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**A STUDY OF ENVIRONMENTAL MANAGEMENT
MECHANISMS IN THE CONTEXT OF INDUSTRIALISATION:
AN ANALYSIS OF THE CASE OF THAILAND FROM INDUSTRY'S PERSPECTIVE**

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From Industry's Perspective

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ABBREVIATIONS

BMR	: Bangkok Metropolitan Region
BOI	: Board of Investment
CBOs	: Community Based Organisation
DCs	: Developing Countries
DIW	: Department of Industrial Works
DPC	: Department of Pollution Control
EIA	: Environmental Impact Assessment
EMAS	: Eco-Management and Audit Scheme
EQPR	: Environmental Quality Promotion Department
ERTC	: Environmental Research and Training Centre
GATT	: General Agreement of Tariffs and Trade
ICs	: Industrialised Countries
IPC	: Integrated Pollution Control
IPCA	: Industrial Pollution Control Application
ISO	: International Organisation for Standardisation
JIT	: Just In Time
LA21	: Local Agenda 21
MNCs	: Multi-National Corporations
MOI	: Ministry of Industry
MOSTE	: Ministry of Science, Technology and Environment
NEB	: National Environmental Board
NEQA	: National Environmental Quality Act
NGOs	: Non-Governmental Organisation
NPPR	: National Pollution Prevention Roundtable
OEPP	: Office of Environmental Policy and Planning
SMEs	: Small- and Medium-sized Enterprises
TBCSD	: Thailand Business Council for Sustainable Development
TEI	: Thailand Environmental Institute
TISI	: Thai Industrial Standards Institutes
TQM	: Total Quality Management
WTO	: World Trade Organisation

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CHAPTER ONE: INTRODUCTION

Industry has the potential to play an important role in economic growth. Successful cases of Asian countries in achieving remarkable economic growth by industrialising their countries have already shown some evidence for this potential. However, observing the environmental states in these countries, it seems that it is difficult to incorporate effective pollution control in the process of industrialisation. Does this imply that industrial pollution has to be accepted as the price of industrialisation? Although there are unfavourable factors for the environment such as lack of financial resources by focusing exclusively on economic achievement, this report argues that environmental management can be incorporated in the process of industrialisation if appropriate policy mechanisms are implemented. Hence industrial pollution should not be accepted as the price of industrialisation. There are a number of environmental management mechanisms available now and they can be used in the process of industrialisation. Despite the efforts put in by governments, it seems that these mechanisms which had been developed in industrialised countries (ICs) do not fit in the context of developing countries (DCs). There is a gap between what mechanisms are meant to do in theory and how they are operating in reality. It could be argued that this gap is caused because of the gap between policy-makers' understanding of industry and the industry's understanding of environmental management. If there is such a gap, then it is necessary to understand environmental management from industry's perspective. This report will take this industry's perspective to examine environmental management mechanisms. In order for industry to improve their environmental management, it is necessary for industry to make a change in their attitude and behaviour. Hence it is necessary to understand how organisational changes take place and, for this purpose, some management theories are introduced.

Prior to examination of environmental management mechanisms in chapter three, chapter two will review ICs' progress in environmental management and its effects on DCs for the period between the 1970s and 1990s. By doing so, it will attempt to identify factors which obstruct DCs in utilising mechanisms effectively. These factors include

differences between ICs' and DCs' industrialisation. It could be argued that because of the differences in context, DCs should not follow the Western style of industrialisation if the environment is to be taken into consideration. In order for DCs to form policies which are suitable for their contexts, it is necessary to understand the mechanisms in depth. Chapter three will firstly introduce theories of organisational change in order to analyse the mechanisms from industry's perspective. By applying those theories, the chapter will attempt to find out what is blocking industry from moving towards cleaner production. Each mechanism will be examined to explore the roles which the mechanisms play at different stages of organisational change. The use of these mechanisms are then examined in the context of Thailand. By applying the analytical framework developed in the previous chapter, this chapter will attempt to illustrate why it is important to choose policies which are suitable for a specific context. In the case of Thailand, the gap between policy-makers' and industry's understandings has led to the situation where there is a wide gap between what mechanisms can do in theory and what they are doing in reality.

There are a number of consequences of industrialisation. For instance, direct effects of industrialisation include pollution and indirect effects include urbanisation and increase in resource consumption. This report will focus exclusively on industrial pollution. This is because industrial polluters could feasibly be regulated since they are stationary and relatively easy to identify. Rather than providing an exhaustive treatment of the issues surrounding industrial pollution control, this report will examine environmental management mechanisms at the policy level. Since it will examine those mechanisms to be applied in the context of a DC in Asia, the analysis will focus on environmental problems of DCs, rather than global environmental problems. Also Eco-Management and Audit Scheme (EMAS) will not be analysed as a mechanism, since it does not apply in the context of Asia.

This report is based on secondary sources, except information on the implementation of ISO 14001 in Thailand which has been obtained via e-mail from Barry Little who is an ISO 14001 manager for Moody International Ltd in Thailand.

CHAPTER TWO: THEORETICAL REVIEW

2.1 Introduction

The debate over the environment in relation to industrialisation has changed significantly over the last few decades. As Parnwell and Bryant (1996) point out, economic growth and environmental degradation used to go hand in hand in the 1970s, however in the 1990s, most people no longer accept this association as inevitable. (Parnwell and Bryant, 1996) In this period between the 1970s and 1990s, there have been significant changes in economic, management and environmental theories which influenced each other. In this chapter, the debate of this period, instead of any other period, is reviewed for the following reasons. Firstly, it was in the late 1960s to early 1970s when environmental issues started to receive some attention from the public, and public pressure has increased since then. Secondly it was when ICs started to invest in pollution controls extensively. For example, Japan's pollution-control investment increased remarkably in the 1970s, as shown in Figure 2.1. Thirdly, in terms of world economy, it was when DCs largely abandoned the import substitution approach and started to look for an export-orientated approach. Finally, although hybrid systems still exist, this was the period when the production system largely changed from Mass production to Lean production, hence the sets of assumptions have also changed.

This chapter attempts to connect those different factors associated with industrial environmental management during this period. Despite the polluted environment which can be

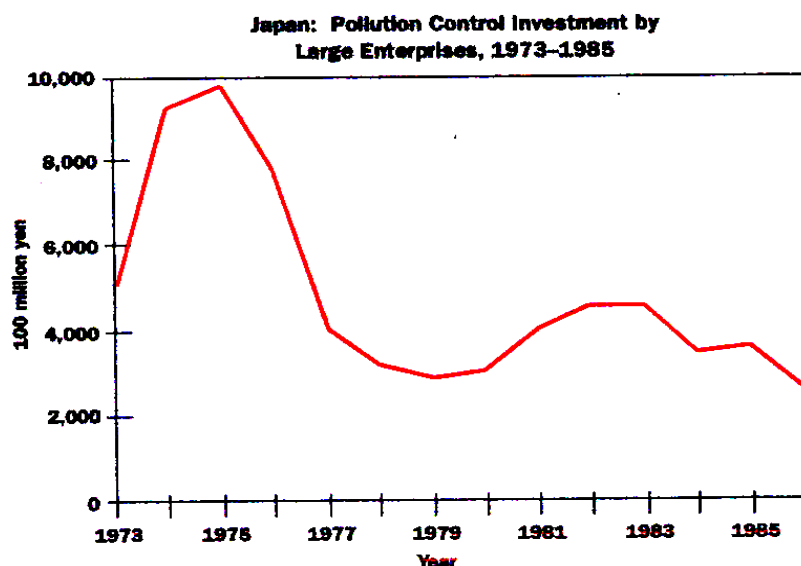
observed in the DCs, this chapter argues that industrial pollution should not necessarily be accepted as the price of development, towards the end of the chapter.

2.2 The debate in the 1970s

Interest in environmental concerns started in the late 1960s to early 1970s when a great rise of public interest in environmental policy took place in Europe and North America. Media coverage, pressure group campaigns and popular interest increased dramatically in a short period of time. Public pressure was also intensified by the increasing number of visible polluting events happened during this period. (Weale, 1992) Above all, the report 'The Limits to Growth'¹ by the Club of Rome played a significant role in attracting people's attention towards ever increasing growth. (Meadows, 1972) Although Adams (1991) criticises that its 'zero growth' ideas are both naïve and trivial, it was 'precisely the blunt instrument that was necessary to get world attention', as Whitehead (2000) describes. (Adams, 1991; Whitehead, 2000)

In response to this increasing public concern towards the environment, there were positive initiatives taken by a few major multinationals, such as Philips and IBM, which have produced environmental policies. However, the majority of the industries were reluctant to make any progress towards environmental protection and to comply with environmental legislation. Environmental issues were seen as a threat to business and there was a clear trade-off between ecology and the economy. (Robins and Trisoglio, 1992)

Figure 2.1 Investment in pollution control in Japan
(Source: Mani and Wheeler, 1998, cited in World Bank, 1999b)



This industrial attitude could be explained by a number of factors. Certainly one of the factors is the way in which government attempted to solve industrial pollution. Weale (1992) identifies that one common feature of policy developments in the 1970s was the use of traditional formal regulatory strategies. This resulted in company actions being largely shaped by regulatory requirements.

The exact significance of this approach varied from country to country depending on constitutional conventions and political culture, however despite differences of policy style, it was based on the same assumption that control by formal regulation was the appropriate way to deal with the main problems. (Weale, 1992) Within the formal regulatory framework, Environmental Impact Assessment (EIA) emerged as an important process for integrating environment and other elements, including socio-economic impacts, into the decision-making processes since the 1972 Stockholm Declaration of the United Nations Conference on the Human Environment. (CBD, 2000) Other environmental management instruments, such as economic instruments, were topics of intense discussion in the relevant policy communities. However they did not occupy a central place in the political response of the 1970s.

There are a number of shortcomings of the formal regulations, which will be discussed later. However one interesting feature of the implementation process in the 1970s was that there were no devices put in place to monitor the consequences of legislative and policy initiatives to provide a feedback loop to policy-makers. In other words, although the regulations were established, they were only on the paper and were not implemented effectively. (Weale, 1992)

In addition, emissions to different environmental media were generally treated separately, which led to the transfer of pollution from one medium to another. (Robins and Trisoglio, 1992) This is a result of pollution control using substantive legislation and control of particular pollutants without any concern for the integration of environmental concerns into wider areas of public policy, allowing problems to be displaced across political and administrative boundaries. There was this assumption that the problems of pollution could be solved by an extension of

existing policy instruments on an incremental basis. Bartelmus (1984) identifies that it was fragmented responsibilities that obstructed an integrated approach. This led to inter-sectorial blaming, as Bielenstein (1973) identifies;

“In general, environmental consequences of industrialisation very often are part of input-output analysis of industrial projects or regional planning. They come into the picture at a later stage and are left to be taken care of by the public authorities and their respective funds. Also in economic structures with central planning of some kind this might come true when economic planning boards refer consequences of industrialisation for social investment to the weaker ‘welfare’ section of public administration.” [Bielenstein, 1973, pp. 9]

On the whole, this period was characterised by industry's lack of willingness to internalise environmental issues and government desires for a quick fix to pollution problems which have resulted in unsystematic and ‘end-of-pipe’ solutions.

2.3 The debate in the 1980s

Industry could no longer ignore increasing public expectation as it started to have implication for profitability in the 1980s. Howes *et al* (1997) explain that many company strategies were motivated by fear of environmental failure rather than the anticipation of environmental success. (Howes *et al*, 1997) This concern of industry was not surprising since the pressure on pollution control increased in every term. Tougher and more result-oriented environmental legislation, together with increasing public pressure and demand for improved environmental performance and accountability, forced industry to take environmental concerns seriously. (Robins and Trisoglio, 1992) In addition, green consumerism became a feature of retail marketing in Europe in the 1980s. (Adams, 1991) Further understanding about the sources and consequences of pollution meant that the origins of pollution came to be seen not simply as a by-product of

economic activity but also as something that reflected the policy priorities of the state. (Weale, 1992)

Howes *et al* (1997) argue that the period from 1970s to the mid-1980s was when industries changed their attitude from fighting and resisting environmental legislation to adopting a more proactive and positive approach to the environment. This new 'compliance plus' approach involved anticipating new regulations and adopting practices and innovation strategies which would place them ahead of evolving requirements. In the long term, this should help reduce the cost of high standards of environmental performance and can promote competitiveness at the company level. Also it could reduce potential conflicts with community stakeholders and the risk of unacceptable environmental behaviour, helping to remove barriers to business expansion.

With this new approach, did industry make much improvement in pollution control? It is difficult to answer this question, as not only does it depend on the country, but also it depends on types of industry and individual company too. Even if there is an answer, many assumptions and simplifications mean that the answer is no longer accurate. It is also hard to reveal the difference between what a company promises and what a company actually does, as details of its environmental management are protected by company's confidentiality. This is one of the reasons why formal regulation should be in place, in order to ensure companies take their responsibilities. Overall, it can be said that if all industries have implemented this approach, then the environmental state around the world should be much better than what we see now.

