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Cleaner production among multinational corporations in Southeast Asia

Nguyen Phan Duy Nguyen

Rochester Institute of Technology
College of Applied Science and Technology
Department of Civil Engineering, Environmental Management and Safety

Cleaner Production among Multinational Corporations in Southeast Asia

by

Nguyen Phan Duy Nguyen

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Approved by

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(Date and Signature)

Juliana Potter, QEP
Associate Professor and Thesis Advisor

(Date and Signature)

Maureen Valentine, P.E.
Department Chair

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Abstract

Cleaner Production (CP) represents the change from a conventional end-of-pipe treatment attitude to a proactive approach to pollution prevention and increased production efficiency. CP has been successfully implemented in developing countries, including the countries of the Association of Southeast Asia Nations (ASEAN). ASEAN is becoming an economic development center in Asia, attracting a large amount of foreign direct investments from multinational corporations during the last two decades. However, success in economic development has been accompanied by environmental problems.

Understanding the level of CP practices among ASEAN's multinational corporations (MNCs) and National Cleaner Production Centers/Cleaner Production (NCPCs/CP) organizations is important to their development and for the environmental protection strategy of the region. This graduate thesis is developed with the aim of determining (1) MNCs' effectiveness in adopting and implementing CP practices within the ASEAN region, (2) the interaction of regional CP centers with MNCs, and (3) knowledge gained through MNCs' CP practices and information dissemination among local industries.

Four surveys were developed to collect information from:

MNCs operating within the ASEAN region;

NCPCs/CP organizations;

United Nations Environmental Program (UNEP)/United Nations Industrial Development Organization (UNIDO); and

Stakeholders (in the U.S. and Southeast Asia).

Findings of the thesis include:

1. With its worldwide influence on CP practices, UNEP and UNIDO obtain success in promoting CP practices in ASEAN and other developing countries through the NCPC and

CP programs. Nevertheless, limited funding and obstacles associated with the host countries' political, economic, and cultural characteristics present major challenges of the initiative.

2. The NCPCs/CP organizations' priorities are more focused on local industries than MNCs. They face funding obstacles, are obligated to improve and expand their activities to gain more credibility among industries, strive for legislative support from the governments in order to ensure an effective operation, and seek to be financially independent as consulting firms without external funding.
3. The interaction between MNCs and NCPCs/CP organizations in the region is limited even though NCPCs/CP organizations play a key role in promoting and developing CP in their countries as well as the region.
4. The lack of communication among MNCs and their stakeholders results in skeptical attitudes about whether MNCs carry out effective CP practices. However, some of the MNCs are implementing CP practices as part of their corporations' environmental policy.
5. Governments play a key role in successful CP adoption and implementation in the region. Incentives based on governments' development strategy and market needs could drive public awareness and the institutionalization of CP not only in MNCs but also in local industries and other sectors of the society.

The thesis results address the initial goals of understanding MNCs' effectiveness in adopting and implementing CP practices within the ASEAN region and MNC interactions with regional CP centers. However, the responses were not sufficient to provide knowledge about MNCs' CP practices and information dissemination with local industries.

Chapter 1: Introduction

Economic development among the Southeast Asian nations of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam has dramatically increased in the last 15 years. With its ideal geographic location as a transition from the East to West and North to South, and a large population of 500 million (ASEAN Secretariat, p. 63), the region plays a major role in the Asian economy in terms of raw material and labor supply, transportation, manufacturing, and technology transfer. A diverse economic spectrum, from a very fast and well-developed Singapore to a slow and underdeveloped Laos and Cambodia, opens a prospective potentiality for foreign investment, especially in the industrial sector. Industry contributed 25% of the ASEAN gross domestic product (GDP) in 1970 while it considerably increased to 40% in 1993 (ASEAN Secretariat, p. 110). In addition, employment in manufacturing sub-sectors occupied more than 70% of the total employment within ASEAN industry (ASEAN Secretariat, p.111). In spite of the fact that the contribution of small and medium enterprises performs a critical role in the region's economic structure, establishment of large-scale production is necessary. ASEAN industrial growth since the 1980s has significantly depended upon capital investment from foreign resources, resulting in the renovation of a new market and new technology access as well as a strengthening of domestic economic constitution.

