VINACOAL General Corporation, in charge of the commercialisation of the entire national coal production, to increase its tariffs to establish an environmental fund. This fund provides grants to the different mining companies for pollution control activities. In this sense, coal producers have to internalise the environmental damage costs associated with their mining activities (UNDP, 1995).

[5] Even in OECD countries, the experience with the use of marketable permits is limited. Until the mid 1990s this kind of economic instruments was only found in the United States and Germany (O'Connor, 1994a, 1995; Barde, 1994). In East Asia, there has been little experiment with marketable permits, the major exception being Singapore (O'Connor, 1994 a, b).

[6] According to NEA (1999), tradable permit is one of the economic instruments that have a potential to be applied in Viet Nam to improve environmental quality in industrial estates and river basins. Le Thi Thanh My (1999) suggested choosing industrial estates as a demonstration project for the application of marketable permits.

[7] Interview Ms. Kasemsri Homchean, Director of Environmental Control and Safety Division (Industrial Estate Authority of Thailand), (April 5, 2001).

[8] Some of them are now collecting user charge for their common wastewater treatment systems.

[9] In the Southern Key Economic Region, Dong Nai Province (June 1998) has its own environmental regulations.

[10] In Bien Hoa City (Dong Nai Province), SONADEZI (the Industrial Zone Infrastructure Development Company of Bien Hoa I Industrial Zone, Bien Hoa II Industrial Zone, and Go Dau Industrial Zone) has already taken up environmental management tasks (see chapter 3).

[11] In 1990, the National Assembly approved the Law on Private Business and the Law on Companies, which laid the formal basis for the development of a private sector.

[12] This is probably underestimated as something like 33 percent of private business operations are not registered and they rarely report their activity or the reports are never correct (McCarty, 1993) because they fear for taxation.

[13] Public-owned pulp and paper companies in that region appeared to undertake far less abatement compared to the private sector (Hettige et al., 1996).

[14] UNDP (1995) lists the international environmental treaties that have been signed by Viet Nam, among which are those on CFC reduction and phase out.

[15] In 1995, The International Development Research Centre (IDRC) in Canada supported a project on applying economic instruments to environmental policy in Viet Nam. In 1995 and 1996 the Economy and Environment Programme for Southeast Asia (EEPSEA) managed by IDRC organised two training courses on economic instruments. Lecturers, staffs from environmental agencies of different parts of Viet Nam were selected to participate in these courses. After finishing the courses, the trainees have to carry out, either individual or in-group, research on the application of economic instruments in environmental protection in Viet Nam. The book on 'Economy and Environment. Case Studies in Viet Nam' (Francisco and Glover, 1999) is the outcome of this programme. A UNDP funded project entitled 'Strengthening National Capacities to Integrate the Environment into Investment Decision' has as one of its objectives to explore the use of economic instruments to achieve sustainable development and environmental goals in Viet Nam.

CHAPTER 7

ENVIRONMENTAL INNOVATION THROUGH COMMUNITIES AND SOCIAL ORGANISATIONS

This chapter analyses the interaction between firms in industrial estates and other actors in the societal network. An overview of the societal network is shown in Figure 7.1.

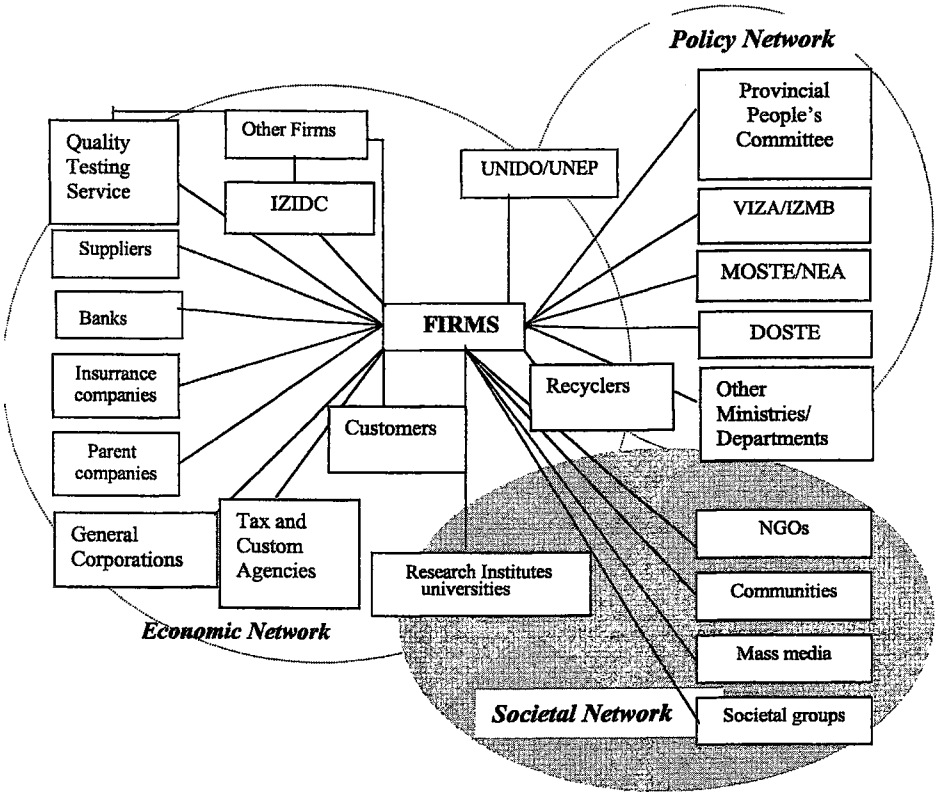

Figure 7.1 Societal Network Relevant to Firms in Industrial Estates

1. Communities as Informal Regulators

In many Western countries, from the late 1960s onward, environmental movements have exerted pressure on governments to improve environmental quality and to redirect the production and consumption patterns towards more ecologically sound practices. Non-governmental organisations (NGOs) are seen as active non-state actors in these environmental movements (see Rootes, 1999; Mol, 2000). From the mid 1980s the ideologies, strategies and positions of mainstream NGOs have changed dramatically. Most of the larger NGOs no longer believe that economic development and environmental deterioration are two sides of one coin. Moreover, instead of being at the periphery of the policy- making process, they enter into direct negotiations with state representatives and economic agents, and participate in and contribute to the development of concrete proposals for environmental reform. These transformations are theorised upon by Ecological Modernisation Theory as presented in chapter 2.

In developing countries, protests against environmental problems by NGOs took place later. Local NGOs in developing countries are often initiated and supported by international NGOs. Sonnenfeld (1999), for instance, pointed out that in newly industrialising countries such as Indonesia and Thailand, Greenpeace has made considerable efforts to help local and national NGOs in their protests against chlorine and dioxin pollution from the pulp and paper industry since the early 1990s. These local and national environmental movements have had a profound influence on the transformation of the pulp and paper industry towards more environmentally sound manufacturing. In some developing countries, NGOs are also very active in environmental training and dissemination of environmental information. In Thailand, for example, environmental consciousness is growing as a result of education and awareness programme conducted by local NGOs (Parasnis, 1999).

Beside NGOs, which are well-organised groups of people, local communities suffering from environmental impacts increasingly engage in environmental protests and activities by asking for compensation, demanding better environmental quality, protesting against the deterioration of their livelihood, etc. Local communities struggle to protect their environmental quality by blocking the siting of waste dumps, incinerators or polluting factories. But they more often protest against existing plants that have a rather poor environmental performance. Abundant evidence from countries all over the world has shown that local communities play a significant role in influencing polluters to change their behaviour and to improve their environmental performance. A number of studies have explained how 'informal regulation' (community pressures on industrial polluters and the state) can supplement formal regulatory strategies in developing and developed countries. These studies provide interesting evidence on

the significant potential for public participation and public information as a means of motivating polluters to reduce pollution (see Hettige et al., 1996; O'Rourke, 1999 for reviews).

In China, South Korea, Taiwan, Thailand, Malaysia and Indonesia, in response to deteriorating local environments, individuals, unorganised communities and popular groups in civil society successfully pressed for local remedies (Cribb, 1990; Lee and So, 1999). According to a recent publication of the World Bank (2000), the success of the rating and public disclosure programme in Indonesia and the Philippines is not surprising, because industrial polluters are very sensitive to public criticism on their poor environmental practices[1]. Other studies of the World Bank in China, India, Thailand, Bangladesh and Indonesia documented the active role of communities through complaints about industrial pollution and environmental impacts of industrial activities (cf. Dasgupta and Wheeler, 1996; Wheeler, 1997). The World Bank reveals that in developing countries where monitoring is costly and agencies' budgets are lean, regulators can not be fully informed about all polluters. So they often focus resources on responding to community complaints. The World Bank concludes that in Asia, Latin America and North America, the neighbouring communities can strongly influence factories' environmental performance via such complaints. Where formal regulators are present, communities use the political process to influence the strictness of enforcement. Where regulators are absent or ineffective, NGOs and community groups pursue informal regulation by pressuring polluters to conform to social norms.

In Viet Nam, an almost similar scenario is happening as in other developing countries. O'Rourke and others (Nghiem Ngoc Anh et al., 1995; Sikor and O'Rourke, 1996; Le van Khoa and Boot, 1998; O'Rourke, 1999) have pointed out that local communities in some cases are successful in forcing industrial polluters to take their environmental responsibility and to change their production process in the direction of 'greener' behaviour. These studies reveal that under the existing Vietnamese conditions (lack of human resources, budget deficit, limited monitoring equipment, etc.) environmental authorities often only take action to control, regulate and enforce industrial polluters after receiving frequent and strong complaints from local people on pollution and environmental deterioration. O'Rourke (1999) calls such informal regulation 'community-driven regulation'. He then concludes that although 'community-driven regulation' has a number of weaknesses, community participation can support multiple mechanisms for environmental protection: by strengthening existing command-and-control programmes; motivating different state roles; and promoting new forms of pressures through 'reputational incentives'. However, in specific cases, people living in the neighbourhood of industrial production units are frequently economically and socially dependent – to some extent

– on the industrial firms. The central questions in this chapter are: (i) how and to what extent do communities manage to improve the environmental performance of industries; and (ii) to what extent do the dependencies of communities on industries and industrial zones hamper effective informal or community-driven regulation.

In this chapter, the role of communities and social organisations in environmental reform is analysed, based on case studies in industrial zones in the Southern Key Economic Region. Subsequently, this chapter will focus upon the constraints and opportunities to mobilise community actions and the contribution of the community to the development of industrial ecology.

2. Case Studies in Binh Duong Province

2.1 The Mass Media and Community as Driving Force for Environmental Regulation: The Case of Viet Huong Industrial Zone

Viet Huong Industrial Zone is located in Binh Giao Hamlet, Thuan Giao Commune, Thuan An District, Binh Duong Province[2]. Established in 1996 on an area of 45 ha, it was developed by a Chinese migrant-owned private company.

This industrial zone houses 21 Taiwanese small and medium sized enterprises. Some of these enterprises are pollution intensive firms such as paint production, textile and dyeing, and plastic production. It is widely acknowledged that the most striking environmental problem from Viet Huong Industrial Zone is related to wastewater. Viet Huong Industrial Zone is still, and for many years has been operated without a common wastewater treatment plant. All kinds of wastewater from enterprises are discharged directly to the sewer and then flows to Chom Sao Stream. The stream runs through Hung Loc Hamlet before discharging to Vam Bun River. According to Binh Duong Department of Science, Technology and Environment (DOSTE), two textile and dyeing enterprises in this industrial zone are the most seriously polluting firms. Although the two enterprises have their own treatment plant, they do not operate the system unless they are forced to do by Binh Duong DOSTE. Figure 7.2 presents the location of Viet Huong Industrial Zone and the locations of the communities where interviews were carried out.

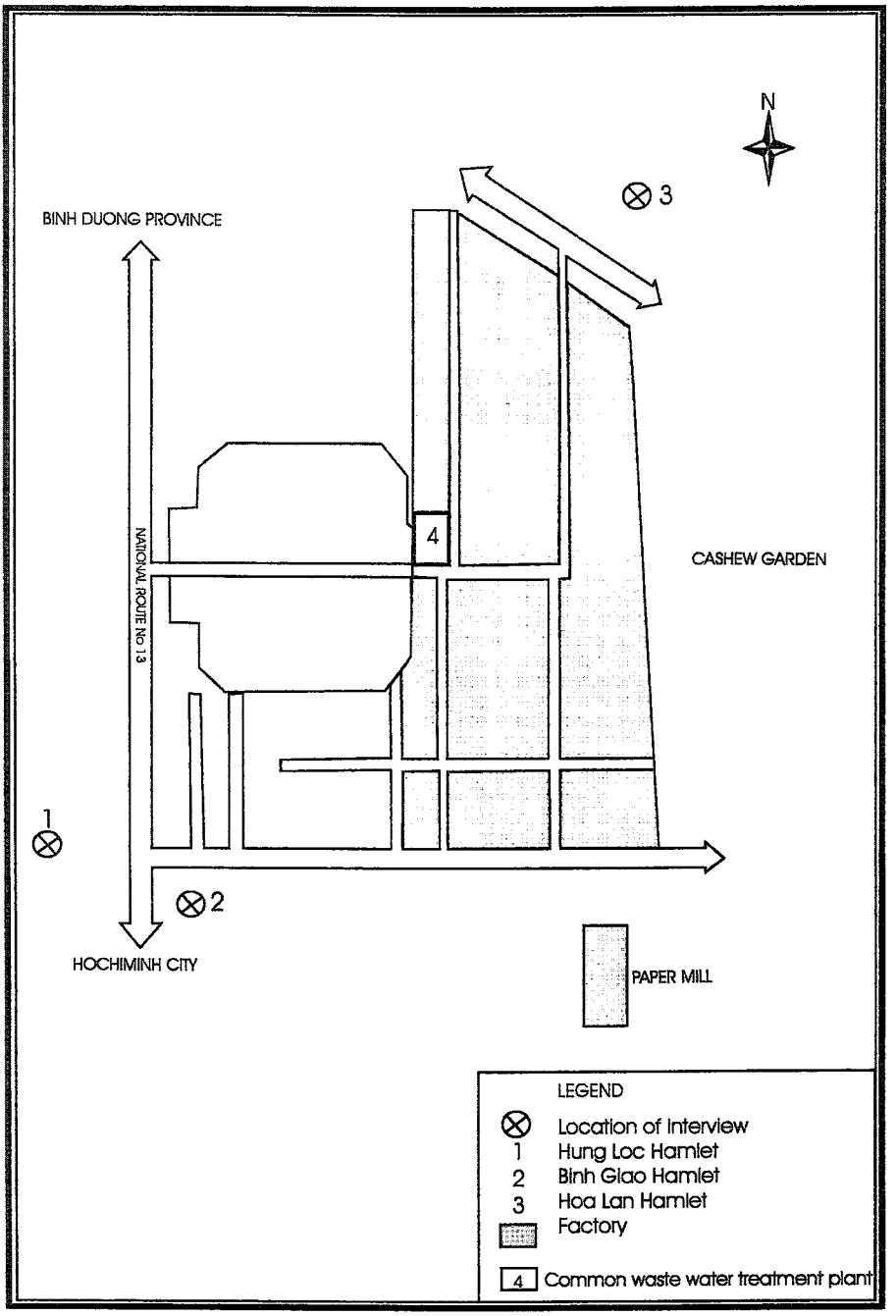

Figure 7.2 Location of Viet Huong Industrial Zone

The community in Hung Loc Hamlet was chosen for interview because they are affected by the wastewater downstream from the outlet of the industrial zone[3]. According to Mr. Hot (the head of Hung Loc Hamlet), there are about 3,000 people living in Hung Loc Hamlet, among which approximately 150-200 people earn their living by working in Viet Huong Industrial Zone. The others work at porcelain production units, run small shops, plant fruit trees or raise domestic animals. All the interviewees agree that the benefits they get from Viet Huong Industrial Zone, such as employment, are not that significant. Meanwhile the damage they have to suffer is tremendous. First, their gardens and orchards are damaged by stream water, which is polluted by wastewater from Viet Huong Industrial Zone. Second, their domestic animals die after drinking the stream water. Third, fish can not survive in the polluted stream, resulting in loss of fish as a source of income and food for the community. Fourth, the stream is not only coloured (black, blue, red, etc.) from time to time (depending on the discharge of textile and dyeing enterprises), but also affects their health. The water often smells bad. The community believes that the wastewater contains toxic substances, because some people have been infected with skin disease after using the stream water for cleaning. But it remains unclear what exactly are the substances that cause the skin disease. Fifth, previously the community could use groundwater for drinking without boiling, but nowadays the quality of groundwater decreases due to high turbidity and nasty odour.

Faced with these problems the community suggested the head to report the matter to the Local People's Council in the latter's permanent meeting[4] in 1998. Subsequently, the People's Council 'complained' at Binh Duong Radio-T.V Station. Reporters from Binh Duong Radio-T.V Station visited the site, took pictures and made a video on the pollution. These pictures and video were sent to Binh Duong DOSTE, followed by DOSTE staff taking water samples. After these initiatives and the reactions of the enterprises the community recognised positive improvements in water quality in terms of smell, but the colour and the 'toxicity' of the wastewater remained unchanged. Again the community reported the problem to the People's Council to seek further action and improvement. The official reply was that the Industrial Zone Infrastructure Development Company promised to treat the wastewater, but until the time of interview (December 1999), the situation remained unchanged. The community members were furious and intended to take strong actions against the industrial zone, threatening to 'destroy' Viet Huong Industrial Zone if no improvements in local environmental quality were made. There exist broad consensus in the community that it is not so much compensation what they want but rather proper treatment of the wastewater and active governmental intervention to prevent such problems, also with other industrial zones being located nearby in

the future. The community members fear the pollution that they and other communities will have to suffer from existing and future industrial zones.

In order to cross-check and complement this information, interviews with the People's Council and staffs from Binh Duong DOSTE and Binh Duong Radio-T.V Station were made. It was clear that after receiving complaints from the People's Council again, Binh Duong Radio-T.V Station broadcasted the video on pollution caused by Viet Huong Industrial Zone. Only after that, 'real action' took place. Twenty-one enterprises in Viet Huong Industrial Zone sent an official letter to the Ministry of Science, Technology and Environment (MOSTE), Binh Duong DOSTE, Binh Duong People's Committee, Binh Duong Industrial Zone Management Board, and Binh Duong Radio-T.V Station suggesting that the Industrial Zone Infrastructure Development Company of Viet Huong Industrial Zone must construct a common wastewater treatment plant as he promised when he called for investment into this industrial zone. An official meeting was held on September 29, 1999, with the representatives from Binh Duong DOSTE, the Industrial Zone Infrastructure Development Company , and representatives of the 21 enterprises. In this meeting, DOSTE demanded the Industrial Zone Infrastructure Development Company to submit the design of the wastewater treatment plant on December 30, 1999, and to start the construction in June 2000. Finally, by August 2000 the common wastewater treatment facility was being built in Viet Huong Industrial Zone.