For this question, it could be argued that the change in production system, which had taken place in this period, helped to create this

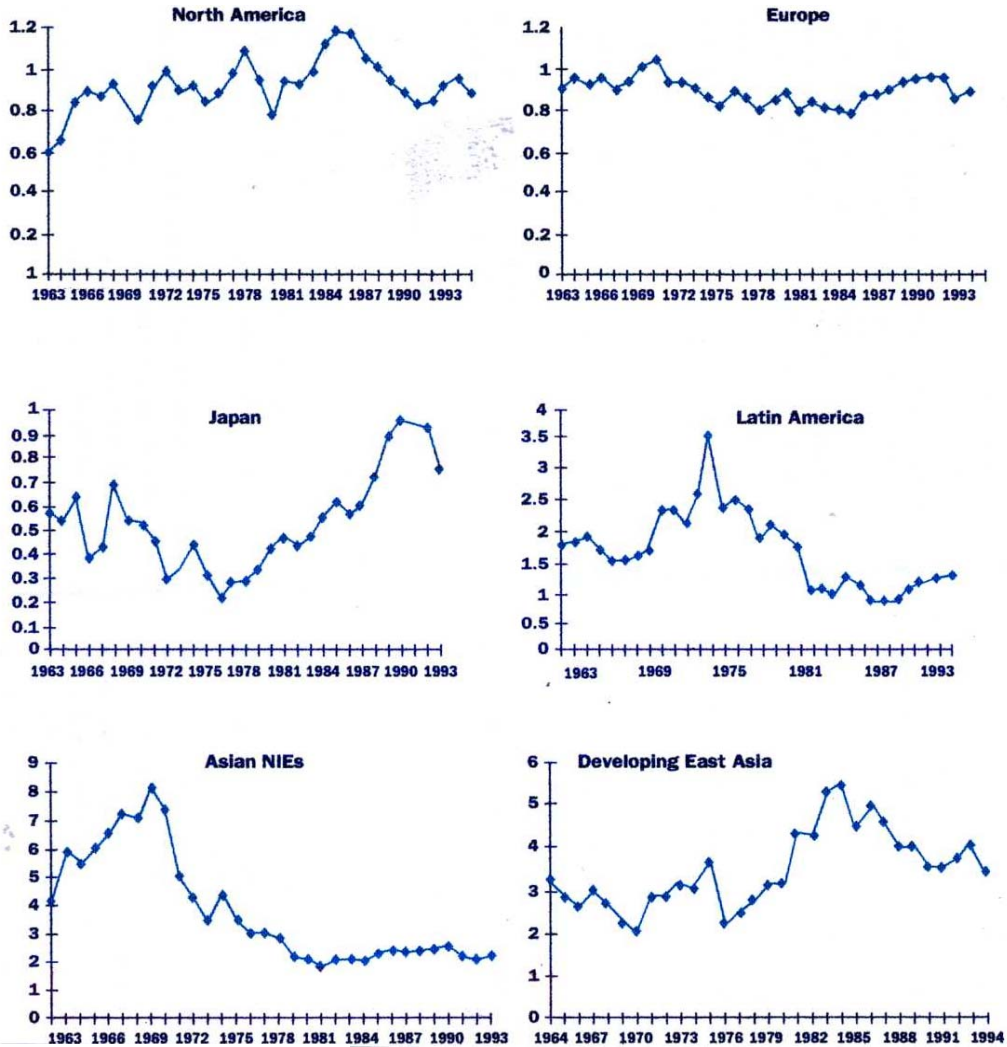
illusion that industry was becoming greener. In the 1980s, the Western industries started to recognise a new production system called Lean production, which emerged in Japan in the 1960s. It uses new methods of working organisation, such as total quality management (TQM)², subcontracting or just in time (JIT) management³. Certain new technology helped organisations to change the production line very quickly in order to respond to changing customer demands. (Rollinson *et al*, 1998) This flexible manufacturing techniques allow firms to rapidly switch production so that smaller batch sizes can be produced with the same efficiency as large batch sizes. This, combined with JIT production ensures that large inventories do not accumulate and scrapping of finished goods is minimal. (Wallace, 1994) The differences between environmental impacts of different production system are summarised in Table 2.1.

Examining this effective use of resources, one can easily rush to the conclusion that Lean production is cleaner than Mass production. This might be the reason why industry seemed to have started their positive attitude towards environmental management. However, it could be argued that although Lean production system uses resources much more efficiently than Mass production, the core corporations are transferring their polluting activities to subcontractors. Since subcontractors are organisations of their own, there is no obligation for the core corporations to comply environmental management of the subcontractors, which are often small- and medium-sized enterprises (SMEs). This could be one of the reasons why production of the core corporate seemed much cleaner, while environmental stresses were accumulating on the subcontractors, often in the DCs.

Table 2.1 Production systems and environmental impacts
(Source: Wallace, 1994)

	Raw material use	Output and demand
Craft production	Products are not made to a standard pattern, hence the raw material use is inefficient.	Output is well matched to demand, hence waste of products is at its minimal.
Mass production	The amount of raw materials wasted per unit of output is reduced considerably by standardisation.	Large inventories of unwanted goods mean that waste of finished product is very high.
Lean production	Raw material use is as efficient as Mass production.	Flexible manufacturing techniques and JIT allowed smaller batch sizes and ensured that waste of finished goods is minimal

Figure 2.2 Import/Export Ratio Trends for Polluting Industries.
 (Source: Mani and Wheeler (1998), cited in World Bank, 1999b)

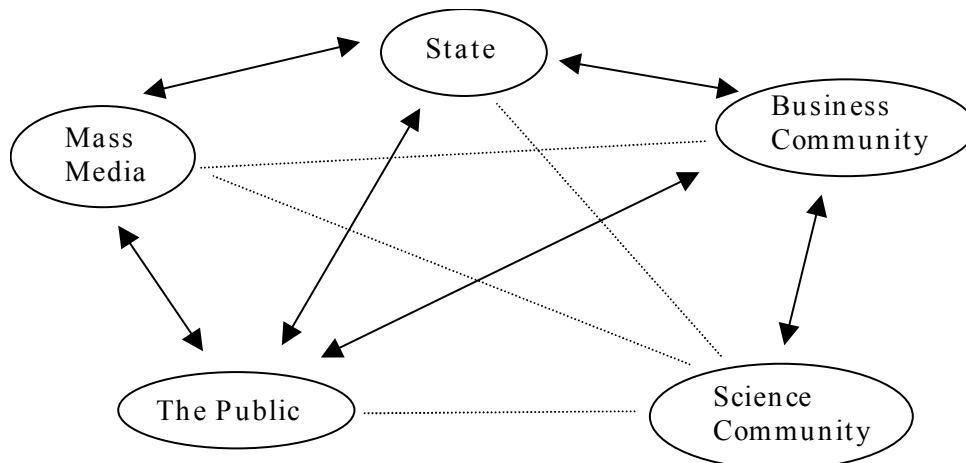


This could lead to the question of pollution havens⁴ in the DCs. For this consideration, Mani and Wheeler (1998) (cited in World Bank, 1999b) provides a good set of statistics, as shown in Figure 2.2. They argue that if the situation of pollution haven was happening in the DCs, it should show in the international trade pattern. DCs' exports of the products of polluting industries should have risen faster than their imports, lowering their import/export ratios for these products.

From the graph, they conclude that pollution havens have emerged temporally in the 1970s and 1980s. (World Bank, 1999b) Hence by having this new relationship between core corporations and subcontractors, the companies in the ICs were transferring polluting industries abroad, while they were projecting a greener image to the market in the ICs.

Wallace (1994) describes this change as 'industrial paradigm' change. He argues that industrial paradigm change is not only about production system change, but it also includes a change in a set of automatic assumptions or fundamental beliefs. In this period, it is easier to see how different actors influenced each other for a new industrial paradigm to emerge. Firstly, technology played a role in this change, as identified earlier. Secondly, the consumers, together with mass media, played an important role in raising the environmental issues higher in both political and business terms. Thirdly, during this period, the economic theory was moving from Keynesian economics which emphasises the importance of the state's role, to neo-liberal economics which undermines the

Figure 2.3 Connections between different actors in this period.



state's role. These actors interacted with each other, as shown in Figure 2.3. Arrows indicate strong influence and dotted lines indicate weak influence. Of course, there are other actors who influence the politics of pollution control, however these are the five major actors who have most influenced this change.

2.4 The debate in the 1990s

As the 1990s arrived, a renewed sense of environmental crisis, driven by the concern over global climate change and the challenge of linking economic and environmental policies to achieve sustainable development, was once more placing the need to improve environmental institutions at the centre stage for both the public and private sectors at every level of management from local to international. (Irwin, 1990) The Rio Earth Summit in 1992 put emphasis on the concept of sustainable development which took the positive-sum game where environmental development and environmental protection should go hand in hand, setting 'win-win' situation for industries.

The 'win-win' situation in industry is about enhancing resource productivity and hence economic competitiveness. By producing more from less, and from cleaner production processes, industry seemed to start accepting that both stakeholder value and the environment can benefit. (Robins and Trisoglio, 1992) In theory, it might be possible to achieve such 'win-win' situations if the consumers put the environment as their first priority and if perfect markets exist. However Howes *et al* (1997) identifies that consumers in the ICs do not necessarily take environmental-friendliness as a first parameter to buy products.

"Consumers think green only when buying a limited range of products and are generally more concerned with functionality and cost rather than the environmental impacts associated with their consumption patterns and choices." (Howes *et al*, 1997, pp.15)

There is this paradox in consumers' behaviour that although they are the ones who push industry towards cleaner production, they are the ones who enjoy the cheap products whose prices do not reflect the environmental costs. In reality, market failure exists. As long as there is a demand for cheap products, and if there is no mechanism to internalise environmental cost, companies would continue to seek the lowest price for quality suppliers wherever in the world they happen to be. (Casagrande and Welford, 1997) It does not improve the situation since consumers do not necessarily receive the full information about products. Since multinational corporations (MNCs) are benefiting, DCs are far from the 'win-win' situation. Wallace (1994) argues that even ICs are not set on a sustainable path. Only a few have attempted to put out official numbers regarding sustainable levels of resource consumption, land use or pollution. (Wallace, 1994) Hence despite almost two decades of commitment to the polluter pays principle, neither industry nor consumers yet pay the full cost of the pollution they generate.

Significant progress has been made in terms of environmental management mechanisms in this period. There was an

increase in the number of mechanisms available. Eco-Management and Audit Scheme (EMAS) has been open for voluntary participation by businesses and industry in Europe since 1995, and ISO 14000 series, an international voluntary environmental management mechanism, was formed in 1996. (Krut and Gleckman, 1998) These mechanisms gave more options for industry to incorporate environmental management. Although some significant steps toward integrated pollution control (IPC) was recognised at the Brussels Symposium on IPC in 1988, most of the countries were at an early stage of building pollution control systems. Hence there was still a need to emphasise a more integrated approach in pollution control. (Irwin, 1990)

There were also increasing numbers of cases using different mechanisms in this period. For instance, the use of economic mechanisms increased from 100 economic instruments in 1987 to 150 instruments by 1993. (WRI, 2000) In addition, some successful cases of implementation of informal regulatory mechanisms such as rating and publicly disclosing factories' compliance with regulations, were seen in Indonesia and The Philippines. (World Bank, 1999b) This increase could be explained in terms of better understanding of the mechanisms by sharing information and experience across the borders.

What is new in the 1990s is that there was an attempt to merge environmental issues with mainstream policy making. (Casagrande and Welford, 1997) From the corporate' point of view, one of the progresses made was that successful corporate programmes relied on strong support from senior management. By doing so, environmental issues have been mainstreamed into the corporations' decision-

making process, enabling reform in management structures to allocate responsibility significantly and provide effective incentives for reducing environmental impact.

Lai *et al* (1999) notes that both global and local environmental movements promoted many private corporations, especially MNCs and large enterprises, to adopt a new proactive mode of interaction in bringing forth their own environmental initiatives in the 1990s. (Lai *et al*, 1999) However, many SMEs remained less positive in their management of environmental issues. They lack the necessary managerial, technology and know-how, financial resources, access to facilities and capital to adopt new environmental rules. (Tay and Esty, 1996; Robins and Trisoglio, 1992) The characteristics of SMEs are summarised in Table 2.1.

2.5 Is pollution accepted as the price of industrialisation?

The last few sections have revealed how ICs progressed in environmental management and its implication for DCs. Now shifting the focus towards the situation of pollution control in DCs, some of the countries are in the situation similar to the one in ICs in the 1970s. In those countries, enforcement of formal regulation is still weak and not many mechanisms are used. Do DCs have to degrade their environment at the risk of industrialisation?