Investment from multinational corporations (MNCs) is an important part of economic and industrial development in the region. Foreign direct investment in 1993 was $15.8 billion in comparison with $3.5 billion in 1981 (ASEAN Secretariat, p.116). This illustrates the significant contribution of MNCs to the region's capital market through a network of subsidiaries of local and joint-venture industries.

Industrial development is typically accompanied by adverse environmental impacts on land, water, air, and community health. These impacts used to be considered an unavoidable consequence. End-of-pipe treatment was viewed as the only approach to environmental pollution abatement. The current trend of globalization and more rigorous competitiveness in markets encourages not only the production of environmentally-friendly products, but also safe, healthy and clean operations. The shift from end-of-pipe treatment to proactive prevention on the process floor, as well as establishment of environmental management systems (EMS), is a business response to stakeholder demands.

Cleaner Production (CP) introduced by the United Nations Environmental Program (UNEP) in 1989, is recognized as an effective and powerful instrument for systematically reducing environmental pollution among industries. Applying CP in ASEAN member countries will necessitate varying levels of implementation, so this research will focus on the understanding of CP practices among MNC subsidiary facilities within ASEAN member countries.

Understanding the level of CP practices among ASEAN's MNCs and National Cleaner Production Centers/Cleaner Production (NCPCs/CP) organizations is important to their own development and to the environmental protection strategy of the region as well. This graduate thesis is developed with the aim of determining (1) MNCs' effectiveness in adopting and implementing CP practices within the ASEAN region, (2) the interaction of regional CP centers with MNCs, and (3) knowledge gained through MNCs' CP practices and information dissemination among local industries.

Terminology

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations – an association of the ten countries within Southeast Asia, including Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam
CP	Cleaner Production – the concept of moving from conventional end-of-pipe treatment to pollutant minimization at the line process, with cost reduction and new opportunity identification (UNEP)
EMS	Environmental Management System – a framework that helps a company achieve its environmental goals through consistent control of its operations (U.S. EPA)
EPA	Environmental Protection Agency
NCPC	National Cleaner Production Center – an organization established under a UNEP/UNIDO program in order to promote CP in a country
P2	Pollution Prevention – or "source reduction" defined under the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants (U.S. EPA)
UNEP	United Nations Environmental Program
UNIDO	United Nations Industrial Development Organization

Chapter 2: Literature Review

In order to provide a general picture of the CP concept and its methodological practices, this review discusses four categories of existing literature:

- CP history, approaches and techniques;
- Development, functions and impacts on CP performance of National Cleaner Productions Centers;
- ASEAN and CP policy; and
- MNCs and CP policy.

The literature review will also present a background understanding of ASEAN and its environmental management strategy for CP, as well as MNCs and their CP performance at home facilities and those within the ASEAN region.

2.1 Cleaner Production

Developing CP in 1989, UNEP initiated a new concept of moving from conventional end-of-pipe treatment to pollutant minimization at the line process with cost reduction and new opportunity identification (UNEP, p.1). In UNEP's *Information on Cleaner Production Activities*, the objectives of CP are defined as:

- to enhance international consensus on CP;
- to encourage participation in CP activities among societal bodies from governments' policies and strategies to industries' environmental performance of environmental management systems, environmentally sound technologies, products, and scientists through the establishment of National Cleaner Production Centers;

- to promote CP and eco-efficiency activities and to strengthen CP capabilities through training and education; and
- to support demonstration projects and provide technical assistance.