Four other interviews with the households in Binh Giao Hamlet, Thuan Giao Commune, next to the outlet of wastewater from Viet Huong Industrial Zone were made. These interviewees are dependent on their gardens for a living. They said that the nasty odour of wastewater is unacceptable. According to them the groundwater was polluted by wastewater from Viet Huong Industrial Zone. Consequently groundwater damaged their cassava garden and pepper garden. They have to buy water for their daily use. They often mentioned this problem in the permanent meeting within the hamlet. But these households did not believe that the local authority would take their complaints seriously, as the benefit these households bring to the community is small compared to the economic benefit that the industrial zone has brought to Binh Duong Province.

A random choice interview was made with a community member who has just immigrated to Hoa Lan Hamlet, Thuan Giao Commune at the time the industrial zone was established, and whose family earns a living by renting houses to workers of Viet Huong Industrial Zone. She also agrees that Viet Huong wastewater has caused a lot of trouble for the local community. But she did not complain to the local authority, as, according to her, it would not work. The fear for losing business related to Viet Huong Industrial Zone is an alternative, or at least complementary, plausible explanation.

2.2 Comparing Joint-venture, Private and State-owned Industrial Zones

To cross-check and verify to what extent the findings for Viet Huong Industrial Zone are similar for other industrial zones in Binh Duong Province, interviews with communities around Viet Nam-Singapore Industrial Zone and Tan Dinh An Industrial Zone, and with communities within Tan Dong Hiep Industrial Zone were carried out.

Viet Nam-Singapore Industrial Zone is located in Binh Hoa Commune, Thuan An District. A joint-venture company between Viet Nam and Singapore developed it. It is one of the so-called best practice industrial zones in the Southern Key Economic Region, as it is the only industrial zone in Binh Duong Province that has installed a common wastewater treatment plant. With 14 factories in operation, mainly through foreign direct investment (from Japan, Singapore, the United States, Switzerland, etc.)[5], Viet Nam-Singapore Industrial Zone has no record on complaints regarding environmental impacts. Community members in the neighbourhood are satisfied with the environmental performance of this industrial zone.

Tan Dinh An Industrial Zone is located in Tan Dinh Commune, Ben Cat District. A private company established it. This industrial zone is not officially on the list of industrial zones. Although it has not yet been approved by the government, the Industrial Zone Infrastructure Development Company continues to develop this industrial zone with the agreement of the Provincial People's Committee. At present, firms from many industrial sectors can be found in this industrial zone such as garments, footwear, electricity and electronics, mechanics, food processing, rubber processing, cashew processing, etc. Interviews with community members near Tan Dinh An Industrial Zone reveal that following a community complaint, a Korean Electronic Company was forced by DOSTE to stop burning its solid waste in the open air, as it produced a lot of hazardous smoke. Among the community members who live next to the company, one person in particular (working for Ho Chi Minh City DOSTE) had the knowledge on what to do and how to act. He suggested the community to send a complaint directly to Binh Duong DOSTE, and this proved to work.

Tan Dong Hiep Industrial Zone is located in Tan Dong Hiep, Tan Hoa, and Tan Binh Communes, Thuan An District. It will be developed from the existing industrial cluster. At present the 'real' industrial zone has not been developed yet, but there are many environmental problems related to existing industrial firms that intermingle with residential areas. The story of this industrial zone is almost similar to that of Bien Hoa I Industrial Zone, where community members keep reacting to industrial pollution with the support of local social organisa-

tions. The case study in Bien Hoa I Industrial Zone will be presented in section 3.1.

2.3 Conclusion on Case Studies in Binh Duong Province

Among the four Industrial Zones that are in full operation in Binh Duong, only Viet Nam-Singapore Industrial Zone is reported by a local community (with the confirmation of DOSTE and a reporter at Binh Duong Radio-T.V Station) to be a so-called best practice industrial zone. This should not surprise us because this industrial zone is developed by a joint-venture company with Singapore, one of the leading countries in Southeast Asia in environmental protection activities. Singapore might want to prove that their industries have good environmental performance not only at home but also abroad. By contrast, Tan Dong Hiep Industrial Zone and Tan Dinh An Industrial Zone carry with them the common problems related to state-owned enterprises and private companies who try to avoid environmental regulations. Viet Huong Industrial Zone, housing all kind of Taiwanese small and medium sized enterprises, is considered to be one of the worst industrial zones regarding environmental performance. While Taiwan is carrying out a profound environmental reform (see Rock, 1996; Yang, 2000), the Taiwanese small and medium sized enterprises have no opportunity to remain in Taiwan. Beside economic opportunities (such as low price of raw materials, low wages, etc.), countries with weak environmental regulations and lax enforcement afford an opportunity for these Taiwanese small and medium sized enterprises to relocate[6]. Local environmental agencies have many reasons for their lax monitoring and enforcement and most of these enterprises have a proven record of not complying with environmental regulations. Nevertheless, these enterprises are faced with continuous and mounting pressure from local communities.

3. Case Studies in Dong Nai Province

Dong Nai Province has nine newly established industrial zones and one that has been in existence for more than three decades (Bien Hoa I Industrial Zone). As such Dong Nai Province has the second largest number of industrial zones after Ho Chi Minh City in the Southern Key Economic Region. Among these industrial zones, only three industrial zones have their own common wastewater treatment plant. A joint-venture company between Viet Nam and Thailand developed Amata Industrial Zone, a joint-venture company between Viet Nam and Japan developed Loteco Industrial Zone, and Bien Hoa II Industrial Zone was developed by SONADEZI (a Vietnamese para-statal company). But among these three industrial zones only Bien Hoa II Industrial Zone is in full operation with 73 factories (March 1999). That is the reason why Bien Hoa I Industrial Zone and Bien Hoa II Industrial Zone were chosen for case studies in

Dong Nai Province. However, because Bien Hoa II Industrial Zone was established on the land of the former army base that is far from residential areas, there are only few households to be found in the vicinity. These households have only moved to settle illegally after the establishment of the industrial zone, but they will have to relocate in near future. Two individual interviews with households in the vicinity did not reveal any environmental problems related to this new industrial zone. There are no complaints on the environmental quality in the neighbourhood. As such Bien Hoa II Industrial Zone has no record on any bad environmental performance as perceived by community members, except for the case of Tae Kwang Vina Company (refer to O'Rourke, 1999). The other case study, Bien Hoa I Industrial Zone presents a different picture and will be elaborated below.

3.1 The Role of Local Social Organisations in Pushing State-owned Enterprises for Better Environmental Performance. The Case of Bien Hoa I Industrial Zone

Bien Hoa I Industrial Zone is located in An Binh Ward, Bien Hoa City, Dong Nai Province. Bien Hoa I Industrial Zone is different from others in many aspects such as its historical development, technological profile, management organisation, environmental problems, etc. Being established in 1963 on an area of 511 ha with 52 factories, Bien Hoa Industrial Zone (the former name of Bien Hoa I Industrial Zone) was among the first Industrial Zone in Viet Nam. It was developed and managed by a company named SONADEZI[7]. At that time, the industrial zone infrastructure was good, factories in Bien Hoa Industrial Zone were private-owned and all equipped with modern production technology imported from different capitalist countries (the United States, Germany, France, Japan, etc.). This Industrial Zone contributed significantly to the economic development of South Viet Nam from the 1960s until the late 1980s.

In 1975 all factories became state-owned. Due to a lack of investment to upgrade technology and a lack of staff for adequate maintenance, the equipment soon became out-of-date. Environmental issues have increasingly become a major problem in this industrial zone. Nevertheless, Bien Hoa I Industrial Zone still plays a significant role in the economy and employment of Dong Nai Province. In addition, Bien Hoa I Industrial Zone differs from the other zones in terms of land use pattern. Specifically, in Bien Hoa I industrial Zone, industrial development occurred simultaneously with residential and agricultural areas engaged by local communities. Nowadays, except for the residential and agricultural areas, the industrial zone covers about 382 ha with approximately 80 factories of all types, including food processing, chemicals, construction materials, metallurgical and metal processing, electronics, mechanics, animal feed, paper-match-wood, consumer goods, and other service companies. The

layout of Bien Hoa I Industrial Zone and the locations of the communities being interviewed is shown in Figure 7.3.

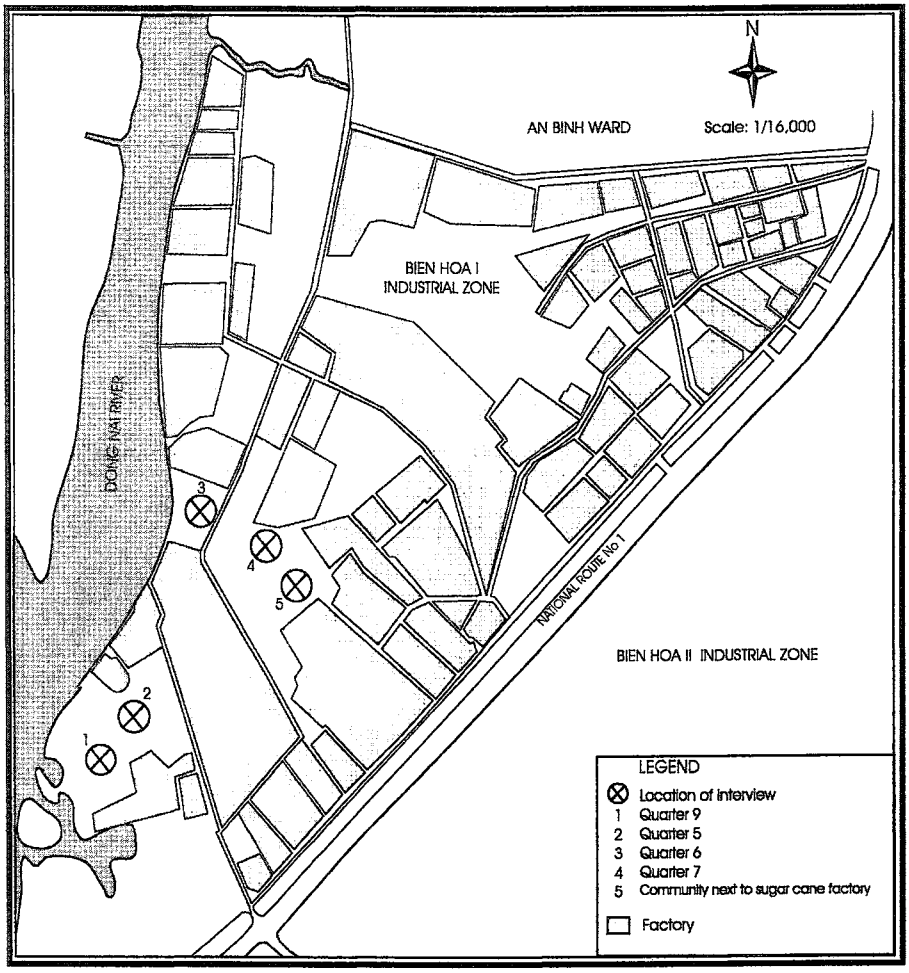

Figure 7.3 Location of Bien Hoa I Industrial Zone

Since 1996 the name Bien Hoa I Industrial Zone has been given to this industrial zone to distinguish it from Bien Hoa II Industrial Zone. The two Bien Hoa Industrial Zones are located at the opposite sides of Hanoi National Highway. Nowadays, the name Bien Hoa I symbolises out-of-date technology and poor environmental performance, while Bien Hoa II stands for modern production technology and 'best practices'. Dealing with Bien Hoa I Industrial Zone, the Provincial People's Committee has to consider economic development and employment on the one hand and environmental quality on the other hand. It be-

comes a challenge to solve the environmental problems in this industrial zone, when economic development and employment are given such a high priority.

In this industrial zone, two group interviews and five individual interviews were made[8]. Mr. Trung in quarter 5 and Ms. Lien in quarter 9, represent different opinions on the same issue of industrial pollution affecting the communities within Bien Hoa I Industrial Zone. Mr. Trung works for VICASA Factory (steel-making factory located in Bien Hoa I Industrial Zone), Ms. Lien's husband and her three sons are employed by Dong Nai Paper Company. Mr. Trung is rather indifferent to environmental problems of Bien Hoa I Industrial Zone. By contrast, Ms. Lien is well aware and receptive of the pollution issues in this area. As her family lives near the outlet of Ajinomoto Factory, she witnesses everyday the dark and nasty odour of wastewater coming from the company that produces mono-sodium glutamate and discharges wastewater to the Dong Nai River. As she reports, chickens and ducks die when drinking the river water in this area. The community in the neighbourhood has to endure the 'unbearable smell' from one day to the next. Besides, she claims that people in this quarter also suffer from air pollution, but they do not know exactly the source of the air pollutants (it might come from Ajinomoto Factory, or Dong Nai Paper Company, or Bien Hoa Chemical Factory-VICACO). According to her, most of the community members have suffered from respiratory diseases due to air pollution. However, when asked about her family and other people's reaction against pollution, she said that although all people feel uncomfortable, no strong and co-ordinated action has taken place. They just complain to each other, since all of them are so busy earning their living and they don't know exactly how to react adequately without endangering their own direct interests. They did not report pollution to the local authority as in the case of Viet Huong Industrial Zone, nor did they discuss pollution issues with the Industrial Zone Infrastructure Development Company as in the case of Le Minh Xuan Industrial Zone (see section 4.1).

Because the community lives on the land of the industrial zone, they have the perception that they have no right to complain and that the local authority will always favour the industries. Above that, there is the dominant fear to lose jobs and to be relocated out of the industrial zone.

Two group interviews and an individual interview with the head of quarter 7 present an opposite picture to the above individual interviews. Most community members in quarter 6 are employed by factories in Bien Hoa I Industrial Zone. Some of them are retail dealers, while others work on vegetable gardens. They came to settle at the time when the industrial zone was established. But according to the new plan for Bien Hoa I Industrial Zone, they will have to move out and the land will be developed for new factories or reserved for expansion

of existing factories. The present direct benefits they get from the industrial zone are employment and electricity use[9]. In the meantime, they suffer a lot from industrial pollution, specifically air and water pollution. The community lives near Dong Nai Paper Company and Bien Hoa Chemical Factory (VICACO). The interviewees said they inhale particulate from the smoke of VICACO, and 'chemicals' (it might be ammonia) from the Paper Company almost every hour. Sometimes they have difficulties to breath or tightness across the chest. With respect to wastewater, the community complains most about the wastewater of the paper company. While some other factories discharge their wastewater to the sewerage system, the paper company discharges its wastewater directly to the Dong Nai River, making it easy for the community to actually see the link between cause and effect. The dark brown wastewater with high suspended solids from the paper company has caused serious fish kill, and it is claimed that children get skin diseases when they swim in the viscous stream of the receiving river. However, some people also get the benefit from such a polluted waste stream. These people earn their living by collecting waste fibres in the waste stream and selling them to 'recycling' enterprises.

These community members do not have any access to either DOSTE or SONADEZI. They do not know DOSTE as a state organisation that is responsible for the monitoring and enforcement of environmental laws, while living on the land of the industrial zone make them cautious not to discuss pollution issues directly with SONADEZI.

Instead, people in this area are organised into, and have close relations with, social organisations through which they express their preferences and complaints. Faced with pollution problems, community members have complained in various ways. In the monthly permanent meetings people complain to the head of the quarter and to the representatives of the Women's Association, the Veterans' Association, the Retired Civil Servants' Group, etc. These representatives transfer the complaints to the local People's Council, who discusses this with the Provincial People's Committee. One result of these complaints has been the engagement of an inspection team in inspecting the local situation. However, the community disagrees with the procedure the team has taken: according to the community, the factories subject to inspection have received advance notice. They feel that it is impossible to have an objective and representative conclusion of the environmental performance of the factories if the factory knows the time of inspection in advance. The majority of the people living in this quarter showed their anger regarding the pollution and the absence of any serious action to combat that. There is a strongly felt fear for losing jobs or a place to live as a consequence of complaining strongly against industrial polluters. The fact that these people have to move out of the area anyhow (albeit no exact time is known), makes this threat bearable, rather than

immobilising potential resistance. And most feel a need to struggle for better environmental quality as long as they still live there. The head of quarter 6 emphasised that he and his community will again send complaints, but now directly to DOSTE, and ask them to carry out factory inspections without informing factories in advance.

Residents of another community in quarter 7[10] get the benefits of employment (approximately 90% of the workers work for Dong Nai Paper Company), electricity use, water use, retail trade, and collecting waste fibres from the industrial zone. On the other hand, they are victims of air pollutants from Dong Nai Paper Company. All interviewees report health effects, such as difficulties to breathe, tightness across the chest, dizziness, headache, irritated eyes, lung disease, and asthma. They claim it is caused by emissions from the paper company[11]. They also report that the smoke has damaged the roofs of their houses and that their clothes become covered with black spots when dried in the open air.

The community members also mentioned other environmental problems caused by other factories in Bien Hoa I Industrial Zone, such as wastewater from Bien Hoa Sugar Cane Factory; and air pollution from the brick kiln, from Bien Hoa Chemical Factory (VICACO), and from VICASA Steel Factory. But they are mainly concerned about the paper company. Similar to the community in quarter 6, this community also reported to the local authority, and to representatives of social organisations. Moreover, in 1991 they sent an official letter with 175 signatures to the Prime Minister to call for help. Copies of this letter were sent to the District People's Committee and the Provincial People's Committee. According to the community in quarter 7, in 1992 and 1996 a team of experts came to carry out a survey on environmental quality of Bien Hoa I Industrial Zone. The team concluded that Bien Hoa I Industrial Zone has been polluted heavily. One of the consequences was that the Provincial People 's Committee planned to relocate people out of this zone. But up until the date of this research, March 2000, nothing has happened.