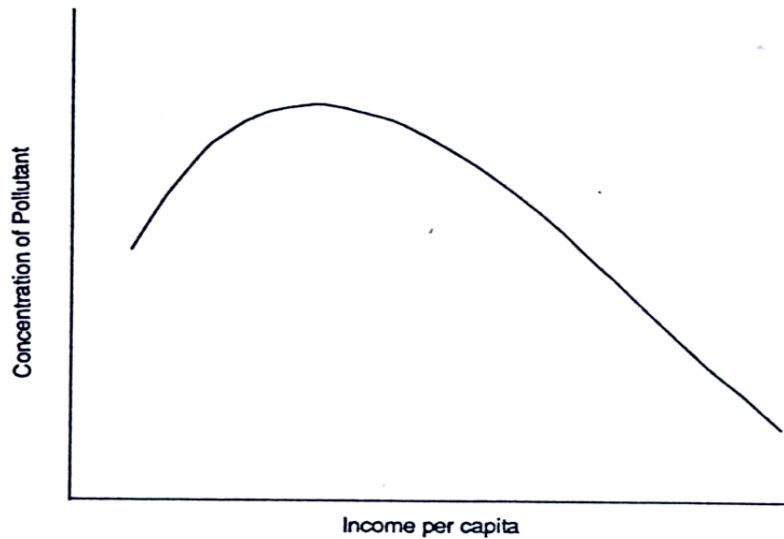
It seems that the answer to the question is yes, when considering the relationship between income and pollution. Some researchers claim that the inverted-U shape of the Kuznets curve describes a universal relationship between GDP per head and measures of environmental quality, particularly air and water quality, as shown in Figure 2.4. (Wallace, 1994)

Table 2.1 Characteristics of SMEs. (Source: APO, 1997; O'Laoire and Welford, 1996; Tay and Esty, 1996; Robins and Trisoglio, 1992)

SMEs are;

- small sized business
- large in number
- representing the major aggregate source of pollution
- difficult to enforce due to their number and individual low significance
- putting environmental management as a low business priority
- rarely targets of public pressure
- flexible in the face of changing market demands
- vulnerable
- assuming their environmental performance has negligible impacts
- limited in managerial, human, financial and time resources
- lacking in technical know-how and access to information and facilities

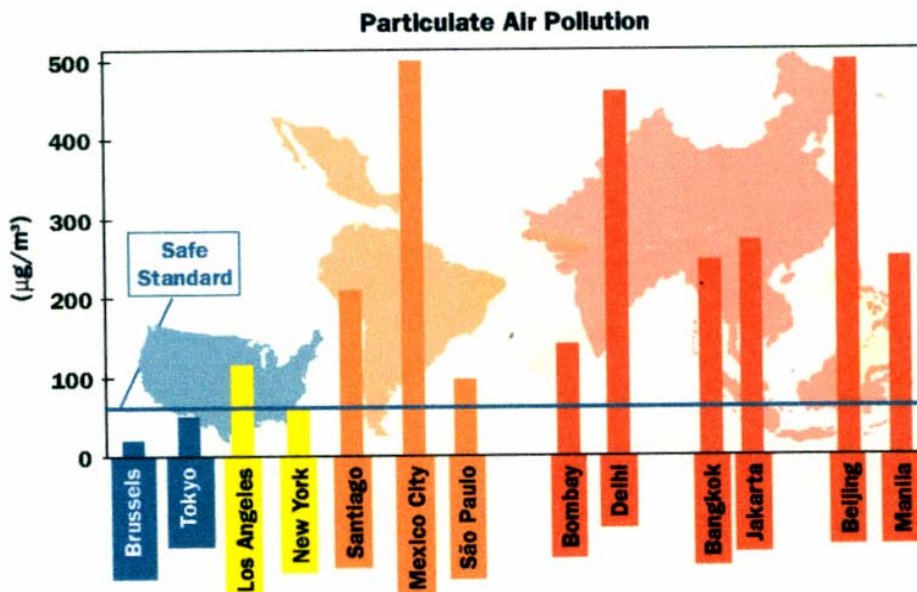
Figure 2.4 Environmental Kuznets curve
(Source: Wallace, 1994)



This graph suggests that pollution increases until the development generates enough wealth to promote significant pollution control and its turning point is estimated around per capita incomes of \$5,000 to \$15,000 per year. However, this implies that a poor country worsens its environmental conditions, as it develops more. Is this true? World Bank (1999b) provides some evidence that this is not necessarily the case. In Figure 2.5, São Paulo, for example, has lower particulate air pollution than Los Angeles and Bombay. World Bank (1999b) argues that many DCs

have already turned the corner in the fight against industrial pollution and DCs have decided that the benefits of pollution control outweigh the costs. (World Bank, 1999b) In order to understand the forces involved in DCs' environment, it is necessary to pay closer attention to the complex factors driving environmental progress in DCs, rather than just focusing on the income. These driving factors include international trade, capacity of regulatory institutions, finance, technology and information, and corruption.

Figure 2.5 Air pollution in world megacities
(Source: UNEP/WHO, 1992, cited in World Bank, 1999)



Korten (1995) notes that from 1965 to 1992, the percentage of world economic output traded between countries rose from just under 9% to just under 19%. In this rapidly changing and competitive world, how could we ensure that environmental consideration is taken into account in the DCs? Firstly, it is important to see where industries position within a society. Robins and Trisoglio (1992) identify that industry plays a paradoxical role. On one hand, it is one of the major productive and wealth-creating sectors of society. On the other hand, industry is a major polluter, both directly through its production processes and indirectly through the products it sells. Because of the paradoxical role it plays, there is a danger that industry uses its power to degrade the environment. Especially MNCs have the potential to override DCs' environmental concerns if DCs are exclusively focusing on economic growth. Glasbergen and Cörvers (1995) argue that the environmental problem is an international problem not only because of the fact that one country's environmental problem affects the others ecologically, but also because today's environmental problems are caused by global socio-economic relationships. For instance, they argue that General Agreement of Tariffs and Trade (GATT) in fact prevents countries from imposing environmental safety requirements on import. As a result, where countries decide to impose them on their own exports, they undermine the competitiveness of their own industry. Suppose the environmental Kuznets curve is accepted and that is the only consideration to be taken, then free trade could lead to the creation of wealth in DCs and this, in turn, should improve environmental conditions. However in reality, the market fails to internalise environmental costs. Esty (1994) describes this as;

“Their confidence in this convergence of interests stems in particular from a conviction that trade generates wealth that can be used to address environmental problems and from a belief that market forces, if properly channelled, will protect the environment in the context of trade liberalisation.” (Esty, 1994, pp.63)

Not only the market forces, but also the wealth generation of trade could be in doubt. Some MNCs impose DCs low wages and low standards of working conditions and it is

MNCs which benefit most. (See Fröbel et al, 1980) Transfer of technology is another benefit of inviting MNCs, however as it can be seen in trade between Japan and East Asian countries that Japan was effectively transferring its old polluting technology to those countries. (Parnwell and Bryant, 1996) This leads DCs to a difficult situation in making industries cleaner. If ICs' cleaner technology, information and experience are shared with DCs, DCs would be in a better situation to initiate environment management. There are other factors associated with this difficulty and one of them is DCs' lack of financial resources to be invested in environmental management, although there are funds available from multi-lateral or bilateral organisations. It is important to note this situation of the DCs that it is not only those actors in Figure 2.3 who are involved in the environmental management in the DCs, but there are also donors who are in a powerful position to influence decisions. This informs us that there is a need to consider pollution control in the DCs at the international level. Examining the problem of DCs' lack of financial resources and importance of considering their pollution control at the international level, it can be said that donor's financial support could be an entry point for imposing environmental concerns to DCs (e.g. setting environmental condition for funds).

Another reason why pollution is seen as at the risk of industrialisation is that many DCs have weak regulatory institutions, that people anticipate factories to pollute with no restraint. However, a weak regulatory institutional framework does not necessary mean that pollution control can not be achieved, as there are other environmental management mechanisms available. It can be said that environmental problems in the DCs are often shaped by inadequate policies put in place. Graedel and Allenby (1995) explain this situation as;

“This apparent anomaly occurs because the rapid increase in average incomes that occurs in the early stages of industrial development is lagged by the implementation of sound environmental policies, usually because of an exclusive focus on economic growth.” (Graedel and Allenby, 1995, pp.22)

There are a number of policy mechanisms available and it is necessary to understand them in depth to form appropriate policies.

2.6 Conclusion

This chapter has reviewed how ICs progressed in environmental management during the period between the 1970s and the 1990s, and how it influenced the DCs. Also it discussed about the factors which should be considered if effective pollution control is to be achieved in the context of the DCs. Although the analysis is limited as there are differences among DCs, it has identified that there are some similarities between the ICs when they were industrialising and the current situation in the DCs. On the other hand, it was argued that it is important to see that there are also differences between them, which have to be taken into consideration when policies are formed. Especially, it has been identified that there is a need to understand DC's environmental problems in international context, since they are influenced by expanding international trade and investment. Especially, with Lean production, it was identified that there is a need to take SMEs' environmental problems into consideration when policies are formed. Since there are

differences, DCs should not follow the path which ICs took while they were industrialising. In theory, ICs should incorporate DCs' environmental management, which they are to some extent, as they are affected by and affecting the DCs' environmental problems. This can be done in the form of technical knowledge transfer or by establishing international convention to support cleaner production in DCs. Although such support has been recognised, there is a limit to what extent ICs can support. What DCs can do is to choose the right instruments which would meet the DCs' own contexts, rather than just copying Western policies. It was argued that pollution does not necessary have to be accepted as a price of industrialisation and in order to overcome the problems of pollution, it is important to have appropriate mechanisms in place. In order to do so, it is important to understand how environmental management mechanisms work and their strengths and weaknesses, which will be examined in the next chapter.

CHAPTER THREE: ENVIRONMENTAL MANAGEMENT MECHANISMS

3.1 Introduction

The last chapter identified the need to understand environmental management mechanisms in depth, and the factors associated with DCs' pollution control. So far, industry has been seen from the policy-makers' perspective and that is what much of the literature does. This is also the way in which policies are formed. There is not much literature which examines environmental management instruments from the angle of how organisations behave, taking industry's need into account. Although, there is an increasing participation of industry in policy-making processes, it could be argued that there is a need to understand environmental management from industry's perspective further by asking 'how do industries make business decisions about environmental performance and what influences their decisions?' In order to do so, it is necessary to understand how organisational change takes place so that policies can be formed in a way that fit industry's situation.

In this chapter, some management theories are introduced and used to form an analytical framework to understand environmental management from industry's perspective. Since the last chapter has identified the need to take SMEs' environmental problems into consideration, these concepts are then applied in the case of SMEs to examine the reasons why they are reluctant towards a change to cleaner production. Environmental management mechanisms are then examined individually. By examining how organisations behave, this chapter attempts to identify the factors which should be taken into account when industries are going through a change. By analysing from this angle, it is also found that SMEs' characteristics obstruct them from making a change and the first necessary step is to raise awareness among SMEs. It is also identified

that there is a gap between policy-makers' understanding of industry and industry's understanding of environmental management. It is concluded that training and support are necessary not only to provide information and skills they need, but also to remove obstacles towards cleaner production.

3.2 Understanding organisational change

3.2.1 Organisational change

Today's organisations face the challenge of coping with difficulties caused by constant changes because of the combination of forces emanating from inside and outside their environments. There are a wide variety of pressures that promote change within an organisation. Rollinson *et al* (1998) identifies some of the triggers for organisational change, such as financial losses and increased competition. Rollinson *et al* (1998) argue that whatever the trigger, the important point is that organisations need to foresee or recognise signs of these triggers well in advance in order to prepare themselves for change.

In the process of change, Lewin (1951) suggests that there are three stages to be taken by an organisation, as illustrated in Figure 3.1. The unfreezing step disturbs the equilibrium to lessen resistance to change and create the need for changes, whereas on the next step moves from old behaviours to new behaviours. Finally the refreeze step establishes the new patterns of behaviour as those that are normal. Hence in order to unfreeze the existing situation, the governments or any other external pressures, such as NGOs, need to provide some kind of stimulant for industry before it can take actions, unless there is an internal pressure towards environmental concerns. On the other hand, industry needs to be supported to proceed in a right direction when it is in the moving stage, before settling down. Even after the refreeze stage, industry needs continuous improvement, hence some kind of forces or triggers are needed to keep them improving, as shown in Figure 3.2.

Figure 3.1 Lewin's three-stage process

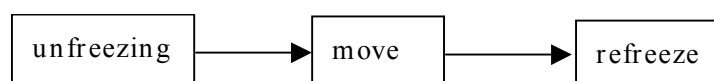
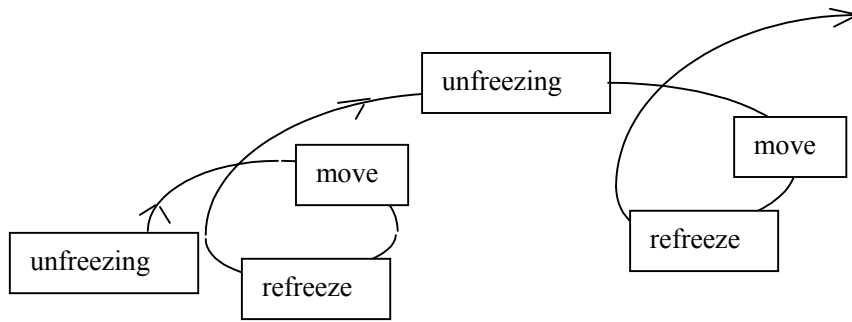


Figure 3.2 Application of Lewin's model for continuous improvement.



What are the factors affecting industry to move it from the first stage to the second stage? Lewin's (1951) 'force field analysis' gives a good model for explaining the forces acting to challenge industry's status quo. Lewin (1951) suggests that in a change of situation, there are two sets of forces acting. One is restraining forces which strive to maintain the

status quo, and the other is driving forces which push for change. In order to encourage a change, it is necessary to increase the driving force or reduce the restraining force. From the characteristics of SMEs discussed in chapter 2, Figure 3.4 shows this Lewin's model applied in the case of the SMEs.

Figure 3.3 Lewin's force field analysis
(Source: Lewin, 1951, cited in Rollinson *et al*, 1998)

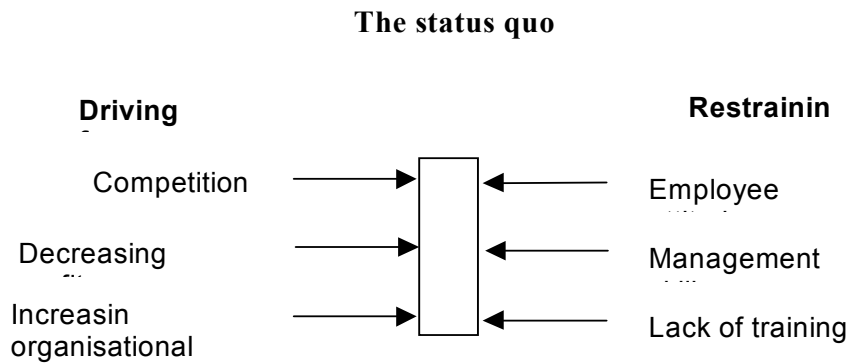
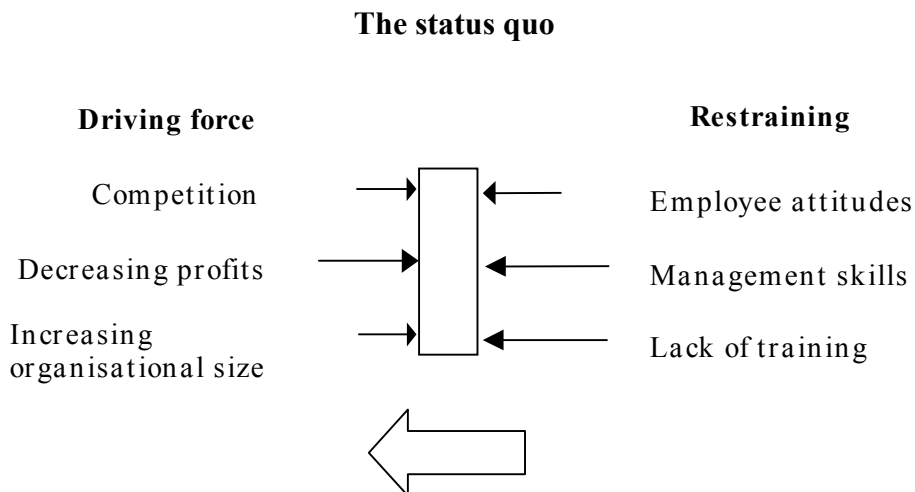


Figure 3.4 Lewin's force field analysis applied to the SMEs.