UNEP describes the CP concept in *What is Cleaner Production?* as:

> *"... the continuous application of an integrated preventive environmental strategy applied to processes, products, and services to increase overall efficiency and reduce risks to humans and the environment."*

In detail, UNEP explains CP as a proactive methodology applying production process review and integrating environmental concerns in order to reduce raw material and energy consumption. The consequences, hence, eliminate toxic raw materials, and abate the quantity and toxicity of all emissions and wastes. In addition, the methodology assesses the product life cycle from raw material to ultimate disposal in order to minimize negative impacts on the environment.

The report *How to Improve the Economic and Environmental Performance of Industry in Ho Chi Minh City*, prepared by UNIDO, claims that effective CP implementation requires attitude change, responsible environmental management and evaluating technology options. CP concepts drive reactive performance to proactive movement in terms of pollution abatement. Ultimately, CP produces benefits through a systematic approach illustrated in three main categories and eight sub-categories:

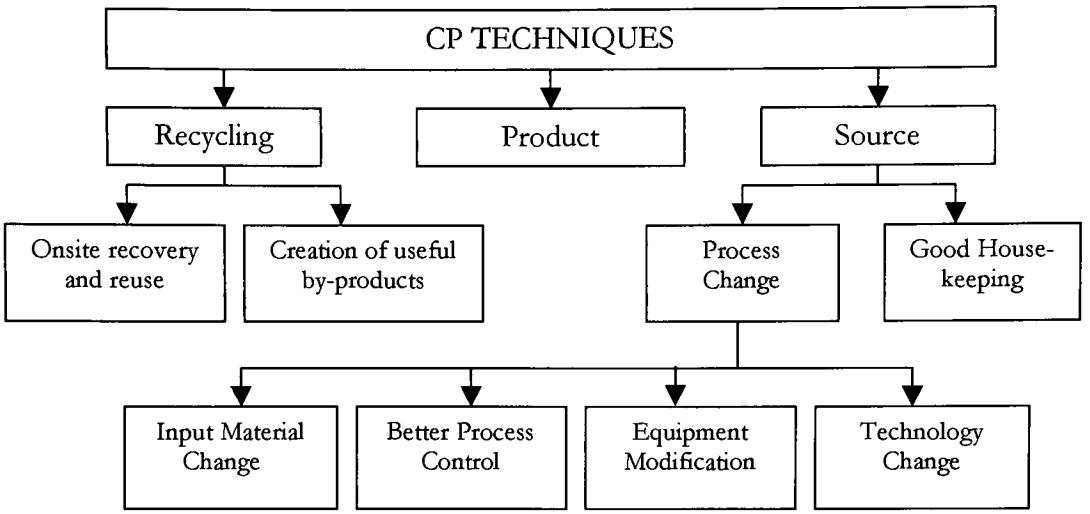

Figure 1: Cleaner Production Techniques

The Summary Report of the *Fifth International High-level Seminar on Cleaner Production*, held in the Republic of Korea in 1998 reflects the status quo of worldwide CP practices during ten years of initiating, developing and implementing CP methodology. According to Chaiyod Bunyagidj, Vice-President and Director, Thailand Environmental Institute, CP implementation within the Asian Pacific region gained certain initial success in terms of fostering activities among nations in the region. Establishment of the First Asia-Pacific Roundtable on CP, and an Asia-Pacific CP network on the Internet with participation of more than 150 subscribers from 30 countries, are supportive results for seeking government CP policies. However, there are still obstacles that affect implementation, such as lack of industry participation, legislative support, coordination among regulatory and industry bodies, and lack of financial, technical and educational support (UNEP, p.10).

Several research and case studies of CP implementation have been institutionally developed and thoroughly carried out within the region during the last decade. In an article released in September 1996, Chaiyod Bunyagidj and David Greason, reviewed the CP approach taken by Thailand's government and industry, and developed the integration of CP into an ISO 14001 EMS.

Initiatives to foster CP adoption met with both success and failure regarding the participation of industry.

> "*While the project was successful in terms of spreading application-specific CP technologies among other industries in the target sectors.... the broader scope of CP activities failed to become self-promoting within the targeted sectors* (Bunyagidj and Greason, p.45)."