With respect to Dong Nai Paper Company, both the head of the quarter and the former worker in the chemical plant of the paper mill agree that the company was subject to many inspections, regardless of the fact that it is a state-owned company which belong to Viet Nam Paper Corporation. The company made considerable efforts to deal with its environmental problems, such as increasing of the height of the smokestack, constructing a wastewater treatment plant (with financial aid from Swedish International Development Agency), and investing in a chemical recovery system. However, these treatment measures and systems did not work effectively. The sedimentation tank, designed to settle out the fibres in the wastewater, does not capture most of those fibres. As a result fibres find their way to the outlet. The tank is cracked, and if it is broken a huge

amount of wastewater will flood the neighbourhood. The chemical recovery system, established by a Chinese company, stopped working after only one year. The community continued to complain to the head of the quarter and the manager of one workshop of the paper company during the permanent meetings. The latter two regularly report these complaints to the director of the company. Although the director made efforts to solve the problem, no effective solution has been achieved up until now.

While some people fail to achieve results in struggling for their better environmental quality, others succeed. The interview with people in Thong Nhat Ward (Bien Hoa City), for instance, revealed that they used to suffer from the smoke of Dong Nai Paper Company. After sending complaints to the Provincial People's Committee their problems were solved. It is not surprising that the community in Thong Nhat Ward succeeded in reaching improvements of their environmental situation. Their problems are not difficult to solve. The paper company 'solved' the problem by collecting the waste previously released to the air and discharging it to the sewage system. In another case, the houses and fishponds next to Bien Hoa Sugar Cane Factory used to be flooded by wastewater from the factory, causing fish kill. Community members discussed the problem directly with the manager of the factory. As a result, they were compensated for the damage to their houses and for fish kill.

Although there is no clear evidence that the 1991 letter of the community in quarter 7 and the complaints of communities within Bien Hoa I Industrial Zone were the direct cause, some remedial actions were taken after that. In 1992, the Environmental Protection Centre (EPC) was asked to carry out a survey on environmental quality related to industrial pollution in Bien Hoa I Industrial Zone. The result of the survey showed that Bien Hoa I Industrial Zone was heavily polluted by wastewater (major sources are Dong Nai Paper Company, Bien Hoa Sugar Cane Factory, Ajinomoto Factory, etc.), air pollutants (major sources are Dong Nai Paper Company, Bien Hoa Chemical Factory, Dong Nai Asbestos Cement Factory, VICASA, Dong Nai Match Factory, NET Detergent Factory), and solid wastes (major sources are VICASA, Sadakim, Bien Hoa Chemical Factory, Glazed Tiles Factory) (EPC, 1992). So is the number of complaints against the paper, chemical, and sugar cane factories revealed in the interviews with community members is not surprising. EPC proposed to construct a common wastewater treatment plant for Bien Hoa I Industrial Zone as a means to reduce industrial pollution. However, as late as the year 2001 a common wastewater treatment plant in Bien Hoa I Industrial Zone had still not been constructed.

In the meantime, since 1992, many factories within the industrial zone have made some efforts to improve their environmental performance. The Dong Nai

Paper Company, Bien Hoa Sugar Cane Factory, Dong Hiep Paper Mill, and Dong Nai Battery Factory have constructed their own wastewater treatment plants, and Dong Nai Asbestos Cement Factory has its own treatment system for air pollutants[12]. In general, although there have been many efforts on both sides (government and industrial polluters), the main focus remains on end-of-pipe technologies that add cost and provide no incentive for further improvement. Also the environmental results remain limited.

In April 15, 1996 the Prime Minister issued the Directive No. 217/TTg on the reconstruction, management, and development of Bien Hoa I Industrial Zone. SONADEZI was assigned to be responsible for this work. More recently the Prime Minister instructed the Viet Nam Industrial Zone Authority to study feasible options to improve environmental quality in Bien Hoa I Industrial Zone. Until that is found and implemented the communities in Bien Hoa I Industrial Zone have to live with the pollution, unless they can (or have to) resettle elsewhere.

3.2 Conclusion on Case Studies in Dong Nai Province

Although both Bien Hoa I Industrial Zone and Bien Hoa II Industrial Zone house enterprises from all types of industrial sectors including heavily and less heavily polluting ones, and they are managed by the same company SONADEZI, they present different environmental performance records. This is especially due to the differences in level of technology applied, the lifetime of the machines in use, the firms' financial capacity, and the differences in environmental awareness of the owners of factories and enterprises in these two industrial zones. Enterprises in Bien Hoa II Industrial Zone are newly established with mostly advanced technologies and machinery. Most of the factories in this industrial zone are foreign or joint-venture companies that have adequate capital to invest in waste treatment and management, and some of them are part of multinational corporations (Fujitsu, Tae Kwang-NIKE, BHP steel, Nippon Paint, etc.) who consider environmental performance to be among the criteria for their global market competition.

By contrast, Bien Hoa I Industrial Zone was established in the 1960s and by now the technologies and production equipment are old and out-of-date. Most of the factories/enterprises in this industrial zone are state-owned and lack capital to update technologies or invest in waste treatment and management. The interviews with local communities in and around these two industrial zones indicated that in some cases, fear of being relocated prevented them from protesting against industrial pollution. By contrast in other cases, even though community members obtain direct benefits from these industrial activities, that does not stop them from taking action and demanding better environmental

quality. Even when the polluters are SOEs, which present regulatory difficulties to the local environmental agency, community members, with the support of local social organisations, can exert pressure to partially change the polluters' behaviours. The fact that community members live on the land of Bien Hoa I Industrial Zone explains the reason why they do not complain at or discuss pollution issues directly with SONADEZI.

4. Case Studies in Ho Chi Minh City

4.1 Economic Profit and Environmental Damage: the Dilemma of the Community around Le Minh Xuan Industrial Zone

Le Minh Xuan Industrial Zone is located in the hamlet 2 of Tan Nhat Commune, Binh Chanh District, a relatively remote area of Ho Chi Minh City. This industrial zone was established in 1997 on a site with an area of 100 ha. It was developed by the state-owned Binh Chanh Building Investment Company. At the time of its development, the rice cultivation activities in the past had converted the soil into active acid sulphate soil which impeded agricultural development. Consequently, the People's Committee of Binh Chanh District decided to use it for industrial development.

In order to understand whether such industrial development helps to increase the living standard of people in remote areas or only brings problems to local people, as well as to gain insight into how people define their problem, and how they react to environmental deterioration, individual interviews and group interviews were made with the community members around Le Minh Xuan Industrial Zone. Figure 7.4 shows the boundary of Le Minh Xuan Industrial Zone and the locations of households that responded the interviews.

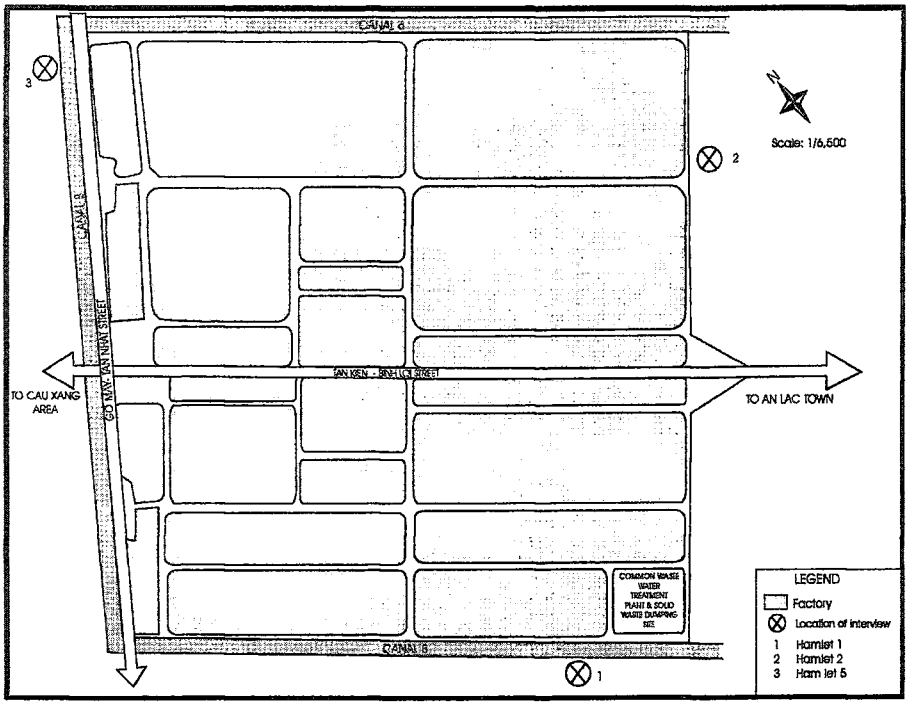

Figure 7.4 Location of Le Minh Xuan Industrial Zone

Le Minh Xuan Industrial Zone is established to receive polluting industries and firms relocated from inner city. At the time of interviews, Le Minh Xuan Industrial Zone had about 62 enterprises in operation. All of them are small-scale enterprises of different sectors: electroplating, textile, textile and dyeing, rubber production, food processing, etc. The existing textile and dyeing enterprises have just relocated from Tan Binh District (one of the most populated districts of Ho Chi Minh City).

People in hamlet 1 of Tan Nhat Commune revealed that previously they earned their living by agriculture. In the mid 1990s the local authority suggested them to sell parts of their land for industrial development. Most of them (99%) agreed to sell the land because the productivity of rice on this soil was very low. Upon the operation of Le Minh Xuan Industrial Zone, a number of community members started to work in the enterprises. In addition, together with the development of the industrial zone, the transport system and electricity network were developed. Although the electricity network was not connected to the households, households could be served by a subordinate system to the main system of the industrial zone. Thanks to these developments (increase in income, better transport system, connecting to electricity network) the number

of children able to attend school increased, and the average knowledge standard among the community also increased.

However, there were also negative side effects. According to the community members, they are suffering from wastewater pollution. Previously the community used water from Canal No. 8 for domestic use and agriculture. But nowadays the canal has become the sewer that receives untreated wastewater from Le Minh Xuan Industrial Zone. The water in the canal has become dark with a bad odour. Fish are expected not to survive in such a polluted canal. During the rainy season nearby rice fields and fishponds are flooded and consequently damaged by wastewater from the canal. Individually, affected people talked with the Industrial Zone Infrastructure Development Company. Some sent complaints to the Industrial Zone Infrastructure Development Company asking for environmental improvement (among them are people who are workers or who have relatives working in the industrial zone). Some others sent complaints to the Environmental Bureau of Binh Chanh District. Faced with the reactions of the community, the Industrial Zone Infrastructure Development Company tried to solve the problem via effect-oriented measures (setting aeration systems in the canal to reduce odour) and via compensation by providing water supply at low price for a limited number of households nearby the canal. However, the community members were not satisfied with these measures and they continued sending complaints to the Industrial Zone Infrastructure Development Company. After receiving repeated complaints from the community members, the Industrial Zone Infrastructure Development Company promised to construct a common wastewater treatment plant in the near future. In August 1999 the Industrial Zone Infrastructure Development Company of Le Minh Xuan Industrial Zone started the invitation to bid for the construction of a common wastewater treatment plant[13].

The communities in hamlet 2 of Qui Duc Commune and in hamlet 5 of Le Minh Xuan Commune both benefit from the transport system accompanying the development of industrial zone. But their experience with pollution is different. Community members in hamlet 2 sometimes see and smell a huge plume of smoke from the industrial zone passing their houses, but that happens rather infrequently. People in this hamlet hardly ever send complaints nor discuss pollution affairs with the representative of the Industrial Zone Infrastructure Development Company, because their economic and health interests are hardly affected by the pollution from the industrial zone. The community in hamlet 5 of Le Minh Xuan Commune is more affected by wastewater from Le Minh Xuan Industrial Zone. Canal B, which has served as an important water source for their daily use, is polluted indirectly by wastewater from the industrial zone since it mixes with water from Canal No. 8. After receiving wastewater from the industrial zone, Canal No. 8 discharges to Canal B. Community

members claim that water in Canal B has became dark with high turbidity, and large amounts of fish died in this canal. This had not been observed before the industrial zone went into operation. As shallow groundwater in this area is affected by acidic water, it can not be used for daily use. Consequently the community has to buy water. Community members in this hamlet have sent written complaints to the Environmental Bureau of Binh Chanh District. But they did not receive any reply on their complaints. According to Mr. Muoi, a staff of the Environmental Bureau of Binh Chanh District, it takes time to solve the complaint, because of the bureaucratic system. His section received the complaints, but these complaints then were submitted to the chairman of the District People's Committee to be considered. This indicates the lack of power of district environmental agencies in dealing with environmental enforcement.

4.2 Living with Wastewater and Air Pollutants: The Case of Binh Chieu Industrial Zone

Binh Chieu Industrial Zone is located in Go Dua Hamlet, Binh Chieu Commune, Thu Duc District with a surface area of about 30 ha. It was developed on the land of the Army Corps No. 4, by Import-Export and Service Company of District I in 1996. Many kinds of industrial sectors can be found here: pulp and paper, paints, aluminium products, food processing, wooden products, electroplating, etc. These enterprises are state-owned, private, foreign investment (France, the Philippines, Taiwan, and the United States) and joint-venture (Viet Nam-Japan, Viet Nam-France, and Viet Nam-Taiwan). The layout of Binh Chieu Industrial Zone and the locations where interviews were carried out is presented in Figure 7.5.

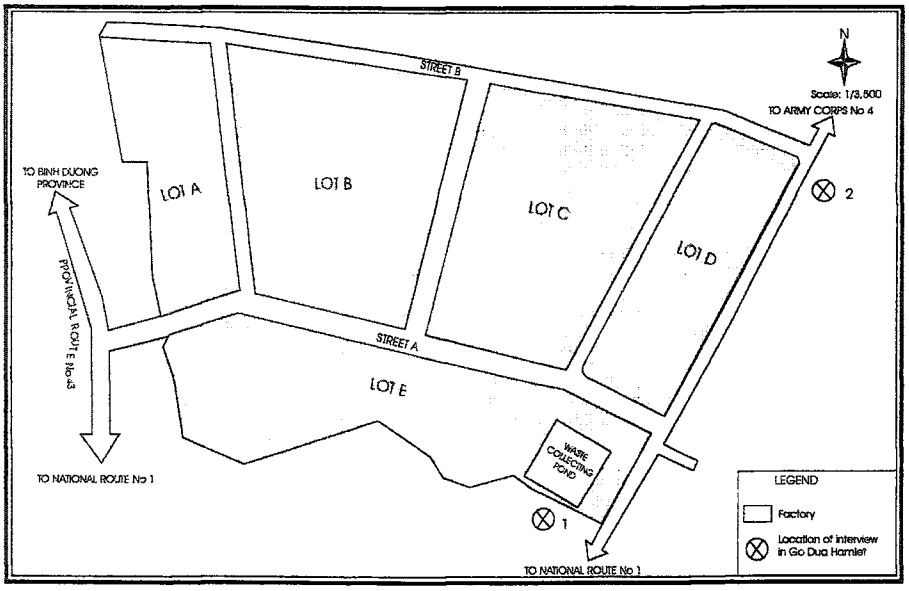

Figure 7.5 Location of Binh Chieu Industrial Zone

According to staff of Ho Chi Minh City DOSTE and Industrial Zone Management Board, and staff of the Industrial Zone Infrastructure Development Company, all the wastewater in this industrial zone is collected in a large pond within the area of the industrial zone. This wastewater is used for fire protection in case of emergency. The Industrial Zone Infrastructure Development Company of this industrial zone has no plan to construct a common wastewater treatment plant. Enterprises that invest in this industrial zone have to treat their own wastewater to comply with the governmental standards. But no data on waste treatment facilities of these individual enterprises are available or could be obtained. During the most recent rainy season (2000), the pressure caused by large quantities of rainwater and wastewater broke down the wall of the industrial zone and untreated wastewater flooded the neighbourhood. Community members who live in the South of the industrial zone have had to suffer from untreated wastewater from the industrial zone that used to flood their houses and the road. Meanwhile community members in the East have to live with air pollutants from the paint and wood production in the industrial zone, because their houses are located next door to these factories.

Although community members get benefits related to this industrial zone, such as employment and retail trade, when affected by pollution they complained to the People's Committee of the commune through their representatives. One of the staff of the Environmental Bureau of the district is also a victim of flooding

wastewater. He made a video film on flooding wastewater and showed it to the Industrial Zone Infrastructure Development Company. Subsequently, the Industrial Zone Infrastructure Development Company solved the problem by rebuilding the wall of the industrial zone to prevent untreated wastewater flowing out. But the Industrial Zone Infrastructure Development Company made no start with wastewater treatment. In this case, the Industrial Zone Infrastructure Development Company has at least taken some initiatives to address and minimise the problem. By contrast, community members who suffer from air pollution are still victimised. In comparing the two cases described above, there are differences in treatment offered by the Industrial Zone Infrastructure Development Company. Immediate remedy has been taken as a solution to prevent flooding, whereas there is no action at all in the other case. Discrimination in responding to public complaint or disputed responsibility can explain this difference.

4.3 Conclusion on Case Studies in Ho Chi Minh City

The two case studies in Ho Chi Minh City show some common characteristics in the reactions of communities to polluted industries. Although residents are getting benefits from their respective industrial zone, community members do react by complaining when they are directly and seriously affected by pollution. The community members do not send complaints to DOSTE because they do not know DOSTE or their function. Most of them send written or verbal complaints to the local People's Committee through their representatives.

In the case studies in other provinces, people have usually no access to the Industrial Zone Infrastructure Development Company of industrial zones. They then try to influence the polluters through the mass media and DOSTE (the case of Viet Huong Industrial Zone), local social organisations and DOSTE (the case of Bien Hoa I Industrial Zone and Tan Dong Hiep Industrial Zone), DOSTE (the case of Tan Dinh An Industrial Zone), or even the Prime Minister (the case of Bien Hoa I Industrial Zone). The community members in Binh Chieu Industrial Zone and Le Minh Xuan Industrial Zone, however, managed to solve the problem either directly with the Industrial Zone Infrastructure Development Company (the case of Le Minh Xuan Industrial Zone) or with the Industrial Zone Infrastructure Development Company through the local authority (the case of Binh Chieu Industrial Zone). It is likely that when Industrial Zone Infrastructure Development Companies are willing to listen to the community, and have a sense of responsibility, they will take action to solve the complaints on environmental quality without the intervention of environmental regulators. However, willingness to listen to the community and having a sense of responsibility are not enough. The Industrial Zone Infrastructure Development Company must have adequate resources to carry out their actions.

Lack of adequate resources might explain the limited action of the Industrial Zone Infrastructure Development Company in Binh Chieu Industrial Zone, compared to the Industrial Zone Infrastructure Development Company of Le Minh Xuan Industrial Zone.