On one hand, negative employee's attitude towards environmental management is formed since SMEs assume that their environmental impacts are negligible. Lack of human, financial and time resources can lead to a lack of training and management skills which also contribute to the restraining forces. On the other hand, since SMEs are flexible in the face of changes in market demands and they are rarely targets of public pressure, competition does not become a strong driving force. The only meaningful driving force would be decreasing profits, since SMEs would rarely increase in organisational size. Hence overall, the restraining force is, in general, stronger than the driving force, as shown in Figure 3.4.

3.2.2 Obstacles to change

Not everybody welcomes constant changes and industry is no exception. In order to find out the reasons why industry hesitates to incorporate environmental management, it is important to see things from industry's perspective by asking why industry does not change to a cleaner production system.

Adams (1987) identifies five possible obstacles to organisational change; perceptual blocks, emotional blocks, cultural blocks, environmental blocks and cognitive blocks. Among these five obstacles, the following three obstacles seem to be especially associated with industry's reluctance towards environmental concerns; perceptual, emotional and cognitive blocks.

Adams (1987) explains that individual perceptions can result in people defining problems very narrowly or having an inability to see problems from more than one perspective or an inability to distinguish relevant information from all the information that is available. Applying this to the case of pollution control, environmental management can be seen as "expensive thing to do" even though it could save money. This could form a perceptual block. On the other hand, some managers might think that environmental management can be only achieved by new and sophisticated technologies. Bad memories and experience in previous change are also included as perceptual blocks. In the case of pollution control, it is likely that the managers could have had the bad memories from the 1970s of government setting formal regulations without consulting the industries. As discussed earlier, environmental management was more fearful for industry due to the inflexible use of formal regulation. Although it is not necessary the case now, this might be acting as a perceptual block.

The second obstacle, emotional block,

includes fear of taking a risk, inability to tolerate ambiguity and preference for judging rather than generating ideas. Industries, especially SMEs, can not afford to take the risk of implementing the new idea of environmental management. Because of lack of training or support given by the government and/or international organisations, there are so many uncertainties for SMEs that it becomes afraid of new subjects such as the environment.

Cognitive blocks include the use of incorrect language, inflexible use of strategies and lack of correct information. Often, information about environmental management involves technical terminology. As discussed earlier, SMEs generally lack skilled labour, hence difficult terminology can block their initiative to change. The nature of the information transmitted to the industry affected by change is also very important, in terms of explaining change process in environmental management. If the government can not show empathy and flexibility, and explain change clearly and meaningfully by using appropriate language, industry is not likely to be able to comprehend why the change is necessary and what it involves. Hence it is not enough to just introduce mechanisms or standards to industry to encourage them to change towards cleaner production. Here, the government-industry relationship plays an important part. In order to have a good relationship between the government, industries and the public, it is important to distribute appropriate information among those actors to increase accountability, and it is also important for all actors to have meaningful participation.

3.2.3 Keys to overcome obstacles

In order to eliminate, or to reduce, those obstacles, Cummings and Huse (1985) suggest three broad steps. The first step is to sensitise individuals to pressure for change. In terms of environment, this can be interpreted as letting industry know the need for environmental management change. At the same time, it would become a much more meaningful process if citizens are informed about environmental issues as well. If all the actors are involved, then they could play their own roles in protecting environment. The second step is to reveal discrepancies between the current and the desired state. It is necessary to inform all actors with accurate information about the current situation, and then have clear visions or goals to be achieved with some time frame. Finally,

positive expectations for the change have to be conveyed. This involves persuasion about the benefits of, or responsibilities of, industry's environmental management. This is usually done by government, however there is a potential that it could be done by other actors.

It is impossible to eliminate all obstacles hence there is always resistance of some degree. Markus (1983) identifies four types of resistance to change; people-focused, system-focused, organisational-focused, and politics-focused. Among the four, system-focused and organisational-focused resistance describe that if the new system is complex and unfriendly to the user, especially without training, or if a new system does not integrate well with the organisation's structure, culture and technology, then resistance occurs. In response to this, Kotter and Schlesinger (1979) argue that education, support, counselling and participation are the key to managing this resistance. This emphasises the need for training programmes to be carried out, in order to give knowledge and to allow industries to learn the new skills which are necessary for the new system.

3.3 Examination of mechanisms

3.3.1 Four mechanisms

In this section, the environmental management instruments will be examined using the analytical framework introduced in the last section, diagnosing each mechanism from the angle of organisational change.

Although Verbruggen (1991) categorises policy mechanisms into three types, there is an additional mechanism, voluntary regulation, emerging rapidly. In total, there are four mechanisms; formal regulation, economic instruments, voluntary regulation and informal regulation. (Verbruggen, 1991; ISO, 1998)

3.3.2 Formal regulation

Formal regulation aims to influence the environmental performance of polluters by regulating, by abandoning or limiting, and/or restricting activities. (Verbruggen, 1991) When the formal regulations are examined in terms of organisational change, enforcing a standard by law gives the need for change to industry. It can be said that formal regulation can play an important role in terms of unfreezing the status quo in the Lewin's three-stage model. If industries do not change their behaviour, they pay a fine, hence the driving force in the force field analysis is decrease in profit.

By setting an environmental standard, it shows the government's commitment towards

the environment, however it can work vis-à-vis, if the enforcement is not carried out effectively.

Without any supporting mechanisms, the standards could be seen as a threat, especially by the SMEs. As discussed earlier, because of the way in which the standards were introduced in the past, some industries might have perceptual blocks towards formal regulation. On the other hand, with lack of enforcement, or lack of government commitment, industry might not take the standards seriously. This could be the logic behind the illegal businesses.

From the policy-maker's perspective, formal regulation can be very effective since all applicable industries follow the regulation so there is no industries left out. However, formal regulation is not flexible nor efficient as companies sometimes have to take more expensive approach, just to respond to standards. (AIT, 1997) In addition, it does not provide incentive for technical innovation, and inconsistent standards might hamper industry's capacity to be competitive. (Gleckman and Krut, 1997) It is also an expensive instrument for the government, as the cost of free rider is placed on the government, and hence the public. In order to set standards, environmental agencies require, among other things, detailed knowledge of the least-cost method of pollution cleanup for each and every polluter. (Verbruggen, 1991)

To overcome these obstacles, it is necessary to let all industries participate in the consultative process and it is vital to provide information and support to all actors, including the SMEs.

3.3.3 Economic instruments

Economic instruments encompass all pricing incentives for the attainment of environmental goals, ranging from taxes, charges and subsidies to tradable permits. It is based on the economic assumption that pollution gets out of hand because the prices of goods and services do not reflect the costs of environmental degradation, and it tries to solve this problem by using the 'polluter pays' principle⁵. (Owens *et al*, 1990)

Just like formal regulations, the driving force for economic instruments is decrease in profit, as if they do not change, they would have to pay for tradable permit etc. It provides the need to change in order to maintain their position in the market. Also from the money collected by the mechanism, revenue can be raised which can then be used to encourage companies to develop new technology,

Table 3.1 Benefits of implementing ISO 14001. (Source: ISO, 1998)

- reduced cost of waste management
- saving in consumption of energy and material
- lower distribution costs
- improved corporate image among regulators, consumers and the public
- framework for continuous improvement of environmental performance.

monitoring and environmental management. (Owens *et al*, 1990) Since it gives the industries more time to plan the change and to adjust their systems, it provides more flexibility in the use of strategies. This, in turn, softens the emotional blocks, as they have more time to explore the new subject. The main difference between formal regulation and economic instruments is that economic instruments encourage more planned and proactive change and provide a continuous incentive to develop better means of pollution control.

Although economic mechanisms can be the most efficient mechanism, they may introduce competitive disadvantage in international trade. This may affect particular industries, for instance, if taxes are imposed on their inputs or products. (Owens *et al*, 1990) From the policy-maker's perspective, Redcliff (1992) argues that economic instruments fail to reflect both "demand" and "supply" side of the equation, as these mechanisms are set at a national level, taking environmental issues away from local people's need. (Redcliff, 1992) In addition, there are difficulties with setting the value of environmental properties and they are set by the economists, not environmentalists.

3.3.4 Voluntary regulation

Voluntary regulation works by companies taking their own initiatives to comply with international or regional standards such as ISO 14001 or EMAS, or by starting their own environmental management system. By doing so, it gains a comparative advantage not only in the consumer market but it is also a good indicator towards investors and customers in supply chain. As it was remarked earlier, this paper focuses on ISO 14001, as EMAS does not apply in the case of Asia and companies' own environmental management systems vary considerably from one system to another.

By complying with ISO 14001, a company can benefit from the incentive summarised in Table 3.1. By complying with ISO 14001, the company is committed to improve their environmental conformance continuously and it is due to comply with the

relevant formal regulations. (ISO, 1998) Its auditing system can be an effective way of enforcing and monitoring the environmental performance of a company.

The driving force for this mechanism is increased competition. Having ISO 14001, for instance, is a comparative advantage to a company who wishes to stay in a very competitive world market. O'Laoire and Welford (1996) identify that despite its benefits, SMEs generally place the environment, hence ISO 14001, low on their list of priorities. For instance, ISO 14001 has the potential to improve SMEs' management skills, hence reducing restraints to change. In addition, not only do ISO 14001 certifiers analyse companies' environmental performance, but they also provide a systematic approach which companies can take and follow up. (ISO, 1998) Hence SMEs could, in theory, benefit more from ISO 14001, only if they have their own initiatives and financial, human and time resources ready. Since there are 15,772 companies around the world which have ISO 14001 in place, there is enough information, experience and scientifically valid data on the environmental effects of economic activities world-wide to respond to different needs companies have. (ISO world, 2000) It can be said that International Organisation for Standardisation (ISO) has established a good network for sharing experiences in environmental management.

The main benefit of ISO 14001 for industry is that the new system is 'industry-friendly' and integrates well with the organisation's structure, culture and technology. Since this mechanism approaches the issue from industry's perspective, it has the potential to change perception block. This can be seen from a number of certifying bodies' brochures which emphasise the fact that environmental management could save money. (For instance BSI, 2000) It can be said that ISO certifiers are 'privatised regulators' who assist 'public regulators' in encouraging environmental management. More information and support means that the

company has less fear towards the change and easy to learn the new subject. In addition, there are so many other successful examples around the world that the company would probably feel more at ease. Also business-minded certifiers should, in theory, explain the process in an appropriate language in order to maximise their own profits and efficiency. This, in turn, conveys a positive expectation for the change. The main difference between ISO 14001 and formal regulation is that with ISO 14001, a company can take their own time to improve their environmental performance with support from ISO certifying bodies, and also the ISO 14000 series offers other tools including Life Cycle Assessment and Eco-labelling.

ISO 14001 seems promising in industrial environmental management as an instrument to support the moving stage of Lewin's model. However, it does not necessarily provide the need for change. The current market is demanding the certification of ISO 14001, however, it is still possible to have businesses without it too. This might be one of the reasons why not many SMEs are certified for ISO 14001. As discussed earlier, SMEs' characteristics block their driving force to move for change. It was also argued that there may be perceptual, emotional and cognitive blocks which obstruct change. Hence it is necessary to remove these obstacles away from SMEs in order for ISO 14001 to be implemented effectively in the moving stage. Having discussed about its benefits, there is a fear among the DCs and SMEs that ISO 14001 could become a non-tariff trade barrier. (APO, 1997)

In spite of its 'industry-friendly' approach, there are limitations to what private-sector's definition of environmental management can do. Gleckman and Krut (1997) argue that ISO 14001 will effectively discourage the trend of companies experimenting with their own environmental management schemes, and will grant an 'easy A' to companies, even if they have low environmental performance standards.