Consequently, the government took actions to promote pollution reduction in lieu of traditional command and control approaches. Industries are willing to shift from a wait and see attitude to the more proactive and motivated incentives of environmental impact abatement via CP application (Bunyagidj and Greason, p.45).

From 1997 to 1999, UNIDO supported the project "Reduction of Industrial Pollution in Ho Chi Minh City". The project initiated and implemented CP technologies at six in-plant demonstrations of the pulp and paper, textile and dyeing, and food processing targeted sectors. The project's report categorizes types of CP barriers as attitudinal, organizational, trade, economical, and governmental. Specifically, attitudinal barriers occur due to lack of finances and obsolete technology as well as other factors such as lack of interest and commitment to CP by management, ignorance of environmental issues, barriers to creativity, resistance to change, and employment involvement. Interestingly, examples of successful CP practices are not persuasive enough to change management concepts.

> *"Experiences from international CP projects documenting environmental and economical benefits were often not enough to gain management support* (UNIDO, p.29)."

Organizational barriers are caused by the ineffectiveness and insufficiency of administrative, managerial, financial, technical and operational structure. The centralized decision- making process weakens motivational efforts, and the over-emphasis on production results in low priority for quality and CP practices. Lack of well-trained employees and performance of monitoring equipment negatively affects the project outputs. The government management system approaches regulatory enforcement, focusing on numerical standards, and drives industry to adopt end-of-pipe control practices. Lack of economical tools to prioritize CP implementation and regulatory guidance on CP practices are also identified as barriers (UNIDO, p.30-36).

2.2 National Cleaner Production Centers

The above analysis contributes part of the CP implementation picture within ASEAN members. Another corner of CP development in the region is related to the National Cleaner Production Centers (NCPCs). The NCPC program was initiated by the United Nations Industrial Development Organization (UNIDO) and UNEP with the aim of promoting and developing a concrete foundation for CP on a national level in developing countries through third-party funding. For example, the NCPC in Hungary was established from the funding of Austria while its counterpart in Vietnam was established from the funding of Switzerland.

> *"UNIDO and UNEP have joined forces to help introduce cleaner production (CP) in developing countries and countries in transition. The UNIDO-UNEP programme for National Cleaner Production Centres (NCPCs), hereafter referred to as the NCPC programme, is a unique programme of capacity development to help achieve adoption and further development of the cleaner production concept at the national level* (UNEP- UNIDO/UNEP National Cleaner Production Centres)."

There have been 19 centers established in the following countries, since late 1994: Brazil, China, Costa Rica, Czech Republic, Ethiopia, El Salvador, Guatemala, Hungary, India, Kenya, Mexico, Morocco, Mozambique, Nicaragua, Slovak Republic, Tanzania, Tunisia, Vietnam and Zimbabwe. These NCPCs are generally managed by UNIDO through its Country Offices, providing industrial expertise and sectoral demonstrations. UNEP is in charge of providing strategic environmental expertise in training, information, and policy analysis (UNEP- What is the NCPC Programme?). It is obvious that Vietnam is the only nation among ASEAN members which is involved in the NCPC program.

UNEP/UNIDO establishes a NCPC on a local support and commitment basis in which the host organization is voluntarily selected among institutions within the country, together with recommendation from the government, to ensure the accomplishment of the nation's environmental strategies. The NCPCs' objectives are achieved through:

- activities showing that cleaner production works through in-plant demonstrations;
- activities providing CP training for practitioners;
- activities gathering feedback information; and
- activities supporting policy research to determine institutionalized obstacles (UNEP-What is the NCPC Programme?).

In his 1996 research, *National Cleaner Production Centres: their establishment and growth*, Syrya Prakash Chandak, Director of National Cleaner Production Centres, India, affirms the major function of NCPCs in the development of CP practices as "a coordinating and catalytic role" to link developed and developing countries through CP technology and information transfer.