5. Lessons from the Reactions of the Community

Even though the limited amount of case studies make it impossible to claim full understanding and information on the complexity of local community protest, the results do provide some insights in local community reactions under different conditions of economic and social dependency. Four lessons can be drawn from the case studies presented above and other studies on community involvement in industrial pollution control.

** Reactions of Local Communities*

Communities – and their members – in the vicinity of industrial zones have different interests, opinions and reactions to industrial pollution caused by these industrial zones. Some community members make their living working in the factories – or indirectly profit from the existence of these factories – that are the source of local pollution. Others experience diseases or are otherwise affected by pollution, losing crops or aquatic resources. A third group earns their living by working for polluting factories, and suffers from pollution at the same time. Finally, some make their living of pollution by recycling waste.

The case studies show interesting evidence that even though community members sometimes have low education levels, have no access to environmental authorities and are economically and socially dependent on the industrial activities of industrial zones, they can still react strongly when affected by industrial pollution, and will ask for improved environmental performance. The modes and diverse strategies with which people react vary from community to community and are strongly determined by the possibilities local community members see and have in putting Industrial Zone Infrastructure Development Companies and enterprises under pressure. Community members can make both verbal and written complaints directly to the Industrial Zone Infrastructure Development Company of the industrial zone (the case of Le Minh Xuan Industrial Zone). When communicating directly to the Industrial Zone Infrastructure Development Company is impossible (the case of Viet Huong Industrial Zone), community members sometimes rely on the support from the mass media. The latter plays a vital role in pushing environmental authorities to carry out monitoring and enforcement on industrial polluters. This confirms the findings of O'Rourke (1999) that in Viet Nam DOSTEs are sensitive to media criticism on their failure to enforce environmental laws.

In other cases, community members exert their pressure through their social organisations (Women' s Association, Retired Civil Servants' Group, Veterans' Association, etc.) (the case of Bien Hoa I Industrial Zone). While on paper all Industrial Zone Infrastructure Development Companies are required to build a common treatment facility for their own industrial zone and individual firms have to install treatment facilities to (pre)treat their wastes, in practice most of them try to avoid this for various reasons. Moreover, the enforcement systems of DOSTEs do not work well enough to push industrial polluters into compliance with environmental regulations. Evidence from Viet Huong Industrial Zone and Le Minh Xuan Industrial Zone show that in the absence of strict regulation and strong enforcement, Industrial Zone Infrastructure Development Companies try to avoid environmental investments for common treatment facilities as is often required in environmental impact assessment (EIA) reports[14]. However, under the enduring pressure of the communities (with or without the support of the mass media, social organisations, local representatives and authorities), environmental regulations are slowly moving from the written word to effective implementation.

* *Community-Industrial Zone Infrastructure Development Company Relations*

Except for the case of Tan Dinh An Industrial Zone, where community members complained directly to Binh Duong DOSTE because one of them was familiar with the organisation and the procedures, it is clear that in most of the cases, community members do not directly address local/provincial environmental authorities, that is, the DOSTEs. This may be because they are undereducated and living in remote areas (except for the community in Bien Hoa I Industrial Zone) or because they do not have any relation with other actors in society who can help them to gain access to environmental authorities. Direct access to Industrial Zone Infrastructure Development Companies can be an alternative. When community members can have direct access to Industrial Zone Infrastructure Development Companies, and these Industrial Zone Infrastructure Development Companies are willing to co-operate with community members, and Industrial Zone Infrastructure Development Companies have a sense of responsibility and adequate resources, then the role of DOSTEs becomes less important (the case of Le Minh Xuan Industrial Zone). Thus it appears that where community members have direct access to Industrial Zone Infrastructure Development Companies, they can move to solve pollution problems in industrial zones in ways that save time and money, and reduce the burden on local environmental agencies. In the case of Viet Huong Industrial Zone, community members found it difficult to contact the Industrial Zone Infrastructure Development Company because they were stopped at the entrance of the industrial zone, and the Industrial Zone Infrastructure Development Company was not willing to talk about pollution problems caused by the industrial zone. As the

latter case shows, in such situations, it takes time to force the Industrial Zone Infrastructure Development Company to build a common wastewater treatment plant because the complaints have to pass many levels of governmental bureaucracy.

The other issue related to community-Industrial Zone Infrastructure Development Company relation is compensation. To acquire compensation for environmental and economic damages that communities have to suffer often presents other difficulties. In Viet Nam the polluter pays principle is not strictly enforced, so that society still has to pay instead of polluters.

The third issue in community-Industrial Zone Infrastructure Development Company relations is the willingness of community members to approach the Industrial Zone Infrastructure Development Company. In the case of Bien Hoa I Industrial Zone and Tan Dinh An Industrial Zone where people live on the land of the industrial zone and have to move out in the near future, their willingness to communicate with the Industrial Zone Infrastructure Development Company is limited. This may explain the limited environmental improvement at these industrial zones and of individual enterprises in these industrial zones.

** The Influence of Local Community Pressure on Foreign Companies and SOEs*

One of the interviewees reported "Binh Duong Province gives high priority to industrial growth and economic development. While on paper, environmental concern must be incorporated into the provincial development plan, in practice, environmental protection is only on the periphery of the provincial programme. The province tries to attract as much foreign investment as possible because foreign direct investment is seen as the driving force for the provincial development. As a result the failure to enforce environmental regulation for powerful foreign firms should not surprise us"[15].

The case of Viet Huong Industrial Zone confirms this picture. In the Southern Key Economic Region, only Viet Huong Industrial Zone has been developed by a private company; the others have mostly been developed by state companies or joint-venture companies. This private company is owned by a Chinese migrant and investment into the development of the industrial zone is in fact a kind of foreign investment from Taiwan. As mentioned earlier in this chapter, this industrial zone houses Taiwanese small and medium sized enterprises. While on paper all Industrial Zone Infrastructure Development Companies have to submit an EIA report as one among the several requirements for establishing an industrial zone, in practice this industrial zone was established without submitting an EIA report. No factory in this industrial zone operates its

treatment facility (even though some have installed one), and there is no common treatment system for wastewater. As a result, the communities in the vicinity suffer from pollution. The provincial environmental agency has failed to enforce environmental regulations towards foreign companies in this industrial zone and the Industrial Zone Infrastructure Development Company. Only under pressure from the communities, and with the support of the media, did the Industrial Zone Infrastructure Development Company finally invest in a common wastewater treatment plant.

With regard to state-owned enterprises (SOEs) in Viet Nam, O'Rourke (1999: 147, 201) argues that "when the state is both the polluter and the regulator it is particular difficult to overcome agency conflicts and advance normal regulation, ... Unfortunately, some SOEs still operate as if they are above the law". Indeed, in the case of Bien Hoa I Industrial Zone, where most factories are SOEs and face severe difficulties to reduce pollution, enforcement by the environmental authority was hampered by the conflicting economic priorities of the province. It was only under the pressure of the local communities that some of these SOEs were forced to invest in pollution control facilities.

Of course community pressure by itself is usually not strong enough to change the situation. Also in this case community actions require internal and external supports. Internal support refers to the contribution of social organisations, which on the one hand belong to the community while on the other hand have – to a certain extent – a secure position in the conventional political system. The external support refers to the response of the Prime Minister. With the instruction of the Prime Minister, the environmental agency can exert its enforcement on SOEs to the full extent of the law. In this case of Bien Hoa I Industrial Zone, the community members have activated an alarm on the environmental deterioration and health problems related to industrial pollution in a specific area, in order to motivate state action. But the alarm must resonate in the political system and catch the attention of powerful state actors, if it is to lead to specific actions.

** The Role of the Media and Social Organisations*

In those cases, where community members have access to neither Industrial Zone Infrastructure Development Companies nor DOSTEs, the media and social organisations have proved to be helpful in supporting community actions to influence changes in industrial practices or enforcement of government regulations. The media is emerging as a supporting actor for community protest against industrial polluters (in the case of Viet Huong Industrial Zone). Staff from DOSTE acknowledged that in some cases, DOSTE failed to enforce industrial polluters but after the latter's poor environmental performance was

presented in the newspaper, or broadcasted on television, a change in their environmental practice could be identified.

O'Rourke (1999: 163) confirms that "two main sources generate public pressure on industrial polluters and the officials who regulate them: citizen complaints and media coverage". There is no doubt that industrial polluters are embarrassed by public disclosure of their poor environmental practices and are motivated by reputational incentives to improve their environmental performance. In Viet Nam recently, the mass media has given more publicity to environmental issues. Interviews with reporters revealed that they experience considerable freedom to write about environmental conflicts, and that environmental issues are 'hot issues' nowadays. Viet Nam television and radio have special programmes on science and education focused on environment; newspapers have separate sections on environmental issues. Reporters gather information on the impacts of pollution from specific firms and they broadcast or transmit that information to the wider public. Bad practices of specific firms can be subject to discussion in newspapers or on television. In some cases, citizens send complaints on pollution directly to the mass media. More and more the media seems to play a critical role in increasing environmental awareness, dissemination of environmental information, supporting local protest against pollution, and triggering state authorities into action.

The conventional (non-environmental) social organisations, especially the Women's Association and the Youth Union, often participate in campaigns on environmental awareness and training, information dissemination, and practical clean-ups organised and co-organised by local governments. 'Green Sundays', 'Green Weeks', 'Women and Home Sanitation', 'Green Houses, Nice Streets' are examples of these activities and campaigns. Hardly any information on more structural activities involving protest against pollution can be found. It seems that such involvement is certainly not a policy from the top of these organisations (cf. Frijns et al., 2000). However, the case of Bien Hoa I Industrial Zone and Tan Dong Hiep Industrial Zone has shown that to a certain extent and at the local level, the Women' s Association together with the Veterans' Association, and the Retired Civil Servants' Group also contribute to the struggle against industrial polluters to protect local environmental quality.

6. Opportunities and Constraints in Mobilising Community Action

There are several factors enabling, facilitating and contributing to the mobilisation of community action in Viet Nam. First, with the Law on Complaint and Accusation (May 1991) complaints and accusations became valid legal actions. Community members know that they have the right to complain. Since 1994, after the passage of the Law on Environmental Protection, complaints and pro-

tests around environmental issues have grown exponentially (O'Rourke, 1999). Beside the law, Decree 175 (Article 6f), Decree 26 (Article 26.2), and Decree 29 form important legal frameworks for the local communities to complain on the quality of their local environment[16]. Second, alongside the legal rights, the increasing knowledge on environmental impacts of industrial pollution stimulates grassroots reactions against industrial polluters. In Viet Nam the government, Vietnamese scientists, the educational system and the media play a vital role in raising environmental awareness and disseminating information. At schools and colleges, environmental issues have become part of the curriculum. Scientists and scientific studies highlight the significance and urgency of environmental problems throughout the country. MOSTE, collaborated with organisations of culture, information, and fine arts, has organised several national contests on the environment with increasing public participation. Viet Nam television, radio and newspapers have separate programmes and sections on the environment. Third, DOSTEs are sensitive to public criticism on their failures to enforce industrial regulations. Fourth, industrial polluters are, to some extent, sensitive to public disclosure on their poor environmental performance. These are critical opportunities to motivate community action in Viet Nam.

However, many constraints exist that hamper community action. The overall level of environmental awareness remains low, and limited access to environmental agencies and the lack of local and national independent NGOs working on pollution issues are among the most significant constraints. Although environmental awareness has increased recently, most citizens hardly know anything on (for instance) long term impacts of industrial pollution. Consequently, community members often react only to direct economic consequences and health effects rather than to long term impacts, and their protests have an ad-hoc character.

While the Law on Environmental Protection writes that "any person who discovers any sign of environmental damage has to report immediately to the local People's Committee or any other governmental organisation..." (Article 33, Chapter III), the practice (as in our case studies) is that community members often do not know DOSTE even by name. Consequently, their complaints have to pass many bureaucratic levels before reaching the right place; community members lose their trust in state organisations and thus stop complaining.

Furthermore, in other (developed and developing) countries, domestic environmental NGOs link to and draw resources from international environmental NGOs, and in that way succeed to mobilise concerned citizens to participate in policy-making and support social movements to push state and industrial polluters towards radical environmental reform. In Viet Nam such independent local or national NGOs are absent. This impedes reform, even though in some

cases citizens by themselves can have significant influence on the state and polluting firms, as examples of the United States and Indonesia show[17]. In the absence of NGOs, however, citizens lack a powerful source of support.

In order to enhance the role of communities in detecting pollution problems, to increase monitoring of environmental practice of industrial polluters by communities, and to change the behaviour of industrial polluters, the state can be of major help. The state can help to increase environmental awareness among citizens, and to disseminate environmental information via the mass media. When direct access to Industrial Zone Infrastructure Development Companies is impossible, direct access to DOSTEs will save time and money for community members to complain on environmental quality and pollution issues. The state should make community members familiar with DOSTEs, its functions and the contact persons in case they have complaints on environmental and pollution issues. In addition, the state could also mobilise the role of community through public involvement in EIA process and in post-EIA monitoring. Last but not least, as industrial polluters are sensitive to public disclosure on their poor environmental performance, public information on good and bad environmental practices and awards for good environmental practices might help to improve environmental performance of industry[18].

7. The Contribution of the Community to the Development of Industrial Ecology

In the case studies above, industrial polluters, in some cases, have shifted from non-compliance to compliance under the pressure of community members. But the compliance is often limited to applying end-of-pipe technology. Hardly any shift to clean technologies can be found. This should not surprise us, because the concept of cleaner production has been introduced only recently in Viet Nam, and its application is still in the early stages. Most local private firms and SOEs have little knowledge on cleaner production, and foreign companies have limited incentives to invest in cleaner production (except for some multinational corporations). I share the opinion of O'Rourke (1999: 124): "with no knowledge of technical alternatives, communities tend to push for pollution control rather than prevention simply because their main concern is stopping local emissions".

One might thus conclude that local protests in Viet Nam have no contribution to make to the development of industrial estates based on the concept of industrial ecology. However, Sonnenfeld (1996) showed that under the pressure of communities, pulp and paper industries in Australia, Indonesia and Thailand have improved their environmental performance by adopting cleaner production technologies. In our case studies, evidence of Dong Nai Paper Company

shows that with the continuous pressure of the community, industrial polluters will seek to apply more effective options to control pollution, and a shift from end-of-pipe to cleaner production can be identified within the company. One might think that with the increase in environmental knowledge, community members will protest not only against short term environmental impacts but also against long term impacts, or that with the increase in knowledge on environmental technologies, industrial firms and estate managers will have a variety of options to reduce their waste and to prevent environmental impacts. In other words, the combination of internal factors (access to environmental technologies) and external factors (continuous pressure of the community) may lead industrial firms and estate managers to take into account preventive measures rather than only focus on proactive measures.

In addition, community members in Viet Nam have been playing a vital role in waste recycling. According to Rekha et al. (1994), from 1975 to 1989 there was a serious shortage of raw materials for industry in Viet Nam. This resulted in the blooming of recycling activities in the informal sector. But since 1993 the situation has changed, with abundant local and imported raw materials. The price of waste and by-products has fallen, which has a disincentive on recycling activities. However, in our case study in Bien Hoa I Industrial Zone, for example, community members around Dong Nai Pulp and Paper Company still collect waste fibres from wastewater to earn their living.

Interviews with managers of factories/enterprises in industrial zones in the Southern Key Economic Region reveal that a number of factories/enterprises use waste materials for their input into production processes (see chapter 4). These factories/enterprises buy by-products in the market or through the intermediates, and sell their wastes to the intermediates. Since there is no formal recycling sector in Viet Nam, most of the recycling activities are carried out in the informal sector.

Another interesting observation is that in some cases, it is the community members who initiate the scientific research on waste recycling. For example, community members around Tan Binh Chemical Factory collect the red sludge from the factory to produce a kind of powder. This powder is used as additive to the production of paint, rubber, and bricks. Based on this activity, Vietnamese scientists have begun to study sludge recovery to produce colouring agents, to be used as additives to the production of coloured materials (Tran Ngoc Anh Tuan and Nguyen Van Phuoc, 2000). By engaging in recycling activities, community members on the one hand get economic benefits from industrial wastes, and on the other, they help to reduce the pollution load at dumping sites, facilitate the reuse of organic wastes (as organic and inorganic wastes are separated), and indirectly help to increase the efficient use of natural resources.

As such, they contribute to a certain extent to industrial ecology. The question is what will happen with the informal recycling sector if the industrial ecology concept is formalised. What role can the community then continue to play? Most likely the role of the community will be changed: either they will still contribute to industrial ecology and make a living from recycling, be it different from the current recycling system, or they will be marginalised and formal recyclers will take over.

8. Conclusion

The result of these case studies is in line with the conclusion of O'Rourke (1999) in his study on community-driven regulation in Viet Nam. In the absence of strict governmental regulation and strong enforcement, community actions serve as a kind of informal regulation. These informal regulators, however, do not so much replace conventional state regulation, but rather supplement or complement existing command-and-control environmental regulation. In addition, these case studies reveal that in numerous cases, community members are to some extent economically and socially dependent both on industrial firms and on local, provincial or state authorities. Nevertheless, when affected by industrial pollution, they tend to react strongly against environmental pollution, asking for better environmental quality and entering into new relations with state and non-state actors. Durable pressure from community actions can motivate and 'force' environmental agencies to regulate even the powerful foreign investment companies and SOEs that otherwise seem to be untouched by environmental enforcement.

In Western Europe and North America, local and national environmental NGOs play a crucial role in environmental reforms. In the absence of local NGOs in Viet Nam, the protests of communities against industrial pollution are supported by other organisations: local mass media and local social organisations. As in China, it is observed also in Vietnam an interest of national governmental authorities in these actions, both as new monitoring mechanisms and as alternative enforcement and control mechanisms of a national environmental policy plagued by limited budgets, manpower and information. At the same time at the national level the absence of environmental NGOs has not been replaced by alternative organisations.

There exist opportunities related to legislation, knowledge, and the sensitivity of DOSTEs and polluters to public criticism contributing to and supporting the mobilisation of community actions. However, many constraints still hamper community actions. More knowledge on environmental risks and more access to environmental policy-making processes can push forward successful and effective community actions complementing state regulation. The government

can mobilise and support these actions through environmental information and awareness programmes, and through policies that on the one hand provide more incentives to the public to participate in policy-making, and on the other open up the policy-making process to these 'non-conventional' contributors.