In addition, the decision-making process of its technical committee is internal to industry, which essentially avoids the participation of various multi-stakeholders. (ISO/TC207, 2000) Especially, governments, NGOs, SMEs, and DCs play a negligible role in the ISO 14000 series drafting and decision-making. SMEs might think that ISO 14001 is irrelevant to them since it is designed by and designed for large companies and it is not taking SMEs' needs into consideration. Not only is it less representative in its technical

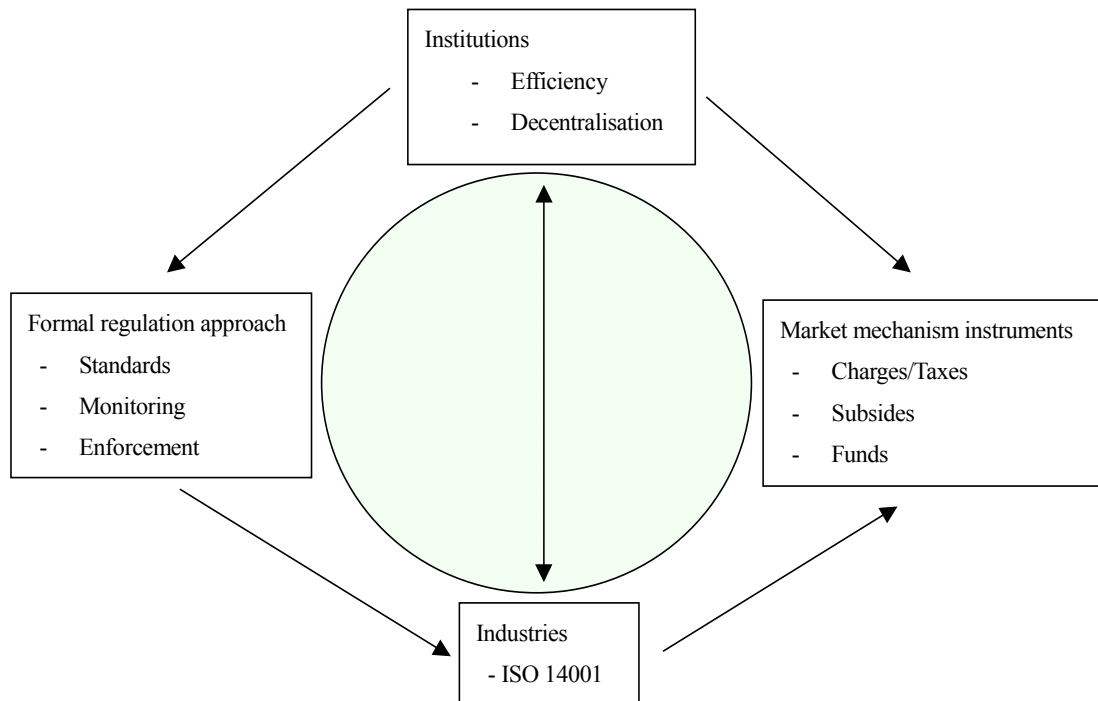
committee, but it is not democratic either. Since the standards are defined by the private sector, there is no accountability to public processes. Usually international standards setting is conducted by intergovernmental bodies in public arenas and subject to a significant degree of accountability. The International Organisation for Standardisation (ISO) is for the first time legally empowered to create international trade standards that will be used to judge the appropriateness of publicly-set national and local environment, health and safety standards. In other words, in principle, ISO 14001 could become an international standard without having actively integrated public comment. In addition, the environmental information prepared by an ISO 14001-certified company can not be accessed by the public as it is a company-confidential. Gleckman and Krut (1997) argue that this is against the trends of opening environmental information to the public, hence Agenda 21. The ISO 14000 series does not include any reference to the Montreal Protocol, the Basel Convention, the Convention on Climate Change, the Convention on Biological Diversity, the OECD Guidelines on Hazardous Technologies, or any other international environmental agreement.

It is clear from the above that there is a need for other actors to understand ISO 14001 well. The limited amount of academic literature on ISO 14001 implies that ISO 14001 has been implemented without extended academic studies outside of industry. This might be one of the reasons why there is a gap between the policy-makers' understanding of ISO 14001 and the way industry uses ISO 14001. Especially, there is a need for other international organisations to realise that there are issues associated with ISO 14001 which can not be resolved at the national level. For example, countries that cannot justify the use of higher standards on these specific grounds are faced with the choice of whether to change their national standards in order to come into line with the international standard. There is no dispute mechanism to challenge the use of lower standards, provided that these meet World Trade Organisation's (WTO) standard-setting criteria. (Gleckman and Krut, 1997)

3.3.5 Informal regulation

Informal regulation works by involving other actors in environmental management. This regulation can be characterised by the two words; information-intensive and transparent. For example, armed with good information, citizens can work with environmental agencies and elect political leaders willing to pressurise

Figure 3.5 Policy framework.
(Source: adopted from AIT, 1997)



factories into curbing emissions, as regions and countries make the transition to greener industry. (World Bank, 1999b) In AIT's (1997) policy framework diagram, this mechanism would fit in the circle drawn in the middle. In order to ensure the success of such a system, regulators need to rely on low-cost computer technology that cuts the cost of gathering, processing, and distributing information. Selective, focused use of environmental data bases and computer models, along with public involvement, also helps communities and business negotiate environmental priorities and action plans based on a common understanding of the impact of pollution and the cost of abating it.

In this mechanism, the role which a regulator plays is somewhat different to that in other instruments. With formal regulations, the regulators have responsibility for monitoring factories' environmental performance and enforcing regulation. However with informal regulation, they use more resources to provide better public information, encourage informal regulation, furnish technical assistance to managers and promote environmental sound economic reforms. Hence they become more like mediators and less like dictators. (World Bank, 1999b)

This mechanism influences the market,

not only from the supply side, but also from the demand side, by citizens playing a role in providing the need to change. The consumer's pressure is getting stronger in this competitive market and companies are interested in consumer's demand and their images. If companies can not meet customers' expectations, they will lose profits. Hence the driving force for this mechanism is decrease in profits. This public pressure would act as a sensitising element not only for the industries, but also for the governments as well. Informal regulation has a great potential to unfreeze all organisations, and also it has the potential to give continuous incentives. However, it is absolutely necessary to have other mechanisms in place, as informal regulation alone can not lead to improvement of industrial environmental performance itself. For instance, informal regulation can not generate the financial resources necessary for industries to take initiatives in environmental management. Although it has the potential to reduce the pollution of industry, it does not necessarily internalise the costs of environmental degradation to consumers.

Agenda 21 emphasises that this participatory approach has the potential to achieve sustainability. This is not only for environmental problems, but this initiative

could also empower people to start tackling other social issues. For instance, the World Bank (1999b) argues that the approach using informal regulation pays particular attention to the problems of the poor. (World Bank, 1999b)

In any case, it is necessary to set mutual goals among all actors, although this is very difficult to be materialised politically. In order to co-ordinate different actors, Local Agenda 21 (LA21) can be used in parallel with informal regulation. In order for LA 21 to be a meaningful process, and hence as an instrument, policy-makers need to consider local political representatives, as well as technical, economic and financial issues.

3.4 Conclusion

By understanding how organisational changes take place, this chapter has identified some reasons why SMEs are reluctant towards cleaner production. SMEs' characteristics obstruct them from making a change and it is important to give training and support not only to supply knowledge, but also to break perceptual blocks SMEs might have. Examination of the mechanisms from an angle of organisational change has shown the differences in the way each mechanism works and what roles they can play to improve environmental management. It was clear that

the instruments could reinforce each other, if applied appropriately. The choice of instruments depends on a number of factors. These include the pertinent circumstances such as the nature of the environmental problems, the available technologies, market conditions and the number of polluters. The possibility and the costs of administration, monitoring and enforcement are in this connection also of importance. Also there are other factors identified in the previous chapter. Whatever the mechanism, it is important to foresee the change, and for this purpose, it is important to have good relationships between the different actors. It was identified that participation and sharing information can help improving these relationships. It is also important to consider environmental management from all levels. Informal regulation emphasises the importance of raising awareness nationally and/or locally, and the last chapter and the voluntary regulation raised the need to consider environmental management at an international level. In practice, LA21 can play its role at a local level while at international level, for instance, environmental concern could be incorporated into international policies towards foreign direct investment.

CHAPTER FOUR: IN THE CASE OF THAILAND

4.1 Introduction

Having examined the mechanisms from industry's perspective, this chapter will analyse the use of environmental management mechanisms in the case of Thailand. Thailand has been chosen as a case study for the following reasons. It is a DC which is industrialising rapidly with its export-orientated strategy. Hence industry plays an important role in its economy and it has resulted in degrading of the environment. Although the government has already implemented a number of initiatives to improve its pollution control by using different mechanisms, there is a clear gap between these mechanisms' potential in theory and how they are used in practice.

After a brief introduction of Thailand's economic and environmental situation, its institutional framework for pollution control will be analysed. By applying the analytical framework introduced in the previous chapter, this chapter will attempt to find the reasons why there is such a wide gap between theory and reality.

4.2 Background

As one of the youngest and fastest growing environmental markets, Thailand is a classic example of a DC attempting to balance its overarching economic ambitions with the search for solutions to environmental degradation. On one hand, Thailand has achieved remarkable economic growth, averaging GDP growth of 9.4 per cent for the

decade up to 1996. (ADB, 1999) On the other hand, its environmental condition among the south-east Asian countries is expressed as the region's most striking signs of spatial disparity and environmental stress. (Parnwell and Bryant, 1996) Thailand's economic growth was achieved by increasingly diversified industrial sectors. These sectors include businesses in food processing, electronics, textile, pulp and paper, and the petrochemical industry, since these are major exporters. (US-AEP, 2000b) Its economic success, up to 1997, was largely supported by relatively abundant and inexpensive labour and natural resources, fiscal conservatism, open foreign investment policies, and encouragement of the private sector. Despite economic recession in 1998, the economy seems to be showing positive signs of recovery.

The change from its agricultural-centred economy to manufacturing economy was dramatic. Thailand's rapid industrialisation has taken place at the same time as more than half the country's population still depend on agriculture. (Hirsch, 1993) This transformation of industrial structure has led to an increase in the number of polluting factories. The number of air- and water- polluting industries has risen rapidly as illustrated in Table 4.1. This increase was in proportion to the total number of factories.

These polluting industries were important for Thailand's economic growth. Figure 4.1 and Figure 4.2 illustrate that these polluting industries generated more than half of the total manufacturing GDP in the 1970s and 1980s.

Table 4.1 Number of Air- and Water- Polluting Industries⁶
(Source: Kritiporn *et al*, 1990)

Industry	End of 1960	End of 1979	End of 1989
Water –polluting industries	159	5,393	20,221
Air-polluting industries	68	2,241	8,120
Overlapping (Air + water industries)	16	604	2,106
Sum of polluting industries	211	7,030	26,235

Figure 4.1 GDP Share of Air- and Water- polluting Industries in 1979
(Source: Kritiporn *et al*, 1990)

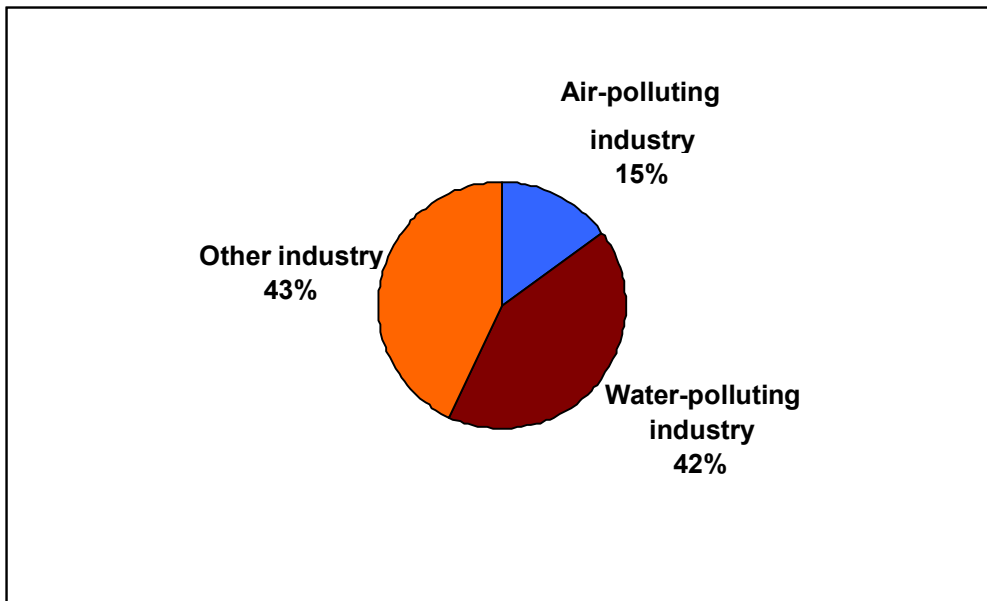
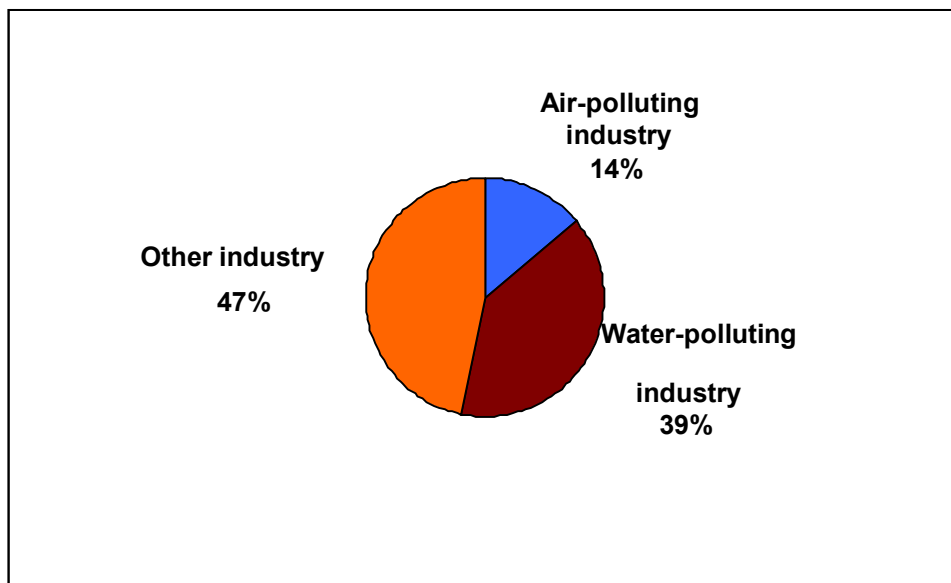


Figure 4.2 GDP Share of Air- and Water- Polluting Industries in 1989
(Source: Kritiporn *et al*, 1990)



As the World Bank (2000) argues, this concentration of polluting industry in Thailand can be explained by the fact that the Board of Investment (BOI) had established policies to encourage foreign investment into Thai industries and it attracted the wrong types of industries. (World Bank, 1994) It is not much of a pollution haven now, as Little (2000) describes, because in general MNCs seem to bring their own environmental management system from their home country and it is old industries such as textiles and leather which generate pollution. (Little, 2000)

In addition to the old industries, it is important to note that the backbone of industrial growth in Thailand is the vast number of SMEs. The unique characteristics of flexibility and inventiveness enable them to not only survive but also to expand in the highly competitive market atmosphere which exists in Thailand. In the Bangkok Metropolitan Region (BMR), the majority of factories are SMEs, as shown in Table 4.2. Hence it is important to consider SMEs' need in the process of forming policies.