> "... *the overall objective of the programme is to facilitate the transfer of Cleaner Industrial Production (CIP) information and technology from developed and developing countries to industrial and enterprises*

and environmental management agencies in developing countries and economies in transition (Chandak, p.29)."

Technically, the operation of the NCPCs is based upon four principal activities including: demonstration projects, training, awareness creation, and policy assessment. With five demonstration projects annually implemented by each NCPC, an average of 80 projects are conducted by NCPCs every year. Training activities diversely include training associated with demonstration projects, awareness training, and intensive training to develop professionals. Other activities such as publications, assistance to neighboring countries, and providing input to other CP-related programs are also effectively implemented (Chandak, p.30).

Economically, Chandak analyzes the cost-effectiveness of the operation of the NCPCs by calculating the nominal cost spent for each participant in intensive/demonstration training and information dissemination awareness. The cost is $20 per participant. Therefore, subsidized funding is still very necessary to effectively maintain NCPC operations. The cost of training abroad should be reduced after a few initial programs due to minimization of training material preparation costs, enabling NCPCs to become financially self-sufficient. Importantly, participants in developing countries cannot even afford the initial cost of information dissemination. Thus, it is extremely essential to provide subsidization and funding for the activity.

In conclusion, achievement of CP sustainability requires both technical and financial efforts for "formulating and insisting on an explicit requirement of CP in all international funded/assisted industrial development and environmental related projects". Patterns of support need to be continued and enhanced by NCPC partners while recognition and promotion of NCPCs as focal bodies of environmental management systems depend upon each country's response (Chandak, p.32).

2.3 The Association of Southeast Asian Nations and Cleaner Production Policy

The Association of Southeast Asian Nations or ASEAN was established on August 8, 1967 in Bangkok by five original members, including Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Brunei Darussalam joined in 1984. Vietnam became the seventh member in 1995. Laos and Myanmar were admitted in 1997 and finally, Cambodia in 1999 (ASEAN). The ASEAN region has a population of about 500 million, a total area of 4.5 million square kilometers, a combined gross domestic product of 737 billion USD, and a total trade of 720 billion USD (ASEAN).

As declared in the Bangkok Declaration which united the ASEAN members, the association's goal is to emphasize "economic cooperation and the welfare of the people in the region (Sunchindah, p.1)". Stimulated by the UN Conference on Human Environment held at Stockholm in 1972, ASEAN correspondingly developed the regional and sub-regional environmental programs to deal with environmental problems in a cooperative framework. Inspired by this framework, the ASEAN Environmental Program (ASEP) was initiated in 1977 with support from UNEP to begin a new era of regional environmental cooperation. There have been three programs, ASEP I, II and III, developed and implemented since 1977 respectively for each targeted stage of the regional development. The programs provided policy guidelines for member countries in order to achieve a sound and harmonized environmental development.

> "... *develop a common awareness of the environment, enact and enforce environmental protection measures, ensure that environmental considerations are taken into account in development efforts, and foster the development of environmental education programs* (ASEAN Secretariat, p.1)."

Continuing the success of previous programs, a new *ASEAN Strategic Plan of Action on the Environment, 1994-1998* has been established and approved at the Fourth Meeting of the ASEAN Senior Officials on the Environment held in 1993 in Bangkok, Thailand. The ten strategies are:

1. *Support the development of a regional framework for integrating environment and development of concerns in the decision making process.*
2. *Promote government-private sector interactions that lead towards the development of policies that mutually support the thrust of each sector.*
3. *Strengthen the knowledge and information database on environmental matters.*
4. *Strengthen institutional and legal capacities to complement international agreements on environment.*
5. *Establish a regional framework on biological diversity conservation and sustainable utilization of its components.*
6. *Promote the protection and management of coastal zones and marine resources.*
7. *Promote environmentally sound management of toxic chemicals and hazardous wastes, and control of transboundary movement of hazardous wastes.*
8. *Develop a system for the promotion of environmentally sound technologies.*
9. *Promote regional activities that strengthen the role of major groups in sustainable development.*
10. *Strengthen the coordinative mechanism for the implementation and management of regional environmental program.*