Notes

[1] Since 1980s Indonesia and later on the Philippines have initiated a programme for rating and publicly disclosing the environmental performance of factories. The programme is called PROPER in Indonesia and Eco-Watch in the Philippines. Under this programme, each polluter was rated on its environmental performance from black to gold – equivalent to very poor and very good respectively – then the result of rating was released to the public, the Indonesian Vice President and the Philippines President congratulated best practice plants in a public ceremony. Such a programme has induced factories of all types to cut pollution and to improve their environmental performance. In the wake of Indonesia and the Philippines, at least five other countries have also begun pilot implementation or active consideration of the programme (WB, 2000).

[2] In rural areas in Viet Nam the administrative units are classified into village, hamlet, commune, and district. In cities these are classified group of households, quarter, ward, and district.

[3] In this zone, one group interview with the head of Hung Loc Hamlet (Hung Dinh Commune, Thuan An District) and 5 households in the same hamlet, and 5 other individual interviews with people who live in the vicinity of the industrial zone have been made.

[4] In Viet Nam, each administrative unit has to organise permanent meetings with the community or representatives of communities to inform new governmental regulations or programmes, or plan for the following period, etc. During the meeting, citizens can give their opinion on all kind of issues, through which the authority can understand the situation of the communities, their wants and needs, their difficulties, etc. in order to help them properly. Members of the People's Council are elected, and they nominate the members of the People's Committee that is the executive body.

[5] Interview Mr. Huynh Son Hai at Viet Nam-Singapore Industrial Zone Management Board – who is responsible for the investment projects in Viet Nam-Singapore Industrial Zone (December 8, 1999).

[6] According to the survey of Rock (2000), many low-skill, low-wage, labour-intensive dirty industries such as textile dyeing, leather-making and low-skilled electroplating in the first group of Southeast Asian newly industrialising countries (Korea, Taiwan, Hong Kong) are moving to the third group of Southeast Asian newly industrialising countries (Cambodia, Laos, Viet Nam) and India, Bangladesh, Sri Lanka. High level of poverty, low level of education, and great weakness in institutional capacity in government in generally and in environmental protection in particular provide opportunities for these industries to relocate.

[7] SONADEZI (Société Nationale pour le Développement des Zones Industrielles) was established in 1963 to develop and manage the industrial zones in South of Viet Nam. After 1975, SONADEZI was disbanded and then re-established in 1990 according to the Decision No. 1713/QD-UBT (December 15, 1990) of the Dong Nai People's Committee (CENTEMA, 1997).

[8] In Bien Hoa I Industrial Zone, interviews were carried out with two groups of people in quarter 6, quarter 7; three individual interviews with households in quarter 5, quarter 7, and quarter 9 of An Binh Ward; one individual interview with people who live next to Bien Hoa Sugar Cane Factory; and one individual interview with people in Thong Nhat Ward.

[9] At home, workers can use electricity of the factories they work for by connecting to the electricity network of the factories and they have to pay for it. People who do not work for any factory can make a subordinate network from workers' houses.

[10] Interviewees in this community include the head of the quarter (a former policeman, now a driver working for Dong Nai Paper Company), the Chairman of the local Cross-Road Association, a representative of the local Women's Association, the Chairman of the local Retired Civil Servant's Group (former worker in the chemical plant of Dong Nai Paper Company), and the Secretary of the local Communist Party (worker for VINAPRO Factory in Bien Hoa I Industrial Zone).

[11] The researcher can confirm the difficulties to breathe and tightness across the chest in visiting this community.

[12] These data were based on the survey of the researcher in 1993-1994 (Phung Thuy Phuong, 1994), and EIA Report on Bien Hoa I Industrial Zone (CENTEMA, 1997).

[13] Interview with Mr. Tran Phuc Tue, environmental expert (Ho Chi Minh City DOSTE) (May 19, 2000).

[14] In our case studies Viet Huong Industrial Zone has no EIA report, Bien Hoa I Industrial Zone, Bien Hoa II Industrial Zone, Le Minh Xuan Industrial Zone, Binh Chieu Industrial Zone, Viet Nam-Singapore Industrial Zone have EIA reports.

[15] Interview with a reporter from Binh Duong Radio-T.V Station, my translation (December 8, 1999).

[16] Decree 175/CP (1994) provides guidance for the implementation of the Law on Environmental Protection; Decree 26/CP (1996) provides regulations on the punishment of administrative violation of Environmental Protection Law; Decree 29/CP (1998) lays out mechanisms for democratic participation at the commune level.

[17] The US Toxic Release Inventory, a simple pollution accounting system established in the late 1980s, and Indonesia's PROPER programme for rating the environmental performance of firms. In both cases, government agencies collect environmental performance data and then provide it to the public (in different forms). This information has been used to pressure firms either directly or indirectly to reduce pollution (O'Rourke, 1999).

[18] PROPER in Indonesia and Eco-Watch in the Philippines are good experiences from which Viet Nam can learn (WB, 2000).

CHAPTER 8

GREENING INDUSTRIAL ESTATES IN VIET NAM: CONCLUSIONS AND RECOMMENDATIONS

This chapter summarises and integrates the findings of this study in reviewing the current environmental management and policy-making in Viet Nam with special reference to industrial estates, and analysing possibilities for greening industrial estates in Viet Nam.

1. Industrialisation and Environmental Challenges in Viet Nam

Viet Nam has shown a rapid acceleration in economic and industrial expansion in recent years, especially following the economic reform under *Doi Moi* policy, from 1986 onwards. *Doi Moi* policy marked a new stage in the economic development of Viet Nam since its aim was to transform the failing centrally planned economy into a more market-oriented economy. This economic transition was followed by rapid economic growth, especially from the early 1990s onwards. The Eighth Five-Year Plan (1996-2000) identified 'industrialisation and modernisation' as the backbone of Viet Nam's efforts to advance socio-economic development and to keep pace with other Southeast Asian countries.

The establishment of industrial estates (including industrial zones, export-processing zones and high-tech industrial zones) was considered to be a key vehicle for the industrialisation process. As a result Viet Nam witnessed a dramatic increase in number of industrial estates throughout the country during the last decade of the twentieth century. Industrial estates in Viet Nam have promoted rapid industrialisation; have increased product quality and productivity; have enhanced local and national employment; and have attracted both domestic and foreign investors. As early as the first half of 1999, output from industrial estates accounted for 20% of total industrial output.

Although industrial estates have indeed contributed strongly to economic development, they have also created new problems. Chapter 1 described serious environmental deterioration related to industrial estate development. The use of natural resources and the discharge of waste into the environment are increasing commensurately with industrial activities. Non-renewable resources are under threat of depletion. Effluents from industry threaten vulnerable ecosystems, cause losses to other economic activities, reduce air and water quality, and affect human health.

From the analysis in chapter 1, one could conclude that there is a need for environmental reform to avoid the path of 'grow first, clean up later' or 'development at all cost,' and to ensure that economic growth and environmental protection go hand in hand. This study contributes to the construction of a path towards 'green industrial estates' in Viet Nam.

In this study, industrial ecology has formed the concept and model for the ecological modernisation of industrial estates. Since in a globalising world increasingly sensitive to environmental concerns, effective industrial environmental management becomes essential. Industrial ecology may offer a new model for effective environmental management of industrial estates.

Chapter 2 presents industrial ecology as an emerging concept that brings together various strategies to address the environmental impacts of rapid industrialisation. This new way of thinking aims to minimise waste and use resources efficiently by redesigning industrial systems. Distinct from current linear flows of manufacturing and production, industrial ecology aims to re-orient industrial systems towards closed loops of material and energy flows. Industrial ecologists have focused upon eco-parks as a key strategy for implementing industrial ecology. Various countries in Asia have experienced the advantages of developing eco-parks, and have made efforts to experiment with industrial ecology models for industrial estate development[1]. Based on the analysis from chapter 4 to chapter 7, this study tried to assess the feasibility and potential strategies for adopting the concept of industrial ecology in Viet Nam, in order to improve the existing environmental management of industrial estates and increase Viet Nam's environmental image as it competes with other Asian industrialising economies for foreign investments.

From a review of the existing literature chapter 2 concluded that up until the present, substance flows between the natural environment and production-consumption systems, and the technologies supportive to close the loops of material and energy, have been the primary focus of most industrial ecology studies. This paper argued, however, that in applying these technologies and substance flow models in practice, other issues such as institutional arrange-

ments, organisational structures, and policies are of crucial importance in moving industrial ecology from paper into practice. In other words, it turns out to be necessary to analyse the actors and institutions that can play an instrumental role in putting the concept of industrial ecology to work. This actor-and-institution-oriented approach to industrial ecology needs a theoretical underpinning to be applied in practice. Ecological Modernisation Theory can provide this underpinning through applying its theoretical insights into the core dynamics, mechanisms, institutions and actors which can shift the unsustainable industrial system to a more environmentally sound direction.

2. Current Environmental Management and Policy-Making in Viet Nam with Special Reference to Industrial Estates

While environmental problems became the focus of major concern in the late 1960s and 1970s, and were thereafter integrated into national policies in Europe, North America and some newly industrialising countries such as South Korea, Taiwan and Thailand, Viet Nam only started to develop environmental protection policies in the 1980s. 1982 marks the beginning of the era in which environmental issues came to be of greater concern for the state, and significant developments in environmental policies can be found only since the 1990s.

The construction of the environmental agenda was not the result of strong environmental movements or environmental activists, as could be witnessed in organisation for economic co-operation development (OECD) countries, but rather triggered by the voices of Vietnamese scientists and the 'intervention' of international organisations such as those of the United Nations. Since 1994 the Law on Environmental Protection and a series of regulations have been promulgated to form the legal framework for environmental protection activities. The establishment of national and local environmental agencies; the introduction and application of different regulatory instruments such as environmental standards and environmental impact assessment (EIA); the creation of environmental monitoring networks; the formation of environmental inspection and enforcement; and the start of environmental education and training were major state efforts to deal with environmental issues.

Notwithstanding, as chapter 3 illustrates, contemporary environmental policy-making and management in Viet Nam remains weak when facing the environmental effects of rapid industrialisation, and the dominant regulatory approach has largely failed to address environmental problems in Viet Nam. A fairly comprehensive legal framework for environmental protection has been established, but the implementation of laws, decrees, and directives falls short. High priority to economic development; conflicts of interest; poor inter-agency collaboration; mixed bureaucratic jurisdiction over tasks and responsibilities; in-

adequate monitoring; lax enforcement; and lack of resources characterise the implementation and enforcement of environmental policy in Viet Nam. The dominant command-and-control approach is at just one of the explanations for the anaemic results of the environmental policy and management system.

In an attempt to overcome the weakness of the existing command-and-control system, the state has recently started to pay attention to more market-oriented approaches. But chapter 6 concluded that the introduction and application of economic instruments are still in its infant stage. Environmental funds, user charges/fees, and a deposit refund system are applied marginally, and subsidies for pollution control and prevention measures, marketable permits, pollution charges, product charges, development impact fees, depletion charges on resource use, etc. are entirely lacking. The problems surrounding the introduction and application of market-based approach include: the lack of experience with the design and implementation of economic instruments; the fear for their impact on income distribution and on competition of local industries in the global market; an inadequate legal framework; the weak institutional capability and reduced power of environmental agencies; and a lack of co-ordination between agencies.

The second path to modern implementation of conventional environmental policy, opening policies for public participation and combined with voluntary industrial agreements; and 'self-regulation', has up until now not been introduced in Viet Nam. The country lacks environmental policies to provide incentives for self-regulated and more regulatory negotiation or negotiated policy-making. For historical and cultural reasons and due to a lack of experience in negotiation and joint policy-making the state has not yet developed a framework for public and private interest group participation in environmental policy-making. In addition, the weak capacity of regulated groups to respond to regulatory negotiation or negotiated policy-making and the lack of a local market for green products has hampered the introduction of new approaches in environmental policy.

With respect to industrial estates, closely related to the shortcomings in environmental policy-making and implementation is the technological orientation. From various case studies and interviews this paper has concluded that the existing focus on end-of-pipe technologies has proved to be inefficient and ineffective up till now in mitigating environmental impacts of industrial estate activities. End-of-pipe technologies, also known as add-on technologies, are often costly and Vietnamese polluters constantly try to avoid the application of these technologies. End-of-pipe technologies are also inefficient because these technologies often transfer environmental problems from one medium to another. In addition, the existing system of EIAs, inspections and low economic incen-

tives creates very few motives for polluters to apply advanced and well-functioning end-of-pipe technologies.

Turning 'dirty' industrial estates into 'green' industrial estates requires an investment in the development and implementation of second-generation clean and green technologies. The analysis and evidence from Viet Nam suggests that the current command-and-control approach in Viet Nam is unlikely to trigger the desired technological innovations and a move towards cleaner production. The government lacks adequate knowledge and expertise to stimulate technological innovations in the production processes that could bring about major reduction of pollution and prevention of environmental impacts. Moreover, as I analysed in chapter 4, the success of advanced clean technologies for pollution control and prevention in industrial estates depends not only on the technological development and diffusion itself, but also on the social context in which the technology is introduced, diffused, and institutionalised. Technological transitions in industrial estates reach much further than 'just another technology'.

3. Environmental Reforms in Viet Nam: between Continuity and Innovation

Having outlined some of the major shortcomings in the current state-of-the-art in environmental reform, I will now discuss the future possibilities for environmental transformations in Viet Nam. In exploring the future agenda for ecological modernisation I will build on the indigenous analysis of developments and innovations that is currently occurring in Viet Nam, rather than suggesting an utopian agenda for an ideal environmental reform programme. I will first elaborate on more general opportunities for innovations in environmental reform, and then focus more specifically on new opportunities for greening industrial estates.

3.1 General Opportunities for Ecological Modernisation

The fact that Viet Nam's economy is undergoing a transformation from a centrally planned to a market-oriented economy presents an opportunity for the introduction of a new policy framework and new environmental arrangements. After having relied for years – with limited successes – only on command-and-control regulation, the incorporation of economic and communicative approaches will innovate the current policy framework. The polluter pays principle endorsed in the Law on Environmental Protection provides the legal basis for the introduction of market-based instruments in environmental policies. Further development and introduction of economic approaches can be expected via international regimes and co-operation and via the process of 'learning by

doing'. The emerging market economy provides a facilitating infrastructure for the development and application of such economic instruments. International competition might also trigger the adoption of (international) environmental standards such as the ISO 14000. The standard on environmental management systems (EMS) can play an especially effective role in shifting from traditional enforcement to more self-regulation. This in turn paves the way for voluntary initiatives and communicative approaches.

Second, the transition to a market-oriented economy and the ongoing process of privatisation may also result in a change in environmental practices of industries along the line of ecological modernisation. State-owned enterprises (SOEs) are currently subject to various forms of criticism on their environmental performance, compounding the negative evaluations of their economic performance.

Still, there are some interesting precedents for individual action, which were presented in chapter 4. Although the overall picture of the (environmental) performance of SOEs is not very promising at the moment, I have examined a few cases where SOEs applied cleaner production on a voluntary basis, because they experienced the benefits brought about by clean technologies. But these cases are limited in number and the ponderous central decision-making system in SOEs often prevents them from taking capital-intensive decisions even when these would lead to greater efficiency over the long term.

Moreover, SOEs consistently fail to take environmental measures even in response to regulatory or market pressures pushing them into a more environmentally sound direction. In general, only SOEs in export sectors are motivated to take care of their environmental performance because of the competitive pressure from the global market. Privatisation of SOEs might have some potential to transform the internal and external dynamics, triggers and mechanisms these firms face, resulting in an improvement of their environmental and economic performance. The state under privatisation is no longer both regulator and polluter, so privatised firms have to be more responsive to external incentives and pressures in order to maintain their position in a competitive market. Hence privatisation and the shift to a market economy trigger changes in the both internal organisation and attitude of companies and the external social environment, which in turn may be expected to foster the implementation of cleaner production.

But one should not be naïve about the benefits of the market. In Viet Nam, private enterprises simply do not voluntarily take pollution control measures. However, as soon as they have access to technological information; recognise the benefits of cleaner production; and experience regulatory and community

pressures they are able to adopt these practices in short notice (chapter 4). This implies that privatisation may be a necessary, but never a sufficient condition for successful environmental reform. It must be accompanied by widespread dissemination of information on environmental technology and management measures and continuous pressure from regulatory agencies and communities for ecological modernisation.

Third, while the first-generation environmental technology is still in its infant stage in Viet Nam, the second-generation environmental technology is already coming. In his study on the pulp and paper industry in Thailand, Sonnenfeld (1998) concluded that late industrialisation provides opportunities for countries to accelerate the incorporation of advanced environmental technology. This presents an opportunity for Viet Nam to learn from early experiences abroad and to leapfrog to less costly and more effective environmental technologies.

Experiences with the introduction and promotion of cleaner production and waste-exchange/industrial ecology in newly industrialising countries of Asia are valuable for Viet Nam. As discussed in chapter 4, the establishment of the Viet Nam Cleaner Production Centre and a number of cleaner production projects can be seen as a starting point for second-generation environmental technological innovations. With the establishment and activities of this centre and the growing international assistance in environmental policy and management, waste minimisation, second-generation environmental technologies and pollution prevention approaches will become more widely implemented among Vietnamese industrial firms.

Fourth, the new policy of opening up to foreign direct investment brings new experiences in environmental technology and management to Viet Nam and as such it can facilitate national industries to adopt advanced technologies and meet international standards. As was pointed out in chapter 4 and 5, in Viet Nam clean technologies and systematic environmental management in companies (ISO 14000) are mostly first introduced and applied in foreign and joint-venture companies, especially the ones where the foreign partner comes from OECD countries. These are not only strongly enjoined to comply with the national environmental regulations, but also have to compete on the global market and have to take care of their public image. Chapter 1 gave evidence that these companies work best with EIA reports. Such foreign and joint-venture companies with better technology and management systems play a significant role in the transfer of environmentally sound technologies in Viet Nam and to Vietnamese industry. But at the same time one should bear in mind that the net environmental benefits of foreign direct investment for the receiving nation are still the topic of debate and as shown in chapter 7 that foreign direct investment from the first-tier newly industrialising economies (e.g. South Korea and Tai-

wan) does not always bring better pollution control measures or best practice environmental performance to Viet Nam.