Table 4.2 Proportion of different sized factories in the BMR.
 (Source: Department of Industry Works, 1987, cited in Hampel *et al*, 1994)

	Number of factories	Proportion
Household-sized	16048	60%
Small-sized	8473	31.68%
Medium-sized	2033	7.60%
Large-sized	192	0.72%

As a consequence, a number of characteristics of SMEs can be seen in manufacturing in the BMR, such as a small

number of employees and underdeveloped employee skills as shown in Figure 4.4 and Figure 4.5.

Figure 4.4 Number of Permanent Workers for Overall Factories (Source: Department of Industrial Engineering, Chulalongkorn University, 1992, cited in Hampel *et al*, 1994)

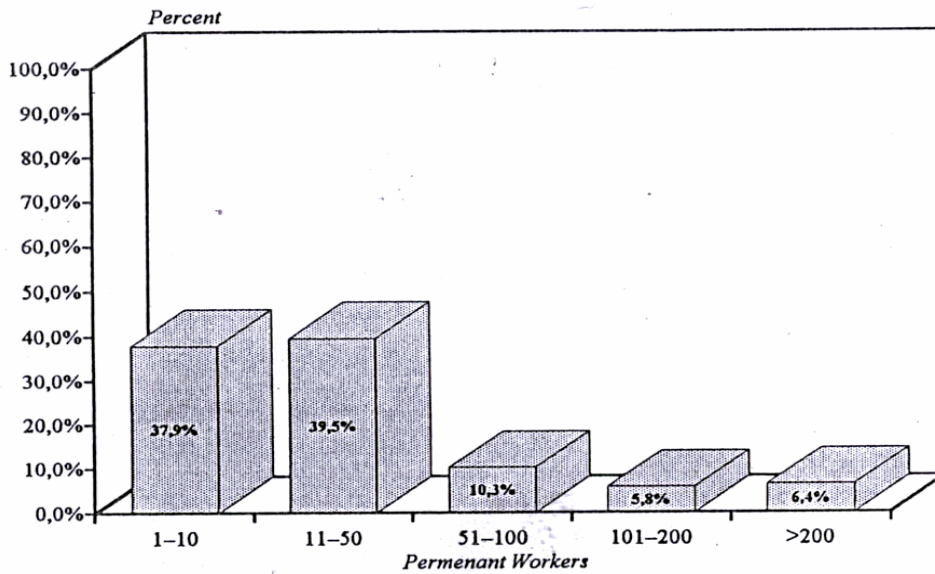
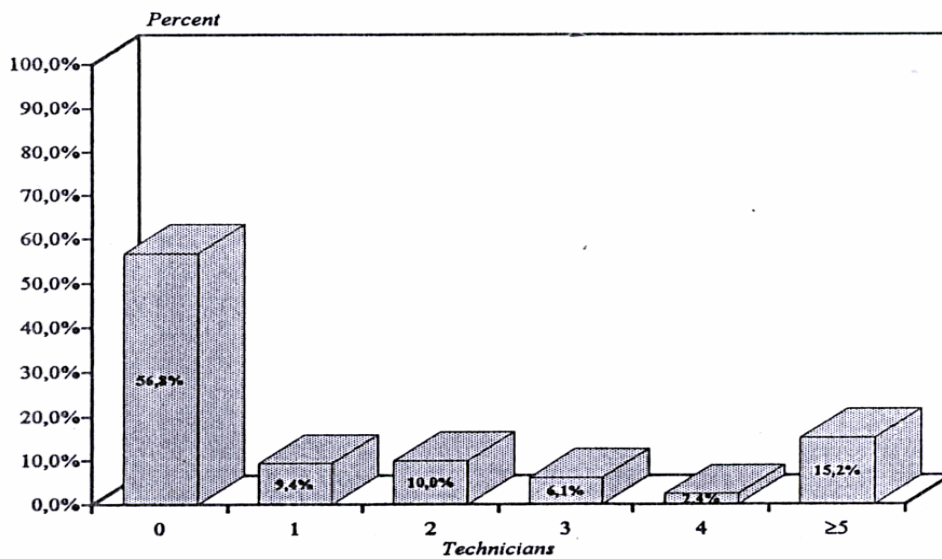


Figure 4.5 Number of Certified Technicians for Overall Factories. (Source: Department of Industrial Engineering, Chulalongkorn University, 1992, cited in Hampel *et al*, 1994)



Bangkok's environmental distress came to the point where it started to affect the economy. Quantitative estimates of the cost related to the urban environmental degradation show that the environmental cost of air and water pollution in Bangkok exceeds \$2 billion per year, which is approximately 8 per cent of the total income of the city. (AIT, 1997) This is partly because 52 per cent of industries, which generate 76 per cent in terms of the GDP, are located in the BMR. (Kritiporn *et al*, 1990) As environmental quality is increasingly coming to be measured as an indicator of developmental performance and an essential component of economic growth, it is important for Thailand to improve its environmental situation.

4.3 Institutional framework for pollution control

Thailand has already taken many steps towards addressing the environmental stresses that have been exacerbated by the recent rapid growth. (See Appendix 1) It took its first step when the Ministry of Industry (MOI) extended its mandate under the Factory Act (1969) to include industrial pollution control. Then environmental concerns entered the planning arena in the Third National Economic and Social Development Plan in 1972. (Kritiporn *et al*, 1990) The most dramatic regulatory changes came in 1992, when the administration of former Prime Minister Anand Panyarachun revamped the environmental management framework and restructured key environmental agencies under the National Environmental Quality Act (NEQA). (US-AEP, 2000b) It should also be noted that in 1992, there was an important political event, the May bloodshed⁷ which led to major changes in many aspects of Thai society. (Lai *et al*, 1999)

The Act upgraded the environmental agencies to cabinet status, the National Environmental Board (NEB), absorbing it into the Ministry of Science, Technology and Environment (MOSTE). The revised Act also departed from previous practice in Thailand in three other ways. Firstly, greater authority in environmental protection was delegated to local government officials including provincial governors and mayors. This change was significant in responding to one of the criticisms of the earlier law in which too much authority for environmental protection was given to central government agencies such as the Department of Industrial Works (DIW). Secondly, the revised law gave non-governmental organisations (NGOs) a greater role in environmental protection by explicitly recognising the need for greater public participation. Finally, the role of MOSTE in

implementing measures to control pollution from energy, transport and industrial sources was expanded by this law. (World Bank, 1994)

MOSTE is responsible for nine departments, three of which are directed by NEQA to carry out functions that may be added by the NEB. These three are the Office of Environmental Policy and Planning (OEPP), the Department of Pollution Control (DPC) and the Environmental Quality Promotion Department (EQPD). (US-AEP, 2000a) Within MOSTE, the OEPP has taken over most of the work of the former, less elevated NEB. Its highest priorities are water and air pollution and it emphasises water recycling and reduction of air emissions. The DPC has authority to set pollution standards for NEB approval, and carried out enforcement actions in cooperation with and with the power to supersede the MOI. However, enforcement has not been stringent. For the DPC, as for other parts of MOSTE, there is a lack of environmental engineers and work must be contracted out of the department. The EQPD primarily conducts public education and awareness programmes. Sixty-five environmental NGOs have been officially registered and certified with the department so far. (US-AEP, 2000a) It established the Environmental Research and Training Centre (ERTC) in 1992 with funds from Japan. (The Nation, 1992)

Outside MOSTE, there are a number of other Ministries and departments which bear responsibility for pollution control. The Ministry of Industry works closely with MOSTE and shares an interest in applying economic mechanisms with MOSTE.

There is a duplication of efforts between the DPC and the DIW, both of them being involved in policy formation and implementation. The DIW monitors and enforces standards on industrial operations and has the authority to revoke a factory's operating license. The DIW looks inside the plant, whereas the DPC's enforcement focuses on what comes out of the pipe. In addition, formal enforcement action also involves the police, and thus the Ministry of Interior. (World Bank, 1994; US-AEP, 2000a)

Other major Ministries and departments involved in environmental management include the Thai Industrial Standards Institute (TISI), which is engaged with promotion of ISO 14000 and green Label programme, the Board of Investment (BOI) which aims to attract foreign direct investment into industries, and the Industrial Estates Authority of Thailand which is also responsible for enforcement.

Therefore, formulation of policy and

Table 4.3 The general legislation and regulatory framework for water management (Source: The United Nations, 1997)

The Public Irrigation Act, of 1939
 The Water Quality Criteria & Standard in Thailand, 1977
 The Ground Water Act, 1977
 The Public Health Act, 1992
 The Public Cleansing and Orderliness Act, 1992
 Building Effluent Standards, 1994
 Industrial Effluent Standards, 1996
 The Housing Estates Effluent Standards, 1996

enforcement of environmental regulations are handled by numerous ministries, departments and divisions. This is one of the weaknesses of environmental management in Thailand, that it involves too many agencies and their responsibilities are not clear. In order to improve the situation, the BOI is meant to be closely linked to the MOI and MOSTE through overlapping board memberships of governmental officials. In addition, MOSTE and the MOI are trying to cooperate in their environmental goals under a jointly chaired "coordinating committee" involving other actors. (US-AEP, 2000a)

According to US-AEP (2000b), Thailand has undergone a period of institutional strengthening and conflicts between MOSTE and the Ministry of Interior appear to be largely resolved. (US-AEP, 2000b) However, there are always conflicts between agencies setting priorities in the process of rapid industrialisation. Although incorporation of environmental issues into MOSTE was a significant move toward mainstreaming environmental matters, it seems that the government still takes a fragmented approach towards environmental management. Little (2000) argues that IPC is still a concept in Thailand. (Little, 2000)

4.4 Environmental management mechanisms

4.4.1 Formal regulation

Reflecting its institutional framework, Thai policies sometimes have overlapping or competing functions. For instance, within general legislation and the regulatory framework for water management, the Public Irrigation Act of 1939 covers the use of water in agriculture while the Industrial Effluent Standards of 1996, the Public Health Act of 1992 and the Public Cleansing and Orderliness Act 1992 cover its use by industry. On the other hand, the Housing Estates Effluent Standards, 1996, Building Effluent Standards, 1994, Public Health Act, 1992 and

Public Cleansing and Orderliness Act 1992 cover the use of water by households. (The United Nations, 1997) Therefore, it is not clear which legislation applies to household-sized factories, for instance. Due to the overlapping of policies, contractors are often caught in the middle of political turf wars. In many cases, it is unclear what policy guidelines must be followed or how projects will be undertaken and by whom. In addition, contractors often find executing agencies lack the requisite experience in highly complex, technical projects. Having highly influential partners and political connections more powerful than one's competitors have proven to be equally, if not more, important to success (US-AEP, 2000b)

Although regulations are largely in place, the Thai government's efforts to avoid environmental impacts have led to cumbersome and time-consuming procedures for obtaining licenses. This, in turn, leads to the problem of illegal businesses. (Krongkaew, 1995) Although the government's effort to solve environmental efforts can be recognised from change in institutional framework and legislation, enforcement remains slow and erratic. In order to improve the enforcement of regulations, recent regulatory policies have tried to provide time-bound enforcement mechanisms and warnings, fines and plant closures demonstrate increased enforcement. (US-AEP, 2000b) It is more likely that ineffective enforcement is caused by the lack of institutional capacity. For example, although Environmental Impact Assessment (EIA) is in place in Thailand, there were only 35 to 40 firms which were registered to conduct EIAs with the Office of Policy and Planning, and only 150 individuals were licensed to conduct EIA work in 1995. (US-AEP, 2000b) In 1990, the Industrial Environment Division of the DIW had only 143 staffs for some 50,000 industrial plants (350 factories per staff) and a budget of only 1,900 baht (equivalent of \$46) per factory. (Kritiporn *et al*, 1990) These resources are inadequate for the implementation of

regulations, monitoring and enforcement. This can be partly because of an exclusive focus on economic growth. For instance, although the environmental budget was increasing from \$360 million in 1995 to \$600 million in 1996, the economic crisis caused the suspension of most government-funded environmental project for FY 1998 and 1999. (US-AEP, 2000b) The government has started to realise that formal regulation is an expensive mechanism, especially for a country which has approximately 80,000 SMEs. (USA-EP, 2000a)

4.3.2 Economic instruments

Thailand uses economic instruments to a limited extent in terms of industrial pollution control. For instance, the government demonstrates its support for the pollution-control equipment market by lowering tariffs to 5 per cent or less on assembled imports. It also provides low-cost, affordable loans to local manufacturers to purchase equipment through an Environment Fund⁸ administered by the Industrial Finance Corporation of Thailand. Low interest loans from an Environment Fund are made available to local administrations and private businesses which need to set up treatment facilities. However, between 1984 and 1989, only US\$ 5.1 million worth of waste-water treatment equipment was imported under these incentives. (Amsberg, 1995)

There are other situations where revenue could be collected for better use of resources for the environment. The water sector is one example. In terms of pricing policies, industrial or commercial sectors drawing water are charged a certain fee. These fees are higher than the rates charged to the agricultural sector. They are intended to result in more equitable allocation of water and

to ensure efficient use of water from the non-agricultural sector rather than to recover costs. In practice, the rate charged is so small that it does not provide any significant amount of revenue to the government and is generally ignored. (The United Nations, 1997) Here, there is a mechanism whereby revenue could be raised, although this opportunity has been missed. Although Little (2000) argues that introducing economic mechanisms is a political nightmare in Thailand as the people are generally against paying for the basic facilities such as waste water treatment, there is already an established system in this case. (Little, 2000) Hence there is no reason why this system should not be used in practice.