The strategies are driven by requirements of new directives of:

- the ASEAN Free Trade Area in which ASEAN facilitates competitiveness through tariff rate reduction. "Increased trade would improve the allocation of resources and increase output, employment and incomes (ASEAN Secretariat, p.24)."
- the ASEAN Common Stand on the United Nations Conference on Environmental Development (UNCED) which calls for urgent measures to cope with international environmental concerns on a diverse basis of environmental, ecological, and biological aspects.

- the Agenda 21 Program areas relevant to ASEAN which creatively apply the global consensus on political commitment towards environmental cooperation into a regional unique context (ASEAN Secretariat, p.25).

Action plans to achieve these strategies are also developed in detail. With respect to CP implementation, there are a number of concerns that are critical to acknowledge. CP methodology represents a win-win situation of economic and environmental performance by reducing costs, thus, increasing productivity and benefits. Therefore, accounting studies and approaches need to be re-structured and functioned to sufficiently capture environmental-related costs, supporting environmentally sound decisions on CP.

> *" However, the gap between environmental data and macro-economic accounting systems remains almost unchanged. An important issue is how to extend existing systems of national economic accounts in order to integrate environmental and social dimensions in the accounting framework....* (ASEAN Secretariat, p. 27)."

Member countries need to overcome the difficulties regarding complexities of organizational structure, technical access, and infrastructure support to achieve integration of environmental concerns into various ASEAN programs and activities (ASEAN Secretariat, p. 28).

Focusing mostly on economic development, the ASEAN members have neglected the environmental aspect of trading. Better understanding of the relationship between trade and the environment will promote sustainable development within the region. In a micro context, this issue relates to CP practices by taking stakeholder opinions into account when doing business. Thus, conducting process and product reviews will potentially initiate effective CP programs.

".... Improved market access for ASEAN's export, in conjunction with sound macro-economic and environmental policies, should result in positive environmental impacts, and environment and trade policies should be mutually supportive (ASEAN Secretariat, p. 29)."

Finally, establishment of a supportive mechanism for the private sector to adopt appropriate standards is critical towards achievement of economic incentives. The responsibility is allocated among concerned social parties of institutions, regulators, managers, economic policy framers, and industry, as the implementor and principal source of technology know-how. The parties need to respect and support each other in order to create "a right climate" that not only encourages industry to with comply regulations but also "allows industry to seek the best practicable environmental alternative which technology can provide." This approach will be successfully applied into CP practices in terms of "reviewing existing policies and introducing incentives to industries and businesses that ensure sustainable process, such as the promotion of the use of cleaner technologies and waste minimization techniques (ASEAN Secretariat, p. 30)."

In a research paper on *Industrial Cities and the Environment in Pacific Asia: Toward a policy framework and agenda for action,* Michael Douglass and Ooi Goik Ling discuss non-collaborative actions among the government and private sector, and proposed a performance orientation. The role of the government is considered as a "corporatist" who "commands planning through regulations and/or subsidies influenced by social pressures for environmental improvement" while the private sector tendency is toward "inefficient use of environmental resources, large scale pollution and degradation (Douglass and Ling, p.114)." In order to improve the situation, a performance orientation is proposed to integrate "performance-focused" environmental protection for both the government and private sector. Moving away from standard-compliance insistence to a performance orientation

opens flexibility and "a multitude of ways to achieve improvements." The theory includes four key tasks:

1. Assessing conditions and prioritizing problems to be tackled;
2. Analyzing and understanding the sources of these problems;
3. Developing policies and identifying policy tools to link solutions to priority problems; and
4. Devising organizational means for taking action and proceeding to implementation (Douglass and Ling, p.125).