Fifth, the development of a Vietnamese ISO 14001 certification institution will strongly push the introduction of environmental management systems. The state organisations Quacert and its three branches – Quatest I, II, III – are responsible for quality assurance and testing of products produced in Viet Nam, and issuing certification of ISO 9000. Quatest III started co-operation with foreign consultant organisations to organise training courses on ISO 9000 and ISO 14000, and provides consultant services related to documentation and procedure for the application of ISO certification. In this way, international environmental standards were introduced to many Vietnamese firms making this organisation a good candidate to become the Vietnamese institution for ISO 14001 certification.

Sixth, the strong role and position of environmental scientists in Viet Nam is crucial for any further ecological modernisation. As presented in chapter 5 and 7, Vietnamese scientists have been contributing significantly to the dissemination of environmental information. They have made significant efforts to put environmental issues on the political agenda, and major governmental actions have been the result of their activities. In that sense they seem to fulfil part of the function that environmental non-governmental organisations (NGOs) have in OECD countries. At high schools and universities, the introduction of environmental issues into the study programmes formed a starting point to increase environmental awareness. It is now time – and the first signs can be identified – that environmental education and environmental research move toward subjects related to the second-generation technologies, advanced environmental management tools and pollution prevention approaches. In the long run and in various ways, these scientists will continue to play a leading role in developing and implementing pollution prevention approaches.

Seventh, communities in Viet Nam have a large potential in monitoring pollution sources and strengthening environmental enforcement by the state. Community protests against industrial pollution have the potential to redirect the environmental performance of industries, especially when these are given more room in the prevailing political structure. Chapter 7 showed that through complaints and protests against industrial pollution, communities force industrial polluters to take pollution control measures and to engage in good environmental practices. This mechanism works with foreign and joint-venture companies and even with SOEs, where environmental enforcement has always proved complicated. However, communities' actions rarely lead to success without the support of the mass media and, to a certain extent, social organisations. Since both industrial polluters and state environmental agencies are sen-

sitive to public criticism, the disclosure of poor environmental performance via the mass media threatens business continuity and forces the state to fulfil its task. The fact that recently the mass media have paid more attention to environmental problems increases pressure on firms and fills the gap left by inadequate monitoring and lax enforcement.

Finally, as pointed out in chapter 4 and 6, international organisations such as UNEP, UNDP, UNIDO, World Bank, Asian Development Bank, and governments of countries such as Japan, Canada, Sweden, the Netherlands, and Australia are contributing significantly to the ecological modernisation of industrial Viet Nam via bi-and-multilateral assistant programmes. These programmes have helped to set up a national plan on the environment, to develop national environmental policies, to support human resources and capacity building of governmental institutions, to provide technical and financial support in waste treatment and to promote cleaner production and waste reduction. In non-environmental bi- and multilateral assistance programmes the environment is increasingly put forward as a precondition for financing.

3.2 The Ecological Modernisation of Industrial Estates

Having discussed on a general level the strategies-in-the-making for environmental reforms in Viet Nam, I now continue the analysis on a more concrete level, outlining some core features for future environmental policy-making and management of industrial estates. The following sections analyse the diversification and decentralisation in environmental policy-making, the redefinition of state-market relations, and the importance of public participation.

3.2.1 New Environmental Policy-Making: Diversification and Decentralisation

As indicated above market-based and communicative approaches might help to overcome the weakness of the traditional regulatory approach in environmental policy and this is also valid for environmental policy towards industrial estates. In this section, four general strategies for enhancing the effectiveness of environmental policy are discussed: (i) strengthening of the present regulatory system, (ii) the application of market-based approaches (iii) the application of communicative approaches, and (iv) decentralisation in environmental policy-making.

** Strengthening the Regulatory System*

Even though it is impossible to fully plan and enforce eco-park projects, regulatory measures will continue to play a pivotal role in environmental improvement in Viet Nam. They need strengthening in the following ways:

- Applying stricter environmental regulations for import of technology, machinery and equipment and banning pollution-intensive technology/machinery/equipment and toxic substances.
- Promulgating environmental regulations for industrial estates as soon as possible to provide a regulatory framework and guidelines for environmental protection. Cleaner production, ISO 14000 (EMS) and waste exchanges could be incorporated into these environmental regulations to promote the establishment of green industrial estates.
- Environmental standards are in need of small changes: standards for solid wastes and domestic wastes need to be developed; total (pollution) load rather than concentration should be used; and standards should reflect the geographic, economic, and technological conditions of Viet Nam, and the industry's technical capabilities.
- The existing system of EIA reports for industrial estates needs revision in some respects: the incorporation of clean technologies instead of end-of-pipe technologies into EIA and environmental permits; the strict implementation of EIA as a requirement for obtaining investment licenses; training expertise to evaluate EIA; and further involvement of the public in EIA appraisal and post-implementation monitoring of EIA.
- Improvement of the existing systems of environmental monitoring in the Department of Science, Technology and Environment (DOSTE) in at least two ways: (i) improving 's financial and human resources and strengthening DOSTE staff capacities, and (ii) relocating some monitoring tasks for industrial estates to Industrial Zone Infrastructure Development Companies (see below).

** Making Use of Market-Based Approaches*

In complementing conventional regulations, the use of market-based approaches is recommended at two levels.

At the industrial estate level, the design and application of development impact fees; depletion charges on resource use; user charge for use of common wastewater treatment plant and disposal facilities for solid waste; land rental fee differentiation; and environmental funds are suggested to improve environmental performance of industrial estates. The application of development impact fees has the potential to alert Industrial Zone Infrastructure Development Compa-

nies to the possible environmental impacts related to the operation of their industrial estates. Such fees also can force them to take responsibility for the environmental quality of their estates. Depletion charges on resource use and user charges for use of common wastewater treatment plant and of treatment and disposal facilities for solid waste have the potential to direct individual firms in industrial estates into more environmental friendly behaviour. At the same time, lower land rental fees for firms applying best available technologies and environmental funds for technological innovation or environmental improvement encourage firms to invest in pollution control and prevention.

At the national level, it is recommended to apply pricing of natural resources; to remove subsidies for water and energy; to use tax differentiation for environmental friendly materials/substances, deposit-refund systems, and tradable permits in order to support for cleaner production, waste exchange practice and eco-park projects. Pricing of natural resources and removing subsidies for water and energy use has the potential to encourage more efficient use of water and energy, and to stimulate the dissemination of waste exchange practices. Tax differentiation for environmental friendly materials/substances can result in a decrease in the use of toxic and hazardous substances. Deposit-refund systems encourage reuse/recycling. Tradable permits are a good fit with the situation in industrial estates, especially with respect to air pollution control and for maintaining environmental quality of estates as a whole.

In the development and implementation of these types of instruments, there is a need to have collaboration between the Ministry of Science, Technology and Environment/National Environmental Agency (MOSTE/NEA), the Ministry of Finance, DOSTEs, and the Industrial Zone Infrastructure Development Companies.

* *Experimenting with Communicative Approaches*

The environmental reform process in general and the greening of industrial estates in particular, can be stimulated by the further development of existing one-way communicative instruments (education, training, workshops, seminars, campaigns, etc.) and experimentation with two-way communicative instruments (voluntary agreements, covenants, etc.).

EIA, waste auditing, cleaner production, the ISO 14000 series and the like are recommended to be incorporated in the curricula of the higher education system, as well as in professional courses for industry. These and other education and dissemination practices are crucial for a broad support for and implementation of preventive environmental approaches.

In order to relieve the environmental burden the government can facilitate and provide incentives for industries to take responsibilities in pollution control and prevention, without neglecting the monitoring and enforcement of ultimate targets and goals. Applying voluntary agreements could support the achievement of these objectives, as long as there is a clear consensus on the final goals and targets. Foreign companies with partners from OECD countries are the logical place to begin experimentation with voluntary agreements. These types of companies have at least some experience in self-regulation and the more participatory forms of policy-making. Experiences of voluntary agreements with these foreign companies could then be documented and replicated in similar domestic companies in the same industrial estates.

* *Decentralisation*

Achieving diversification of environmental policy-making requires a parallel development of flexibility and decentralisation. The central government then partly transfers responsibilities and authority for decision-making, finances and management to local authorities and para-statal organisations. Decentralisation is believed to increase the efficiency of the existing environmental management of industrial estates as local agencies become more flexible in adapting environmental regulation to the local specifics of waste exchange programmes and eco-park projects. Fine-tuning environmental standards and regulations to specific local circumstances; enforcing the environmental law at the level of enterprises; setting the level of fines for violating environmental laws; experimenting with innovative instruments and approaches; and using pollution charges/fees to invest in pollution control and environmental improvement activities, are all tools that deserve be put in the hands of DOSTEs. Other tasks could be delegated to Industrial Infrastructure Development Companies (see below), while the central government remains in charge of the main responsibilities. Fora where local authorities, environmental agencies, industries, industrial zone authorities and communities can meet to discuss various approaches and institutional arrangements in environmental policy will enhance participation, legitimation, support, public information and thus effectiveness of greening industrial estates.

3.2.2 New Institutional Arrangements between State and Market

As shown both in this study and in the Ecological Modernisation literature, not only state actors but also other actors take part in the environmental reform of industrial estates. A clear division of tasks between agencies is needed to avoid overlapping competencies and competition, to increase the efficiency of environmental management and to develop eco-parks. This section focuses on the role and division of tasks of central and local agencies in charge of environ-

mental management, Industrial Zone Infrastructure Development Companies, research institutes and universities, the Viet Nam Cleaner Production Centre and Quacert/Quatest, and General Corporations as core actors in the regulation of industrial pollution in industrial estates.

The establishment of a Ministry of Environment (ME) – as has been suggested and recommended widely in Viet Nam – will mean a significant step in overcoming the fragmentation of co-ordination and responsibilities in environmental management and protection. The upgrading of NEA to a Ministry of Environment will also increase its power in the governmental struggles and will put environmental issues higher on the political agenda. In any governmental reform and any institutional re-arrangement MOSTE (or the future ME) and DOSTEs (or future Departments of Environment DE) have to remain in control of responsibilities such as setting environmental standards, approval of EIA reports, issuing environmental licenses, inspection of industrial estates and industries. These core state environmental authorities are also in charge of, among others, monitoring environmental quality outside the boundaries of industrial estates and dealing with communities' complaints. In addition, in the development of eco-parks, DOSTEs/DEs will play a significant role in organising demonstration projects similar to what they have done for cleaner production. As new environmental regulations for industrial estates are being drafted at the moment (2002), legal requirements and institutional arrangements for the design and development of eco-parks can now be integrated in these regulations.

But in view of the large burden of the environmental state in Viet Nam, state environmental authorities could delegate some environmental tasks to other state, para-statal and private organisations. With respect to environmental protection of industrial estate, Industrial Zone Infrastructure Development Companies represent logical candidates to take over some state environmental tasks.

There are at least two reasons for this. First, Industrial Zone Infrastructure Development Companies fulfil already a crucial role in managing a wide variety of daily practices in industrial estates. As such they have a crucial intermediary position between various provincial and national state authorities on the one side and individual enterprises on the other. With respect to environmental management this position could be crucial. In taking an overview of industrial estate management, Côté (1998b) pointed out that these structures vary from country to country. For example, in a new estate in South Africa, overall responsibility is vested in a property owners association. In others there may be an estate authority. In Thailand, for instance, the Industrial Estate Authority of Thailand is responsible for economic development and environmental protection of the national industrial estates. In Viet Nam, the Viet Nam Industrial

Zone Authority and its local/provincial departments (Industrial Zone Management Boards) are representatives of the state in charge in managing industrial estates. However, the actual powers of these organisations are limited, and they also lack knowledge, experience, and human resources to carry out environmental tasks. Industrial Zone Infrastructure Development Companies are much more powerful para-statals, with expertise, resources and direct access to individual industries, and as such for Viet Nam they could relieve the environmental regulatory burden of the state. Second, Industrial Zone Infrastructure Development Companies are crucial agents in bringing together various industries for the exchange of by-products and wastes in industrial estates. For moving to an eco-park, it is necessary to create an industrial network of exchange in which mutual trust/belief and continuous co-operation are critical for maintaining exchange of information, technology, materials and energy. Mutual trust is a prerequisite for entering into contracts needed for organising the exchange of waste materials. As it appears from the literature, most strategic alliances in industrial ecology at the moment are bilateral, structured in the form of contracts between two companies. In other cases, one influential company constitutes the organisational platform for co-operation. In case of industrial estates, estate managers (Industrial Zone Infrastructure Development Companies in Viet Nam) are best suited to organise a co-operation and exchange platform for firms within industrial estates. Industrial Zone Infrastructure Development Companies can then play a crucial role in the following aspects:

- Monitoring environmental quality: With respect to monitoring tasks, DOSTE decides on the monitoring schemes, such as the parameters to be monitored and the frequency of monitoring. Industrial Zone Infrastructure Development Companies are responsible for the actual monitoring of effluents and emissions from individual firms within their industrial estates and the periodic sending of monitoring reports to the provincial DOSTE and the Industrial Zone Management Board. When monitoring information is made transparent to the public and to the nearby communities via mass media, the regulatory effectiveness of monitoring is enhanced. In addition, it is possible to imagine a set of monitoring tasks in relation to a tradable permit system in Viet Nam[2].
- Serving as an intermediary between state regulatory agencies and individual enterprises, for instance in relation to dissemination of information, collecting of environmental data, negotiating voluntary agreements or a system of tradable permits.
- Promoting cleaner production, ISO 14000 (EMS) and waste exchange: In any attempt to build up an eco-park in which a closed loop of energy and material is formed, each industrial firm should be familiar with reuse/recycling practices and should continuously improve its environmental

performance. At company level, cleaner production and environmental management systems (ISO 14000 EMS) are crucial to reduce both waste generation and production cost, to increase the company image, and to increase the self-regulatory potential that is needed for new environmental policy approaches (e.g. voluntary agreements). The Industrial Zone Infrastructure Development Company can facilitate the diffusion of environmental technologies and environmental management system in industry by establishing a network of support and information exchange within an industrial estate. As each Industrial Zone Infrastructure Development Company already has an environmental section, their tasks can easily be expanded to collecting of information and support on waste treatment, waste reduction and minimisation, energy conservation, pollution prevention measures, environmental regulations and related issues[3].

- Financial assistance for environmental reform: Some firms face budget constraints in applying advanced environmental technologies and management strategies. A fund for waste reduction might be helpful in providing incentives for technological innovation and environmental improvement. The Industrial Pollution Minimisation Fund in Ho Chi Minh City forms a good example (see chapter 5). Such funds should be created for each industrial estate and Industrial Zone Infrastructure Development Companies are then the most likely responsible agents for collecting and allocating these resources. Financial sources to create the fund may include wastewater fees, and/or land lease fees. The procedure to apply for funding should be simple with low interest rate to facilitate and encourage loaning activities. However, in order to keep it transparent and to prevent corruption, there is a need to divide tasks between 'the cashier', 'the treasurer' and 'the accountant' of such funds.
- Implementing eco-park projects: Industrial Zone Infrastructure Development Companies have an active role to fulfil in implementing eco-park projects by ensuring that adequate and advanced environmental infrastructure is available, such as waste treatment and disposal facilities, waste exchange pipelines, and waste recycling units.

Moving beyond state environmental authorities and Industrial Zone Infrastructure Development Companies, the research institutes/universities, the Viet Nam Cleaner Production Centre, and Quatest are key actors in technological innovation, research and development, and information dissemination. It is recommended that research institutes and universities include pollution prevention approach beside traditional pollution treatment approach in their activities. The Viet Nam Cleaner Production Centre should focus on the identification and dissemination of clean technologies that are domestically relevant, and could widen its scope to include the application of the concept and practice of industrial ecology into Viet Nam's industrial estates. Quatest should focus more on

introduction, promotion and certification of advanced international environmental standards (such as those of the ISO).

As analysed in chapter 5, most SOEs face difficulties in investments in cleaner production and ISO 14000 (EMS), due to the existing financial mechanisms and relations. But this is no iron law. As I presented in chapter 6, VINACOAL Corporation created an environmental fund to stimulate and enable its member companies to invest in pollution control measures. By providing financial support, 'political' freedom and technological information and assistance to their members, General Corporations can encourage SOEs to incorporate environmental issues into their business strategies, via investments in waste minimisation and reduction, pollution control and prevention of negative environmental impacts.

3.2.3 Public Participation

Public participation can complement the current environmental management of industrial estates via a variety of mechanisms. First, people living in the vicinity of industrial estates are the experts on environmental performance of these industries and the first victims of industrial pollution. Public involvement in EIA processes could allow community members to participate in reviewing EIA reports, and in post-EIA monitoring. Communities should have access to monitoring data on industrial emissions and environmental quality of industrial estates, as that increases public awareness and generates constructive criticism towards industrial polluters. Second, in a number of cases the community's complaints can help to strengthen state enforcement and force polluters to accept the polluter pays principle by installing waste treatment facilities or applying waste reduction measures. Mobilising and supporting these actions counteracts the general weakness of regulatory enforcement and control. This type of public participation is in line with the spirit of the Law on Complaint and Accusation and Government Decree 29/CP (1998) on the exercise of democracy in communes. However, specific guidelines to facilitate community actions are needed, for instance, on how, where, and to whom complaints can be sent. Third, as polluters are often sensitive to public disclosure on their (poor) environmental performance, 'black' and 'green' list, awards for best practices and media coverage have the potential to stimulate an improvement in their environmental performance. One good example is the 'black books' and the 'case book of best practice' published by Ho Chi Minh City DOSTE.

In order to develop green industrial estates based on the concept of industrial ecology, new ways of thinking and co-operation are crucial. Some of these new ways and mechanisms are already there in *status nascendi*, including cleaner production projects and the Viet Nam Cleaner Production Centre; financial as-

sistance schemes; economic instruments and market-based approach; pressure from communities; and some environmental tasks implemented by para-statals such as the Industrial Zone Infrastructure Development Companies. Other mechanisms, such as decentralisation, participatory approaches to environmental policy-making and a strong Ministry for Environment only work on paper and in discussions. In a developmental state such as Viet Nam, the strongly expressed political will and determination of the government remains a vital factor for all of these types of initiatives.

Notes

[1] Information from the International Conference and Workshop on New Strategies for Industrial Development-Learning from Pioneer Experiences in Eco-Industrial Networking in Asia, in Manila, the Philippines indicates that China, Indonesia, Thailand, India and the Philippines all have eco-park projects.

[2] In applying tradable permits, DOSTE can assign each industrial estate a set of effluent or emission permits. Industrial Zone Infrastructure Development Companies have to allocate effluent or emission quotas to individual firms and monitor and regulate the market within the estate. Industrial Zone Infrastructure Development Companies can carry out these tasks and get paid for the services provided within industrial estates.