As identified earlier, the MOI and MOSTE are interested in applying economic instruments. Economic instruments would be beneficial in the case of Thailand, since there is a lack of financial resources for environmental management due to its exclusive focus on economic growth. However, as the AIT (1997) identifies, it is necessary to question if Thailand has the administrative capacity to design, administer, monitor, enforce and modify the instrument in response to changing conditions. Economic instruments which are poorly designed become useless and will result in more distrust and disrespect for the government. (AIT, 1997)

4.4.3 Voluntary regulation

By April 2000, 255 companies had been certified for ISO 14001 in Thailand and the number is increasing rapidly, as the government supports the ISO 14000 series in the Eighth National Economic and Social Development Plan. (ISO world, 2000; UN, 1999) Figure 4.6 shows its transition in number of certifications.

Figure 4.6 ISO 14000 certification in Thailand⁹.
(Source: ISO, 1999)

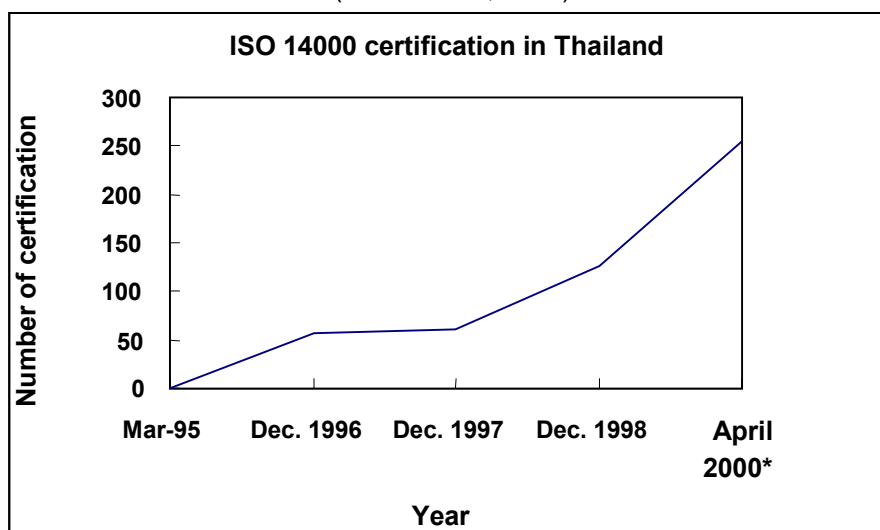


Table 4.4 Number of public complaints¹¹ and number of ISO certification against specific industrial sector.
(Sources: US-AEP, 2000b; TISI, 2000)

Industry	No. of cases	ISO 14001 certification
textile	71	3
garage	67	15
metal products	65	7
plastic & rubber	62	12
wood products	56	0
basic metals:iron/steel	54	2
machinery&electronics	41	99
bags & shoes	25	14
pulp &paper	20	8
food	20	13

Although there is no legislation to enforce implementation of ISO 14001 yet, it is becoming de facto for industry. The government is encouraging its implementation by providing incentives. For example, Board of Investment privileges and government contracts are only awarded to companies committed to achieving ISO 9000¹⁰ / 14001. (Little, 2000) For SMEs, TISI have a major program of providing highly subsidised but limited man days of consultancy assistance. The SMEs are not only forced to implement ISO 14001 by the government, but also by WTO fears and supply chain management pressures. (Little, 2000)

This move towards voluntary regulation is not a new idea for Thailand. Kritiporn *et al* (1990) identified in 1990, before establishment of ISO 14001, that an environmental auditing system would be especially beneficial for Thailand as it minimises the monitoring and

enforcement requirements which are prohibitively costly and difficult to implement. (Kritiporn *et al*, 1990) Since Thailand's institutional capacity is weak, the government might be trying to cover this weakness by demanding that industry monitors its own environmental performance. It seems that the government is trying to fix problems of pollution by encouraging voluntary regulation. Is this approach effective in Thailand? From the Table 4.4, it is clear that the amount of ISO 14001 certification does not necessarily match the number of complaints, hence the most polluting industries.

In addition, the weakness of institutional capacity can be seen in the implementation of ISO 14001. Despite the government's emphasis, there are only 70 consultancy firms which can undertake certification of ISO standards. The size of these firms varies from 2-3 consultants to a maximum of 25

Table 4.5 Thailand's literacy rates. (Source: ADB, 1999)

	Literacy rate
Adult male	96%
Adult female	92%

consultants, and not all of them undertake ISO 14001. (Little, 2000) There is a tendency to encourage companies to take ISO 9000 prior to ISO 14001. ISO 14001 is in line with the Pollution Prevention policy, however, it can be concluded that there are limitations to what voluntary regulation can do.

4.4.4 Informal regulation

Thailand is gradually adopting practices that foster more open disclosure of information on industrial pollution and government regulation action. NEQA includes a provision of information to public, however it is discretionary, and not mandatory. At present, no public information is available on industrial pollution other than what might come from an EIA available to the public on a plant operation. (US-AEP, 2000a)

There are a number of positive signs which show the potential of proceeding informal regulation in Thailand. For example, there are already a number of environmental projects which are based on community development, supported by international organisations. (For example, Atkinson, 1999) In Thailand, community development is not new. In the 1980s, there was a strong community movement towards what we would now call 'sustainable agriculture', supported by Buddhist leaders, NGOs and environmental groups. (Krongkaew, 1995) Since Thailand's literacy rate is high, as shown in Table 4.5, it is likely that informal regulation could be used by raising awareness about environment. Although the election in June 1996 of Bangkok's new mayor, a former head of an environmental NGO with no previous government experience, demonstrated citizens' concerns towards the environment, it seems that people are not willing to fight against pollution, as seen by people's reaction towards a toxic-fume leak incident on the 5th July 2000. The citizens could have sued the polluting company for compensation, however only a few were interested in doing so. (The Nation, 2000; Paengnoy, 2000) (See Appendix 2) Although US-AEP (2000b) argues that it is partly due to the cultural Thai tendency to avoid litigation and the courts, there must be other reasons why people are reluctant to fight against pollution. (US-AEP, 2000b) It could be

argued that one of the reasons is that citizens themselves are accepting pollution as a risk of industrialisation, since 'modernisation' has become interpreted as 'Westernisation' in Thailand. (Krongkaew, 1992) In order to catch up with ICs, citizens might see pollution as an inevitable consequence of economic growth, which contradicts the Buddhist values of living in harmony with nature. Once citizens realise that 'modernisation' does not necessarily mean 'Westernisation', then people may be able to initiate their own strategies to take action against pollution. It is necessary for citizens to be empowered in order to take such action. For instance, there is a need to understand how the legal system works in order to proceed in suing the company. Alternatively, NGOs and CBOs could play a role in providing this support.

In assisting citizens' participation, the National Pollution Prevention Roundtable (NPPR) is a good example of expanding the framework of pollution prevention and actively involving stakeholders from the whole society. (World Bank, 1999a) Thailand has been following the success of NPPR models in other countries around the world to prepare for the roundtable, and the first Thai NPPR conference was held in support of DPC in March 1999. It was intended to forge consensus among Thai stakeholders and to serve as an ongoing forum to promote coordination and cooperation on pollution prevention activities, as well as to promote information sharing and exchange of knowledge and experience on pollution prevention nationally and internationally. (World Bank, 1999a)

There are some other institutes which are intended to coordinate different sectors. For example, the Thailand Environmental Institute (TEI), an independent non-profit organisation, was established by former government ministers to coordinate environmental issues among government, NGOs and the private sector. (US-AEP, 2000b) TEI also helps to convince many business leaders to become members of the Thailand Business Council for Sustainable Development (TBCSD) which was established in 1993 with Mr Anand as one of its founders. (Lai *et al*, 1999) However these business

related institutes concentrate on promotion of ISO 14001. Hence there is a limit to what this group can do from a business perspective. Therefore, there are still roles which other actors can play in pollution control.

4.5 Analysis of the case

It was recognised in the case that there are a number of mechanisms already in place in Thailand and it is clear to see what roles they are playing, or are not playing, in pollution control. For instance, in the case of Thailand, it seems that formal regulation is not providing the need for change due to enforcement deficit, and hence illegal activities take place. This is a systematic problem as a considerable amount of time and human resources are needed to be spent in order to obtain licenses, for example. Overlapping policies and unclear definitions of each agency's responsibility do not give clear procedures to be followed by industry. This lack of clear information leads to cognitive and perceptual blocks, as discussed in Chapter 3. In addition, enforcement deficit exhibits the government's lack of commitment which also leads to perceptual blocks towards environmental management. This is especially true for SMEs since they lack necessary resources. If formal regulation is not providing the incentive to change, then what else is providing the incentive to reduce industrial pollution?

Among the others, economic instruments can also play a role in unfreezing the current situation of industry's environmental management, however they are not used in a way that provides incentive to change in Thailand. The only way in which economic instruments is used are to support companies in the moving stage, such as reducing tax on pollution control equipment. Although there are other forces such as government pressure, WTO fear and supply chain management pressures pushing towards implementation of ISO 14001, it is important to note that there is a limit to what ISO 14001 can do in terms of unfreezing the current situation. In the case of Thailand, promotion of ISO 14001 is accomplished by certain factors which lead to increased competition to drive for change. However, ISO 14001 is not the best mechanism to be used effectively in the unfreezing stage. Lack of recognition of this weakness of ISO 14001 has resulted in mismatch between the industries which need effective pollution control most and ISO 14001 certified industries. This weakness was seen especially in the case of SMEs. As discussed in chapter three, ISO 14001 does not necessarily supply the incentive which SMEs

need. This weakness of ISO 14001 and characteristics of SMEs should be taken into account in the policy-making process in Thailand.

For pollution control in SMEs, Hampel *et al* (1994) provide a practical methodology, called industrial pollution control application (IPCA), which innovates government-industry-academic relationships to initiate SMEs' environmental management. (See Appendix 3) By providing training necessary for SMEs, it break the perceptual blocks towards environmental management and motivates for change. It also provides good opportunities for government and academics to understand SMEs' needs in changing their production and helps the coordination among those actors. (Hampel *et al*, 1994)

In providing the need to change, it is more appropriate to use informal regulation. Especially in the case of Thailand, formal regulation is not effectively enforced by the government due to corruption and inter-sectorial conflicts. In order for informal regulation to be implemented effectively, it is primarily necessary to build citizens' capacity, as they are currently just accepting the bad environmental situation. For this purpose, Buddhist values would help not only in terms of recognising the importance of understanding the relationship between humans and nature, but also for community development. NGOs and CBOs can also play their roles in supporting citizens to take part in pollution control, and Local Agenda 21 can be used as a framework to coordinate different actors. Although Thailand has a fairly central system, it should be noted that NEQA has recognised the roles which local governments, NGOs and CBOs can play.

In order to untangle Thailand's fragmented approach towards pollution control, IPC could be introduced. As Irwin (1990) argues, international pressure might be needed in order to promote such an approach. (Irwin, 1990) There are other entry-points which can be taken at international levels. As discussed in chapter two, Thailand has a dependent economy and as ICs are affecting and affected by DCs' production, the consideration of DCs' pollution should be taken into account in ICs. This could be done by encouraging economic mechanisms more in ICs and collected money could be then fed back to DCs for promoting cleaner production. Forming international agreements such as Agenda 21 at the Rio Earth Summit, is absolutely necessary in order to see environmental problems from wider perspectives. Although international

agreement does not have enforcement power, it can generate political commitment and raise awareness nationally.

In order to strengthen institutional capacity, ERTC could play a role in training the personnel needed to coordinate different mechanisms. Alternatively, human resources could be regained by eliminating the duplication of work done by DIW and DPC. Once the overlapping of responsibilities are solved, resources could then be used more efficiently.

4.6 Conclusion

In this chapter, the use of the mechanisms has been analysed in the case of Thailand. By comparing this application of mechanisms in

Thailand and the mechanisms' potentials identified in chapter three, this chapter has attempted to understand why such a gap exists between mechanisms' potential in theory and their use in practice. It was concluded that there is a lack of understanding of mechanisms, such as the weakness of ISO 14001, and also lack of understanding of industry's situation, such as lack of concerns towards SMEs. These have lead to introduction of inappropriate mechanisms and this explains the reasons why there is this gap between theory and reality. This case study has emphasised the importance of understanding environmental management from industry's perspective to reduce this gap.

CHAPTER FIVE CONCLUSION

By understanding how organisational changes take place, this report has analysed the environmental management mechanisms from industry's perspective. The examination of the mechanisms from this angle has revealed that the logic behind each mechanism is different and the mechanisms play different roles. In particular Lewin's three-stage process identified the need to understand at which stage the mechanisms can be used effectively. For instance, formal regulation, economic instruments and informal regulation provide the need to change, hence they can play their roles in the unfreezing stage. On the other hand, voluntary regulation and economic instruments provide incentive for continuous improvement, which can be used in the moving stage. Thailand's case has illustrated this importance of choosing mechanisms which suit industry's stage in the process of change. For example, ISO 14001 is promoted by the government to cover its weak institutional capacity, however it does not necessarily provide the need for change. Also economic instruments could be implemented in the unfreezing stage at which the majority of industries are.

Different industries are in different situations. It was argued that it is necessary to understand their own needs in environmental management. In this report, it was identified that a move towards Lean production has resulted in transferring environmental impacts to subcontractors which are often SMEs. Thailand's large number of SMEs has illustrated the importance of incorporating their needs into the policy-making process. Analysing SMEs using Lewin's force field analysis has led to the conclusion that their lack of human, financial and time resources has resulted in a restraining force stronger than the driving force for change. SMEs' weak driving force is explained by their flexibility in the face of change and organisational size. Hence what SMEs need most in environmental management is awareness raising to unfreeze their status quo, which is different to what MNCs need most. In the case of Thailand, this awareness raising can not be effectively achieved by formal regulation, not only because of its lack of institutional capacity, but also because of its cost

implication. A more SME-orientated approach, such as IPCA, should be encouraged. It is beneficial for SMEs because it provides the support and information at SMEs' level and they, in turn, reduce their perceptual, emotional and cognitive blocks. It is an unfreezing element which also promotes co-ordination among different actors.

From the arguments above, it is important to form appropriate policies which take industry's different needs and the country's context into account. By forming context-specific policies, industrial pollution should not be accepted as the price of industrialisation. With any instruments, it is important to ensure that there is effective communication between different actors and participation of those actors is crucial to form policies which reflect their needs. Distribution of information and participation are important not only to improve the relationships between the actors, but also to reduce the obstacles discussed above. These two factors play key roles in the implementation of informal regulation.

It was also identified that it is important to consider DCs' environmental problems at an international level. As illustrated in the case of Thailand, international trade affects the types of industries that exist in DCs, and transfer of polluting technology can make it difficult for industry in DCs to change to cleaner production. Not only for DCs, but also for ICs, there is a limit to what a nation can do to tackle environmental problems which are increasingly becoming international. For instance, issues of ISO standards can only be treated at international level. International agreements also play an important role, since they give external pressures for a country to take environmental issues seriously. On the other hand, awareness-raising among citizens can be achieved effectively at local level.

This analysis can be potentially applied for any other industries in different contexts. For example, this could be applied to old industries in Thailand, such as textile and leather industries, to find their needs in environmental management. By identifying different needs, the gap between policy-makers' and industry's understandings should be reduced and this should, in turn, reduce the gap between mechanisms' potential in theory and their use in practice.

APPENDIX 1

Historical background of Thailand's institutional and policy framework for pollution control

The framework for managing the urban environment in Thailand has been in place since the early 1970s. At that time, as concerns grew about the adverse effects of industrialisation, the Ministry of Industry (MOI) broadened its mandate under the Factory Act (1969) to include industrial pollution control. The Third National Economic and Social Development Plan recognised environmental concern in the planning arena in 1972. The emphasis of environmental protection was extended beyond industrial pollution control in 1975 with the enactment of the Improvement and Conservation of National Environmental Quality Act (NEQA). Under this act, the National Environmental Board (NEB) was established as the main policy planning and co-ordination agency with the Office of the National Environmental Board (ONEB) as its secretariat.

Ambient quality standards as well as guidelines for the use of Environmental Impact Assessments (EIAs) were also established in this act. ONEB was responsible for co-ordinating the process of policy planning and formulation with inputs from the National Economic and Social Development Board (NESDB) and the Ministry of Science, Technology and Energy. Implementation of pollution control policies for the industrial sector, including the establishment of emissions standards, monitoring of sources, and enforcement of regulations were the responsibility of the Department of Industrial

Works (DIW) in the MOI. These activities were conducted under the provisions of the Factory Act.

Despite a revision of NEQA in 1978, there was a growing perception in the 1980s that its provisions were inadequate to address Thailand's increasingly complex environmental problems. In response, a revised environmental law was enacted in 1992. Under this revised NEQA, the NEB has been upgraded to the ministerial level, and was chaired by the Prime Minister. The environmental functions previously handled by ONEM have now been delegated to three departments of the Ministry of Science, Technology and Environment (MOSTE). The revised Act also departs from previous practice in Thailand in three other ways. First, greater authority in environmental protection is delegated to local government officials including provincial governors and mayors. This change is significant in responding to one of the criticisms of the earlier law that too much authority for environmental protection was given to central government agencies such as the DIW. Second, the revised law gives non-governmental organisations (NGOs) a greater role in environmental protection by explicitly recognising the need for greater public participation. Finally, the role of MOSTE in implementing measures to control pollution from energy, transport and industrial sources is expanded by the revised law. Within this Ministry, the Department of Pollution Control (DPC) is allowed to establish effluent and emissions standards that are more stringent than those of the DIW, and can also undertake source monitoring and enforcement actions. This transition in legislation is summarised below.

Legislation history for environmental protection in Thailand.

Year	Legislation	Description
1969	Factory Act (amended 1975; 1992)	Basic guidelines for industrial pollution control under Ministry of Industry; monitoring of factory pollution by third parties; control smoke intensity at the mouth of the stack; under Ministry of Industry.
1971	Industrial Emission Standards (under Factory Act) Motor Vehicle Emissions Standards	Control of black smoke and carbon monoxide (under the National Environment Board, the Police Department, and the Department of Land Transport)
1975	National Environmental Quality Act (revised 1978; 1992)	Created ONEB; endorsement of the EIA in 1978.
1978	Industrial Wastewater Pollution Control	Modifications under Factory Act of 1978; establish effluent standards for industries; submission of poisonous matter analysis reports.
1981	National Ambient Air Quality Standards	Established by ONEB: regulates concentrations of carbon monoxide, sulphur dioxide, suspended solids, lead and ozone (based on EPA, USA; modified guidelines to account for local conditions)
1985	Boat/ Ship/ Vessel Emission Standards	To control black smoke emission (under Harbour Department)
1992	Hazardous Substance Act (amendment of the 1967 Act) The 1992 Act	Empowers government to control (via licenses) the import, export, manufacture, sale, storage, transport, and use of toxic or poisonous substances. Establishment of environmental fund; Polluter-Pays-Principle; decentralisation of enforcement authority; pollution control areas; public's right to know.

(Sources: World Bank, 1994, *Thailand: Mitigating Pollution and Congestion Impacts in a High-Growth Economy: Country Economic Report*, World Bank Country Operations Division, Country Department I, East Asia & Pacific Region.; Asian Institute of Technology (AIT), 1997, *Regulatory measures and technological changes in the cement, iron & steel, and pulp & paper industries*, AIT, Bangkok, pp.1-41; Kritiporn, P., Panayptpu, T. and Charnprateep, K., 1990, "The Greening of Thai Industry: Producing more and Polluting less, Session: Industrialising Thailand and the Impact of its Environment", Research report.)

APPENDIX 2

Toxic leak incident

On the 5th July 2000, a toxic-fume leak made 248 students ill. However, the factory was only facing a maximum fine of Bt 1,000 (equivalent of \$25) and one month imprisonment, if found guilty of negligence. The parents could have filed civil action law suits against the company asking for compensation concerning their children's sickness. However, only a few parents were interested in suing the company. (Paengnoy, 2000) *The Nation* (2000) reported the situation as;

"It is obvious that today's city dwellers are not easily shocked. Incidents of chemical leaks have become increasingly frequent. Children have to be evacuated from their schools and residents removed from their homes and rushed to hospitals whenever a nearby factory spews out noxious fumes that far exceed the legal limits....These occurrences have virtually become commonplace because most people expect this sort of things to happen again and again - with or without intervention from government regulators." (The Nations, 2000, A2)

It is a telling indicator of the efficiency and competency of the authorities responsible. Following the last accident, the Pollution Control Department decided to get tough on polluters. A joint committee made up

of representatives from 10 government agencies will be formed to draw up a comprehensive set of safety measures, which in their present form are either ineffective or non-existent. The department also promised to spend Bt 190 million (equivalent of \$ 4.5 million) to buy safety gear for use in case of emergencies. (The Nations, 2000)

Having promised to crack down on polluters, the departmental chief complained that the biggest problem with implementing precautions and safety measures has been lack of co-ordination among agencies concerned. The government bureaucracy has been plagued with lethargic inefficiency, ingrained corruption and lack of accountability to the public. As a result, many industrial polluters have been allowed to flout pollution control regulations with impunity. Government regulators are sometimes bribed to turn a blind eye to unscrupulous entrepreneurs who fail to have proper equipment installed to prevent chemical poisoning affecting their own workforce and the general public.

(Sources: *The Nation*, 2000, "Time to crack down on toxic polluters", *The Nation*, Friday 14 July 2000, Vol. 25, No.49025, Bangkok and Paengnoy, A., 2000, "Minor penalty awaits toxic-leak plant", *The Nation*, Wednesday 12 July 2000, Vol. 25, No.49023, Bangkok.)

APPENDIX 3

Industrial Pollution Control Application (IPCA) for Small- and Medium-Scale Enterprises (SMEs) in Thailand

IPCA is a three-year pilot training project (January 1991 - December 1993) implemented in conjunction with the Asian Institute of Technology (AIT), Chulalongkorn University (CU), the Industry Works Department (IWD) of the Ministry of Industry, and more lately, Chiang Mai University (CMU). The target area was initially the Bangkok Metropolitan Region (BMR), but as of September 1993 the northern city of Chiang Mai was added.

IPCA is a training programme which takes a non-formal (as opposed to formal) training methodology called *the Project Casework Approach* (PCW) developed by Mr Tharun at the end of the 1970s. It is a training methodology that is increasingly gaining recognition in CDG-SEAPO*'s sphere of activity. The PCW approach is described as 'learning by doing' by Mr Tharun. Its approach can be explained in three ways; action, social and participation orientated, as summarised below.

PCW is action oriented, based on role-playing simulation games and case-studies. PCW is social or group oriented. Training takes place in small informal groups, where the individuals participate in collective problem solving.

PCW is also participation oriented. Participants are encouraged to develop their initiative and capacity for problem-solving. There are no predetermined ideals to be memorised and implemented.

The programme is designed as an interdisciplinary 'academic-government-industry' package that would bring modern environment-friendly technology and management strategies to the attention of Thai industry. The idea was to involve academics, government officers, and industrialists in a 'joint-venture' to solve some of Bangkok's most pressing environmental problems. Tharun saw that the academic component would function as the 'motor', and the government body, in this IWD as the 'vehicle'

in order to bring a 'new environmental message' to the SMEs.

There are three qualities of IPCA. Firstly, it has identified an important polluter, i.e. SMEs, that has yet received little or no attention and has come up with strategies to solve some of their problems. Secondly, it has attempted to bridge the academic-government-industry divide through an integrated 'joint venture' that involved institutions (AIT, CU and CMU), government (IWD) and participating industry. Finally, it has contributed to the development of the environmental debate in Thailand by stimulating interest in the environment among otherwise indifferent academics.

There are other projects for pollution control, such as the Industrial Environment Management Programme (IEM), a Thai-US project, and Environmental Advisory Assistance to the Agro-Industry in Thailand, a Thai-German project. Although there are some similarities, IPCA is distinct in the sense that;

IPCA is concerned with SMEs

IPCA as a training package is a 'software' approach

IPCA is aimed at strengthening the self-help capacity of its target groups.

As it was concluded, a basic structure in dealing with certain aspects of pollution problems in Thailand has now been laid down by CDG-SEAPO. IPCA has been tested, modified, and in the face of the limitations - financial, institutional, as well as in terms of time - has had relative success. It is therefore concluded on the basis of Thailand's developmental needs and CDG-SEAPO's invested experience to further develop IPCA.

* Carl Duisberg Gesellschaft - Southeast Asian Programme Office (CDG-SEAPO)

(Source: Hampel, R., Oberndorfer, D. and Srichai, W., 1994, *Industrial Pollution Control Applications for Small- and Medium-Scale Industries in Thailand (IPCA); An End-Term Evaluation of a CDG-SEAPO Project*, Arnold Bergstraesser Institute, pp.1-47.)

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ENDNOTES

¹ 'The Limits to Growth' was based on the Systems Dynamics model of a homogeneous world. The report has predicted that population and industrial growth will stop within the next century, at the latest, if current trends continued. (Source: Meadows, 1972)

² TQM is an organisation-wide strategy that focuses on achieving or exceeding customer expectation. (Source: Rollinson *et al*, 1998)

³ JIT is a technique for minimising stock levels, which involves very close control of inventories so that raw materials and work in progress move direct from one stage to another without being held in a buffer stock. (Source: Rollinson *et al*, 1998)

⁴ It is a concern towards DCs attracting polluting industries to be relocated from the ICs in order to avoid strict regulations.

⁵ 'Polluter pays' principle emphasises that nobody has the right to pollute and those who are responsible for pollution should pay the price. This includes both the consumers and the producers.

⁶ These figures are derived from the department of Industrial Works' database. Factories registered under the Industrial Estate Authority of Thailand and Provincial Industry Offices are not included

⁷ Wide-spread domestic protest against former army commander Suchinda Kraprayood to resign from the prime minister position, as he was appointed undemocratically. (Source: APPC, 2000)

⁸ To control hazardous wastes from industrial sources, the Thailand Development Research Institute has proposed the creation of an autonomous Industrial Environment Fund. In line with the polluter-pays-principle, the fund would be financed from waste charges that would first be estimated for each industry and later verified by environmental auditing. (Source: Amsberg, 1995)

⁹ Statistics for April 2000 is based on the number of ISO 14001 implementing companies.

¹¹ The statistic for the number of complaints is from 1992.

¹⁰ ISO 9000 is a quality management system designed by the ISO.