[3] In this way transfer of knowledge and information from foreign companies and domestic companies in one industrial estate might also be facilitated, and at the same time foreign companies might be supported with easy access to local environmental regulations and institutions. The financing of these information and support facilities can be either from pollution fees or from obligatory or voluntary membership fees.

CHAPTER 9

REFLECTIONS ON ECOLOGICAL MODERNISATION THEORY

1. The Value of Ecological Modernisation Theory for Viet Nam

In this final chapter I turn to Ecological Modernisation Theory, and evaluate the descriptive and normative value of this theoretical framework for environmental reform of Viet Nam's industrial estates.

1.1 Descriptive Value

This paper takes the position that Ecological Modernisation Theory has extremely limited descriptive value in describing the environmental landscape in Viet Nam. Classic Ecological Modernisation Theory misses the mark in analysing the current status of technology, of state intervention, of economic agents and of civil society in environmental protection in Viet Nam. As a result, it is possible to receive the impression that very few of the environmental reform processes that are hypothesised by European Ecological Modernisation Theory have been observed or identified.

First, as mentioned in chapter 2, Ecological Modernisation Theory emphasises the shift from first-generation technology to second-generation technology, specifically in the form of cleaner production. In the processes of ecological reform, environmental technologies are often seen as the instruments for a realistic simultaneous economic development and environmental protection. But in Viet Nam, the implementation of environmental technology is still in its early phase, as even end-of-pipe technologies hardly exist, let alone second-generation environmental technologies. Even the enterprises that have treatment facilities operate these facilities only marginally. In industrial estates, the situation is almost the same. Studies have shown that even newly established factories in Viet Nam, often including the joint-ventures and those of foreign

companies, import old equipment without proper pollution control facilities. In general, most Vietnamese industries are equipped with old, often obsolete manufacturing technologies. These technologies have relatively high levels of polluting emissions and promote continued inefficient use of resources.

Second, changing state-market relations in environmental reform represents one of the core features of Ecological Modernisation Theory. According to Ecological Modernisation Theory, the importance of market dynamics and economic actors in the environmental restructuring of industry is increasing. Through the use of cleaner production and the application of environmental management system (EMS) or ISO 14000 producers can significantly reduce negative impacts on the environment on the one hand, while enhancing their public image and reducing waste treatment costs on the other. In this sense, producers are evolving from the regulated to the self-regulating. Consumers too are increasingly asking for ecological products, and insurance companies, credit institutions, and branch associations force producers to improve their environmental performance.

In Viet Nam, the scenario is quite different. Except for some multinational corporations, most industrial firms are in their first stage of the development of environmental management, or even in a situation where there is no environmental management at all. ISO 14000 (EMS) is seen as a luxury that only large firms can afford. Industrial firms in Viet Nam lack environmental awareness and resources (information, technology, and money) to improve their environmental performance. Other economic agents such as consumers, banks, insurance companies hardly integrate environmental concern into their activities, and thus there is no practical incentive to push industrial firms in environmentally sound directions.

Third, Ecological Modernisation Theory does not deny the role of the state in ecological reform, but emphasises its changing role in environmental management and policy-making towards more preventive environmental policies; more participatory policy-making; and a more decentralised governance style. By leaving fewer tasks in environmental policy-making for the central state and by changing the relation between state and society/economy, the central state can mobilise other actors in society to share environmental tasks and increase the effectiveness of environmental management and policy-making.

In Viet Nam, there is not yet much in the way of movement towards more consensual policy styles or negotiated policy-making. In contrast, the dominant development at the present time is the establishment or further refinement of a basically hierarchical and centralised command-and-control model, in which environmental laws and decrees, together with environmental impact assess-

ments (EIA)s, form the core. Viet Nam's environmental policy system is incapable of detailed monitoring – so essential for control and enforcement – because of the lack of financial and human resources. The top-down relationship between state-industry and state-non state actors, and the lack of experience with and tradition in negotiated policy-making and regulatory negotiation are inconsistent with what is described in European Ecological Modernisation Theory.

Fourth, Ecological Modernisation Theory deals with a modification of the position, role, and ideology of environmental movements. In many aspects the situations in Viet Nam differs from Western countries, since hardly any form of environmental activism or public participation can be found.

First, in Viet Nam environmental awareness is less widespread among the population. When facing industrial pollution, the community members react on an ad-hoc basis. Local protests focus on acute health impacts or economic loss, not on long term environmental consequences. Second, in public participation, the state sets the agenda for discussion and creates the forums of participation. These forms of public participation include formal public input procedures such as hearings and EIA reviews; environmental dispute resolution proceedings; formal appeals to decision-making bodies; and litigation to force the government or corporations to comply with existing laws. In Viet Nam this kind of participation is absent. Only the process of EIA reviews looks similar, but no public participation is involved in EIA proceedings.

Third, while in Western countries environmental non-governmental organisations (NGOs) play a critical role in industrial restructuring, there are no independent Vietnamese NGOs pushing for environmental protection in Viet Nam. What comes most close to an environmental NGO are groups of environmental scientists (such as the Viet Nam Association of Nature and Environmental Protection, the Association of Water and Environment and the Association of Urban Environment), and national branches of international environmental NGOs (ENDA, IUCN, and WWF)[1]. Fourth, in the absence of local NGOs and the presence of a limited number of branches of international environmental NGOs, it is the mass media and social organisations (Youth Union, Women's Association, etc.) that play a more vital role in environmental 'protest'. Some even argue that the presence of these social organisations might explain the absence of NGOs in Viet Nam (Eccleston and Potter, 1996). Given the above analysis, the current practices in Viet Nam are different from those described in Ecological Modernisation Theory.

1.2 Normative Value

Even though I conclude that Ecological Modernisation Theory – as it has been developed under conditions of Western organisation for economic co-operation and development (OECD) countries – has limited descriptive value in understanding processes of environmental reform in contemporary Viet Nam, it does not mean that it has no normative value. In chapter 8 I have extensively analysed what kind of ideas can be generated from Ecological Modernisation Theory for future environmental reform in Viet Nam. Most of these ideas attempt to bridge the gap between current developments in Viet Nam on the one hand, and ecological modernisation ideas on the other.

At least three arguments support the value of ecological modernisation ideas in putting the industrial ecology concept into practice in Vietnamese industrial estates. First, the concentration of various industries in an area under the management of the Industrial Zone Infrastructure Development Companies facilitates the application of alternative policy instruments and the shift of environmental governance tasks from the state to para-statal organisations. Second, beside the variation in the types of industry, industrial estates are also characterised by diversity of ownership ranging from state-owned, private, joint-venture, to foreign factories. The fact that the concentration of foreign companies in these industrial estates is rather high – and that therefore they have better (access to) environmental knowledge and management, some experience with alternative governance models and a direct connection to the world market – increases the chance of successful experiments with the normative model of ecological modernisation.

Third, the development of networks of by-product exchange among co-located companies is one of the options for the greening of industrial estate based on the concept of industrial ecology. Experiences from other countries show that the development of such a network requires not only a technological innovation, but also a great social shift in thought and action. The need for change will only come about by changing behaviours and awareness of government, industry and economic agents, and the public. Companies themselves hardly ever implement new radical environmental strategies unless they are forced and triggered. The driving forces come from various actors including the government (formal regulation), customers/consumers, suppliers, credit organisations, insurance companies, etc. (market pressure), and community (informal regulation). The World Bank (2000), summarising six years of research and project work in developing countries, suggested that co-ordinated action on all three fronts – economic reforms, formal regulation, and informal regulation – could reduce industrial pollution significantly, even in very poor countries. The new model for pollution control is the one in which government, markets, and

community work together. This model is in line with Ecological Modernisation Theory. While in Viet Nam the state has a solid position in economic and societal development, it fails to protect the environment under conditions of the rapid pace of industrialisation (see chapter 3 and chapter 6). In such a situation, market pressure and informal regulation prove to be necessary to support the formal regulation in environmental protection. Particularly for the development of eco-parks, it is impossible to rely solely on regulatory instruments without the active co-operation of different actors.

2. Towards an Ecological Modernisation Theory for Viet Nam

The Ecological Modernisation Theory was originally developed as a theory for describing and analysing environmental reforms in Western industrialised countries and this theory has proved its descriptive/analytical value in these countries. For non-western industrialised countries like Viet Nam, its descriptive and analytical value proved to be limited, as I concluded above. However, as Viet Nam is in the process of industrialisation, economic transformation and internationalisation, Ecological Modernisation Theory might gain relevance for Viet Nam, first in its normative mode, but later on even in its descriptive mode. As Rinkevicius (2000) claims, Ecological Modernisation Theory can be used fruitfully, although it needs to be adapted or refined for the specific situation of what he calls a 'double-risk society'[2]. Therefore, in applying Ecological Modernisation Theory to societies for which it was not originally developed, one needs to be cautious. Viet Nam and other developing economies will mirror their specific local conditions and institutional layouts in environmental reform strategies and developments. Institutional transformations in environmental reform can be more or less similar to those identified for Western industrialised societies by the European Ecological Modernisation Theory, but will always mirror Viet Nam's own specific identity. An adequate Ecological Modernisation Theory for Viet Nam will differ on some major points from the one developed under European conditions. These major differences are:

- A solid and vital role of the state in both economic and environmental fields, as is characterised by the notion of 'developmental state'.
- Any environmental consultation with the private and decentralised public sector by the central government will be within the boundaries of a hierarchical policy style typical for most Southeast Asian economies.
- The importance of economic actors in environmental reform do not so much follow from privatisation, but rather from opening up to foreign direct investment and the international market.
- An active Vietnamese academic community, not only in developing appropriate environmental technologies and strategies that are economically fea-

sible with short term returns, but also in putting the environment on the political agenda.
- Civil society articulation of environmental interests happens not so much in environmental NGOs, but rather through community pressure, mass media, social organisations, and expert groups.
- An influential role of international treaties and regimes, oversea development aid (ODA) and donors in directing the course of environmental reform.

In building an appropriately Vietnamese (or perhaps Asian) Ecological Modernisation Theory, these characteristics will have to be taken into account, as they will be at the foundation of any radical environmental reform in Viet Nam. It is here that the academic agenda for future research on ecological modernisation is promising.

Notes

[1] Among international environmental NGOs that work on the ground in Viet Nam nowadays, including ENDA, WWF, IUCN, ENDA is the one that basically works in local communities with local authorities and mass organisations (Youth Union and Women's Association) on environmental and other community development topics.
[2] Double-risk society is a society in transition facing both severe environmental and economic risks.

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APPENDIX 1

List of Enterprises Respond to Interviews

Name	Location	Ownership	Scale	Market		
				domestic	*export*	*domestic&export*
DN Paper(pulp&paper)	Bien Hoa I IZ	SOE	M	x		
VICASA(steel)		SOE	M	x		
VICACO(chemicals)		SOE	M		Asia	x
BH Sugar(sugar)		SOE	M		Asia	x
DN Battery(lead battery)		SOE	S	x		
CPVN (animal food)	Bien Hoa II IZ	JV(Thai)	L		Thailand	x
Technopia VN (insecticides)		FDI(Malaysia)	M		Asia	x
Fujitsu (electronics)		FDI(Japan)	L		Asia	
Tae Kwang (footwears)		FDI(Korea)	L		America,EU, Asia	
Cargill (animal food)		FDI (USA)	L	x		
Hualon (textile-dyeing)	Nhon Trach IZ	FDI(Malaysia)	L		EU, Asia	x
LT (super phosphate)	Go dau IZ	SOE	M	x		
SERRANO VN (fine arts)	Viet-Sing IZ	JV (Singapore)	S		Asia	x
ALCAMAX (packaging)		FDI (Malaysia)	S		Asia	x
ROHTO (pharmaceuticalproduct)		FDI (Japan)	L		Japan, ASEAN	x
New TOYO VN (sanitary tissue)		FDI (Hongkong)	L		America, Australia, Asia	x
GODREJ (steel products)		FDI (Singapore)	M			x
Seamaster (paint)		FDI (Singapore)	S			x
KK (textile-printing)	Le Minh Xuan IZ	P	S	x		
BH (textile-printing)		P	S	x		
MT (rubber)		P	S		America, EU, Aus, Asia	x
LV (rubber)		P	S		America, Asia, Africa	x
THD (textile-dyeing)		P	S	x		
TTD (textile-dyeing)		P	S	x		
HL (textile-dyeing)		P	S	x		
HuaHeong VN (food processing)		FDI(Singapore)	S		America,Australia, EU,Asia	
TN (battery)		SOE	S	x		

LIDOVIT(car spareparts)	Binh Chieu IZ	SOE	S		EU, Australia	x
VIJALCO (electroplating)		JV (Japan)	M			x
TE.I (painting)		FDI(Taiwan)	S	x		
PH (wooden furniture)		JV (Taiwan)	S		Japan, Taiwan	
TA (packaging)		FDI(Hongkong)	M			x
TOYO (paper)		FDI(Singapore)	M			x

***Remark*:**

SOE: State-owned enterprise
JV: Joint- venture
FDI: Foreign Direct Investment
P: Private

Scale: till now Viet Nam has not had any specific standard on the definition of scale. The following classification is based on the investment capital
L:large with >20 million USD
M:Medium with 5-20 million USD
S: Small with <5 million USD

APPENDIX 2

LIST OF INTERVIEWEES

Name	Title	Date of interview
In Hanoi		
Dr. Nguyen Dac Hy	Head of the Policy Division NEA, MOSTE	April 2, 1999
Dr. Tran Hong Ha	Deputy Head of the Policy Division NEA, MOSTE	April 2, 1999
Ms. Chu Thi Sang	Head of Environmental Technology and EIA Division NEA, MOSTE	April 2, 1999
Dr. Phan van Hoa	Expert VIZA	April 3, 1999
Dr. Tran T. Thanh Phuong	Environmental Expert World Bank in Hanoi	Dec 16, 1999
Ms. Loan	Information Section VNCPC	August 21, 2001
In Ho Chi Minh City		
Mr. Dinh Minh Hiep	Youth Union in HCMC	April 17, 1998
Ms. To Thuy Hang	Environmental expert Representative Office of UNDP in HCMC	May 16, 1998
Mr. Do Tuong Tri	Head of Sciences &Technology Section. HCMC DOSTE	May 16, 1998
Mr. Tran Phuc Tue	Environmental Expert HCMC DOSTE	January 22, 1999 and May 10, 2000
Mr. Le van Khoa	Environmental Expert HCMC DOSTE	January 23, 1999
Mr. Nguyen Yen Khau	Chief Secretariat IZMB in HCMC (HEPZA)	January 26, 1999
Mr. Nguyen Phan Duy Nguyen	Environmental Expert HCMC DOSTE	January 30, 1999
Mr. Dang Ngoc Thanh	Director IZIDC (NW Cu Chi IZ)	February 2, 1999
Dr. Le Trinh	Director EPC	February 4, 1999
Mr. Tran Nguyen Hien	Deputy Head of Environmental Division. HCMC DOSTE	Feb 10, 1999
Mr. Ho Trung Hieu	Environmental Expert (HEPZA)	March 5, 1999
Ms. Diep Thi Lan	Technical staff Department of Training and Consultant (Quatest III)	May 27, 1999 May 25, 2001
Ms. Bich Thuy	Reporter VN Industrial Zone Bulletin	July 23, 1999
Mr. Thai Duc Long	Vice Director	

	IZIDC (Le Minh Xuan IZ)	August 4, 1999
Ms. Dang Thi My Phuong	staff	
	IZIDC (Vinh Loc IZ)	April 11, 2000
Ms. Le Thi Thanh My	cleaner production expert	
	CP Consultant Team in HCMC	August 25, 2001

In Ba Ria-Vung Tau Province

Mr. Le Xuan Tinh	Specialist	
	Investment Division	
	IZMB. Ba Ria-Vung Tau Province	March 23, 1999

In Binh Duong Province

Ms. Ngo Thi Van	Head of Environmental Division	
	Binh Duong DOSTE	March 2, 1999
Ms. Kim Phung	Reporter	
	Binh Duong Radio-TV Station	Dec 8, 1999
Mr. Huynh Son Hai	staff	
	Viet Nam-Singapore IZMB	Dec 8, 1999
Mr. Ly Hung	Vice Director	
	IZIDC (VSIZ)	Dec 9, 1999

In Dong Nai Province

Ms. Pham Thi Hong Cuc	Vice Chairwoman	
	IZMB. Dong Nai Province	Nov 9, 1998
Mr. Nguyen Hoang Hung	Deputy Head of Environmental Division	
	Dong Nai DOSTE	Nov 10, 1998
Mr. Hoang Minh Duc	Head of Administration Division	
	IZMB. Dong Nai Province	March 13, 1999
Mr. Pham Gia Hai	Project Manager	
	Dong Nai DOSTE	March 17, 1999
Ms. Chu Thi Thu	Director of SONADEZI	March 18, 1999
Mr. Tran Quang Thoa	Head of the Environmental Section of SONADEZI	April 8, 1999
Mr. Phan Van Het.	Head of Environmental Division	
	Dong Nai DOSTE	Sept 18, 1999
Ms. Hoang Mai	Reporter	
	Dong Nai Radio-TV Station	June 19, 2000

In Bangkok (Thailand)

Ms Krissadaporn Boonyu	Scientist, IEAT	Nov 24, 1999

In Manila (The Philippines)

Dr. Gupta P.	cleaner production expert CP consultant team, VNCPC	April 5, 2001
Ms. Kasemsri Homchean	Director Environmental Control and Safety Division (IEAT)	April 6, 2001

APPENDIX 3

QUESTIONNAIR FOR INDUSTRIAL ESTATE MANAGERS

Date
Interviewee
Title/position

General Information

Name of Industrial Zone
Location
Previous land use
Surface Area
Ownership (state-owned, private, joint-venture, foreign)
Type of industrial zone (1, 2, 3, 4)
Type of industries in this zone
Number of plants in operation (state-owned, private, joint-venture, foreign)
Percentage of plots have been rented
Economic achievements

Network Relationship

1. Do you have any relationships with the following actors (kind of relation, frequency of contact, report, etc.)?
   - People's Committee
   - Ministries/Departments
   - Industrial Zone Management Board
   - Factories in industrial zone
   - Institutes/Universities
   - Social organisations (Youth Union, Women's Association, Labour Union, community)
   - International organisations (WB, ADB, UNDP, UNIDO, etc.)
   - Others (specify)

Environmental Information

2. What are responsibilities and tasks of Industrial Zone Infrastructure Development Company? Are there any tasks that are related to environmental protection?

3. Do you have specific environmental section within your company to take care of environmental issues of industrial zone?

4. Do you have EIA report? When was it prepared? By whom? Is EIA report obligatory?

5. Do you carry out any measures to control air pollutants in this industrial zone?

6. Do you have any measures to control wastewater in this industrial zone?

7. Do you have any measures to control solid wastes in this industrial zone?

8. Do you have any measures to control toxic wastes in this industrial zone?

9. Do you have any measures to control other environmental impacts in this industrial zone?

10. What is your opinion about environmental performance of factories/enterprises in this industrial zone (comply with Environmental Law, standards, carry on EIA, implement what have been written in EIA, install waste treatment facilities, apply cleaner production, apply ISO 14000, etc.). Are there any differences between state-owned/private/joint-venture/foreign companies in this respect?

11. Do you have any idea to improve environmental performance of firms in this industrial zone?

12. Do you have to deal with any pressure from environmental agencies, the community in the neighbourhood, or other actors on environmental issues?

13. What are main difficulties you have to face with in carrying out environmental tasks?

14. What is your opinion on how to improve environmental management of industrial estates?

QUESTIONNAIR FOR FACTORY MANAGERS

Date
Interviewee
Position

General Information

Name of Industrial Zone
Name of Factory/Enterprise
Ownership (state-owned, private, joint-venture, foreign)
Year of operation
Scale (large, medium, small)
Raw materials and source of raw materials
Products
Market (domestic, export to which country/countries)

Network Relationship

Specify kind of relation, contact frequency, report, report frequency, kind of resources, kind of exchange, etc.

- Government/authority
  - People's Committee
  - Ministry/Department of Industry
  - Ministry/Department of Construction
  - Ministry/Department of Planning and Investment
  - MOSTE/DOSTE
  - Ministry/Department of Public Health
  - Industrial Zone Management Board
  - Others
- Other economic actors
  - Industrial Zone Development Company
  - Other factories/enterprises in Industrial Zone
  - Other factories/enterprises in the same sector
  - Suppliers
  - Customers/consumers
  - Banks
  - Insurance companies
  - Quartest
  - Others
- Universities/Institutes, Environmental Consultant Company
- Labour Union, Youth Union, Women's Association, community, etc.
- International organisations (WB, ADB, UNDP, UNIDO, etc.)
- Others

Environmental Information

1. Do you have EIA report? When was it prepared? By whom? Is EIA report obligatory?

2. Is there any section responsible for environmental protection within your company?

3. How do you control air pollutants?

4. How do you control wastewater?

5. How do you control solid wastes?

6. How do you control hazardous wastes?

7. How do you control other pollutants (noise, odour, and temperature)?

8. Major problem(s) you are facing in pollution control?

9. Cleaner production:
   - Do you apply cleaner production measures? If yes, please specify
   - Advantages/constraints in applying cleaner production?
   - What support is needed?

10. Waste exchange:
   - Do you use waste material from other factory? If yes, please specify the supplier (type of industry, type of waste, exchange with factory inside or outside this industrial zone)
   - Do you sell waste from your company to others? If yes, please specify the consumer (type of industry, type of waste, exchange with factory inside or outside this industrial zone)
   - Advantages/constraints in waste exchange practices?
   - What support is needed?

11. ISO 9000, ISO 14000 (EMS):
   - Do you plan to apply for ISO 9000 and ISO 14000 certification? Reason?
   - Advantages/constraints in application for ISO 14000 certification?
   - What support is needed?

12. Which environmental policy instruments do you prefer: command-and control, economic instruments, and communicative instruments? Why?

13. What is/are the most important factor(s) influence(s)environmental performance of the company? (Laws, standards, environmental inspection, influences of the community, the reputation of the company, pressure of the consumers, or others)

14. What are your ideas about existing environmental policy, environmental standards, and environmental protection measures?

15. What are your ideas to improve environmental performance of your company and industrial zone?

QUESTIONNAIR FOR COMMUNITY MEMBERS

Date
Industrial Zone
Address
Personal Data

Name	Education
Sex	Career
Age	Religion
Ethnicity	

Family Status

1. How long have you been living here?

2. What is the main income source of the family?

3. Is there anyone in the family members working in industrial zone?

Influence of Industrial Zone on the Community

4. What kind of benefits the community get from the industrial zone?

5. What do you think about environmental performance of this industrial zone?

6. Have you ever experienced with environmental problems caused by the industrial zones? If yes,

7. How can you define the problem? What impact/damage the community have to suffer?

Actions and Result

8. What is the reaction of the community in the confrontation with environmental impacts?

9. Do you discuss your problems with your neighbours? How often and where?

10. Do you co-operate in action or not?

11. Do you know any organisation responsible for environmental protection in this zone?

12. Have you ever sent (verbal/written) complaint? To whom?

13. Do you have any access to the Industrial Zone Infrastructure Development Company/Industrial Zone Management Board/local government/Environmental Bureau of your district/DOSTE?

14. What is the reaction of the Industrial Zone Infrastructure Development Company?

15. What is the reaction of Industrial Zone Management Board?

16. What is the reaction of local government?

17. What is the reaction of DOSTE/Environmental Bureau?

18. What is the result of the reaction of the community?

19. What are the reasons for the success or failure?

20. Do you have any idea or suggestion regarding to environmental protection for industrial zone?

21. Do you know any other cases where the communities complain environmental problems of industrial zones?

SAMENVATTING

De ontwikkeling van industrieparken wordt in Vietnam gezien als motor voor het proces van industrialisatie. Sinds de jaren 90 is een groot aantal industrieparken verspreid over het hele land tot stand gekomen. De industrieparken hebben bijgedragen tot verhoogde productiviteit en verbeterde productkwaliteit, een toenemende werkgelegenheid, verhoogde binnenlandse en buitenlandse investeringen en een versnelling van het industrialisatieproces.

Bij de ontwikkeling van industrieparken heeft men echter te weinig rekening gehouden met de effecten voor het milieu. Verscheidene milieuproblemen doen zich nu voor, terwijl maatregelen die industriële ontwikkeling en milieubescherming laten samengaan vooralsnog ontbreken.

Deze studie beschrijft hoe milieuvriendelijker industrieparken in Vietnam tot stand kunnen komen. Als model voor milieuvriendelijker industrieparken worden concepten uit de industriële ecologie gebruikt. Daarnaast is de theorie van ecologische modernisering toegepast om de ontwikkeling van dergelijke industrieparken te beschrijven.

Het industriële ecologie concept biedt nieuwe manieren om afvalproductie te minimaliseren en hulpbronnen efficiënt te gebruiken door een herontwerp van industriële systemen. Anders dan binnen de gangbare lineaire stroommodelen van industriële productie gaat industriële ecologie uit van het sluiten van materiaal- en energiekringlopen binnen industriële systemen. Dit idee is toegepast op industrieparken in de vorm van industriële ecosystemen of eco-industrieparken. Met een toenemende wereldwijde belangstelling voor milieuzorg vormen eco-industrieparken tevens een marketing instrument om buitenlandse investeerders aan te trekken, zoals al in verschillende Aziatische landen gebeurt.
Het ontwikkelen van milieuvriendelijker industrieparken in Vietnam is dus niet alleen een manier om industriële ontwikkeling te koppelen aan milieubescherming, maar ook een strategie om te concurreren op de wereldmarkt. De ontwikkeling ervan vergt behalve technologie ontwikkeling ook sociale, institutionele en beleidsmatige verandering. Het is dan ook noodzakelijk om ook het handelen van actoren en instituties te analyseren die een instrumentele rol spelen in de toepassing van industriële ecologie in Vietnam.

Dit gebruik van het industriële ecologie concept vergt een verdere theoretische onderbouwing voor het in de praktijk kan worden toegepast. Ecologische moderniseringstheorie kan deze onderbouwing bieden door de toepassing van haar basisprincipes op de kernmechanismen, instituties en actoren die nodig zijn voor de transitie van een onduurzaam industrieel systeem naar een milieuvriendelijker industriesysteem. Toepassing van ecologische moderniseringstheorie biedt zodoende de mogelijkheid om de ideeën over industriële ecologie succesvol in praktijk te brengen.

De doelstellingen van dit onderzoek waren:
i) Het bieden van een overzicht van milieubeleid en management in Vietnam, met speciale aandacht voor industrieparken;
ii) Het analyseren van de mogelijkheden voor het vergroenen van industrieparken, gebaseerd op de institutionele karakteristieken in Vietnam en de theoretische noties uit de ecologische moderniseringstheorie;
iii) Het bepalen van de relevantie van ecologische moderniseringstheorie voor Vietnam.

Het onderzoek is gebaseerd op een kwalitatieve case-study in de Southern Key Economic Region in Vietnam. Deze regio speelt een significante rol in de nationale industrie ontwikkeling en heeft het grootste aantal industrieparken met een grote diversiteit in grootte, type en organisatievorm.

Het vigerende milieubeleid en -management in Vietnam is niet toereikend in het voorkomen van milieueffecten van de snelle industrialisatie. Er is weliswaar een uitgebreid wettelijk kader voor milieubescherming ontwikkeld, maar de implementatie daarvan schiet tekort. Het gebrek aan implementatie van milieubeleid kan verklaard worden door de hoge prioriteit die gegeven wordt aan economische ontwikkeling; belangentegenstellingen; de slechte samenwerking tussen instanties; bureaucratische geschillen over taken en verantwoordelijkheden; inadequate monitoring; zwakke handhaving en het gebrek aan middelen. Bovendien worden technologische innovaties op het gebied van schonere productie niet gestimuleerd in de huidige command-and-control aanpak binnen het Vietnamees milieubeleid. Economische en andere marktgeoriënteerde instrumenten worden nauwelijks toegepast. Ondanks de toegenomen inspanningen op het gebied van milieu-educatie en een aantal campagnes is het publieke milieubewustzijn nog pril.

Nauw gerelateerd aan de tekortkomingen in milieubeleid ten aanzien van industrieparken is de technologische bias op dit gebied. De bestaande nadruk op end-of-pipe technologieën en het systeem van gecentraliseerd milieumanagement blijkt inefficiënt en ineffectief in het verminderen van milieugevolgen van industriële activiteiten. Ook voor het voorkomen van milieueffecten van industriële ontwikkeling op de lange termijn blijkt deze aanpak ongeschikt. Boven-

dien sporen het bestaande systeem van milieueffectrapportage, inspectie en de lage economische prikkels vervuilers te weinig aan om meer geavanceerde end-of-pipe technologieën toe te passen. De overheid heeft daarnaast onvoldoende financiële en menselijke capaciteit voor het monitoren en handhaven van vervuilende industrie. Er zijn grote investeringen in schone technologie vereist om van vuile industriezones 'groene' zones te maken. Echter het succes van groene, schonere technologie hangt niet alleen af van technologische ontwikkeling en diffusie, maar ook van de sociale context waarbinnen technologie wordt geïntroduceerd en geïnstitutionaliseerd. Technologische transities in industrieparken vergen meer dan alleen het toepassen van slechts een andere technologie.

Ondanks de tekortkomingen in het huidige milieubeleid laten sommige ontwikkelingen het begin van een transitie zien richting ecologische modernisering.

- De economie van Vietnam ontwikkelt zich van een centraal geplande naar een marktgeoriënteerde economie en dit biedt de mogelijkheid voor de introductie van een nieuw beleidskader en nieuwe milieu-arrangementen;
- De transitie naar een marktgeoriënteerde economie en het privatiseringsproces kan leiden tot een verandering in de milieu-praktijken van industrieën langs de lijn van ecologische modernisering.
- Als laat-geïndustrialiseerd land kan Vietnam leren van eerdere ervaringen elders en grotere sprongen maken naar goedkopere en meer effectieve milieutechnologie dan in eerder geïndustrialiseerde landen.
- Bovenstaande ontwikkeling kan versterkt worden door de recente oprichting van een Centrum voor Schone Productie in Vietnam
- De opening van de Vietnamese markt voor buitenlandse investeringen kan nationale industrieën helpen nieuwe geavanceerde technieken over te nemen en te voldoen aan internationale standaarden.
- Quacert en Quatest I, II en III zullen naar verwachting de introductie en toepassing van ISO 14000 standaarden stimuleren.
- Vietnamese wetenschappers vervullen een trekkersrol die milieuorganisaties in OECD landen hebben.
- Lokale gemeenschappen in Vietnam kunnen ingezet worden in het monitoren van vervuilingsbronnen en de overheidshandhaving ondersteunen.
- Internationale organisaties (UNEP, UNDP, UNIDO, Wereldbank, Asian Development Bank) en de overheden van een aantal landen (Japan, Canada, Zweden, Nederland, België en Australië) hebben een belangrijke bijdrage geleverd aan milieuhervormingen in Vietnam via bi- en multilaterale bijstandsprogramma's.

Hieronder zijn de aanbevelingen voor de ecologische modernisering van industrieparken in Vietnam samengevat:

- Diversificatie in de ontwikkeling van milieubeleid en decentralisatie in milieumanagement: het versterken van bestaande command-and-control praktijken met tegelijkertijd de toepassing van economische en communicatieve instrumenten; het overdragen van verantwoordelijkheden en besluitvormingsbevoegdheden, financiën en beheer van centrale overheidsinstanties naar semi-publieke organisaties.
- Nieuwe institutionele arrangementen tussen staat en markt; het optuigen van het bestaande nationale Milieubureau tot een Ministerie van Milieu; het aansporen van ontwikkelaars van industrieparken tot milieubeschermende activiteiten; het versterken van de rol van onderzoekscentra en universiteiten zoals centrum voor Schone Productie in Vietnam en Quacert/Quatest.
- Publieke participatie: het betrekken van de bevolking bij milieueffectrapportages en monitoring; het inzichtelijk maken van de milieukwaliteit in industrieparken en milieuprestaties van individuele bedrijven; het mobiliseren en ondersteunen van publieke klachten over het milieu.

De huidige status van technologie, aard van overheidsinterventie, economische betrokkenen en maatschappelijke organisatie in Vietnam biedt weinig aangrijpingspunten voor de milieuhervormingen die worden verondersteld in ecologische moderniseringstheorie. De algemene conclusie is dan ook dat ecologische moderniseringstheorie, zoals dat is ontwikkeld binnen de maatschappelijke context van OECD landen, beperkte analytische waarde heeft voor het begrijpen van milieugerichte veranderingen in Vietnam. Toch kan een aantal innovaties worden verklaard met behulp van ecologische moderniseringstheorie. Voor het toepassen van het industriële ecologieconcept in Vietnam kan de theorie van ecologische modernisering op drie punten van betekenis zijn:
Ten eerste, de concentratie van verschillende industrieën in één gebied, onder het beheer van 'industriële ontwikkelingsmaatschappijen', maakt de toepassing van alternatieve beleidsinstrumenten en de overgang van milieubeheerstaken van centrale overheid naar semi-publieke organisaties mogelijk. Ten tweede, naast de variatie in soorten industrie, kennen industrieparken ook een diversiteit aan eigendomsrelaties, variërend van staatseigendom, privaat eigendom, jointventures en bedrijven in buitenlandse handen. De hoge concentratie van buitenlandse bedrijven in industrieparken biedt toegang tot milieukennis en management, brengt ervaring met alternatieve milieubeheersvormen met zich mee, alsmede een directe ingang tot wereldmarkten. Dit alles vergroot de kans op succesvolle experimenten in ecologische modernisering. Ten derde biedt de ontwikkeling van uitwisselingsnetwerken van hulpbronnen en bijproducten mogelijkheden voor milieuhervormingen in industrieparken die zijn gebaseerd op het concept van industriële ecologie. De ontwikkeling van zulke netwerken vereist niet alleen technologische innovatie, maar ook sociale verandering. Alleen verandering van bewustzijn en gedrag bij overheid, industrie en publiek zal de beoogde innovatie voortbrengen.

Bedrijven zullen zelf geen radicale milieustrategieën toepassen, tenzij zij daartoe worden gedwongen door overheid (formele regulering), economische actoren (marktdruk) en maatschappij (informele regulering). De staat heeft in Vietnam een belangrijk aandeel in de economische en maatschappelijke ontwikkeling van het land, maar het faalt in de bescherming van het milieu in een tijd van snelle industrialisatie. In deze situatie zijn marktdruk en informele regels noodzakelijk ter ondersteuning van de formele milieuregulering. Vooral bij de ontwikkeling van eco-industrieparken is het onmogelijk om alleen op regulering te rekenen zonder actieve participatie van de verschillende actoren.

Ecologische moderniseringstheorie dient dan ook op een aantal punten aangepast te worden voor de toepassing in Vietnam. De belangrijkste kenmerken die verschillen met een Europese context zijn:

- De dominante rol van de staat in economisch en milieu opzicht, typerend voor een land in ontwikkeling.
- De samenwerking op milieugebied met de private sector en gedecentraliseerde publieke sector vindt plaats binnen een hiërarchische beleidsstijl die typerend is voor de meeste Zuid-oost Aziatische economieën.
- De dominantie van economische actoren in milieugerichte verandering is niet zozeer het gevolg van privatisering, maar van de opening van de binnenlandse markt voor buitenlandse bedrijven.
- Een actieve academische gemeenschap in Vietnam zorgt niet alleen voor de ontwikkeling van aangepaste milieutechnologie en management, maar zet milieuproblemen ook op de politieke agenda.
- Niet zozeer de milieubeweging is verantwoordelijk voor formulering van milieubelangen, maar de lokale belangengroepen, media en milieu-experts;
- Een belangrijke rol in milieuhervormingen is weggelegd voor internationale verdragen, ontwikkelingssamenwerking en donoren.

De ontwikkeling van een aangepaste Vietnamese of Aziatische ecologische moderniseringstheorie zal gebaseerd moeten zijn op bovenstaande karakteristieken. Op deze wijze biedt het onderzoek naar ecologische modernisering buiten de Westerse context een veelbelovend perspectief.

ABOUT THE AUTHOR

Phung Thuy Phuong was born on 7 July 1959 in Saigon City, Viet Nam. Since 1983, after obtaining a B.Sc. degree in Biology from the University of Ho Chi Minh City, she has worked as a lecturer at the Faculty of Biology of the same university up till now (the university is now divided into University of Natural Sciences and University of Social Sciences, the Faculty of Biology belongs to University of Natural Sciences). In 1994 she obtained a M.Sc. degree in Environmental Management from the Asian Institute of Technology, Bangkok, Thailand.