On a macro basis, the government actions can be accordingly described as:

1. Considering CP practice as an incentive for improving environmental performance among industry;
2. Identifying advantages and disadvantages of promoting CP performance;
3. Developing CP regulatory bodies and authorities as well as economic tools to foster CP practices; and
4. Formulating supportive enforcement processes through monitoring, evaluating and providing corrective measures on CP implementation.

On a micro basis, the theory's elements go along with CP methodology by:

1. Reviewing manufacturing processes to identify waste streams;
2. Conducting material and energy balance to accurately allocate materials and wastes to their original sources;
3. Proposing CP options to minimize and eliminate defined waste sources and conducting technical and financial feasibility analysis to select CP solutions; and
4. Implementing CP solutions and continual improvement (UNEP).

Moving from a macro-economic and environmental perspective of ASEAN strategies to a micro-economic and environmental perspective of local government and industry performance, can foster development of a sound policy toward CP practices among industries within the region.

2.4. Multinational Corporations and Cleaner Production Policy

As defined in Encylopaedia Britanica, mutinational corporations (MNCs), also called transnational corporations, are any corporations that are registered and operate in more than one country at a time. Generally, the corporations have their headquarters in one country and operate wholly or partially owned subsidiaries in one or more other countries. The subsidiaries are responsible to central headquarters.

Why do MNCs need to invest internationally? Aseem Prakash, Kerry Krutilla, and Panagiotis Karamanos explain in their *Multinational Corporations and International Environmental Policy* that MNCs can take "market power or costs advantages" offered by foreign countries to locate their "value-addition activities." In addition, investing at foreign countries will enhance MNCs' internalization advantages through "internalizing transactions" in lieu of "licensing or selling their technology to foreign firms."

MNCs and foreign direct investment significantly affect developing countries' economic development. Investment in developing countries by MNCs grew from 13 to 224 billion USD between 1981 and 1996 (Moser and Miller, p.41). However, along with economic benefits are environmental concerns regarding MNCs' subsidiary operations at host countries. On one hand, environmental regulations and enforcement in host countries are too weak to promote incentives to develop a concrete environmental infrastructure (Hadlock, p.155). On the other hand, MNCs

themselves have immense impacts on local community and the overall global environmental protection, as described:

> *"... The US company RCA has long been dumping hazardous wastes into deep wells located within its manufacturing plant. Groundwater and soil have been polluted as a result of this practice. The pollution has affected the health of the nearby population, which occasionally uses groundwater for drinking purpose...* (Tsai and Child, p.1*)*."

However, MNCs "provide a significant bridge in the environmental sphere between one country and another," therefore, "the transfer of well-developed environmental technology and expertise throughout their domains of operation can be important results (Hadlock, p.155)." In addition, fear of liability for environmental disasters and regulatory pressures from the home country also drive MNCs to establish and maintain more philosophical consistency across their organizations with respect to environmental performance. More importantly, non-government organizations (NGOs), realizing the variations in environmental legislation between developed and developing countries, called for a set of international regulations of MNCs while local communities criticize MNC operation and the government response (Moser and Miller, p.44).

There is not much research nor many studies specifically conducted in the area of MNCs and CP practices at ASEAN host countries. However, Pollution Prevention (P2) has been thoroughly studied and widely applied by U.S. MNCs. P2 can be considered as the U.S. counterpart of CP. It became a national environmental policy through the Pollution Prevention Act passed by the U.S. Congress in 1990. P2 is a preventive approach to reduce pollution at the source by implementation of efficient resource consumption (U.S. EPA- Pollution Prevention).

The main similarity between CP and P2 methodologies is the proactive movement from end-of-pipe treatment to waste reduction at line processes. Pollution prevention or "source

reduction" reduces pollutants through efficient use of raw materials, energy, water, or other resources. The practice aims to reduce hazardous substances or contaminants released into waste streams prior to recycling, treatment, or disposal. P2 includes technology modifications, process modifications, product redesign, change of raw materials, housekeeping maintenance, training, and inventory control. However, the P2 Act does not take recycling, energy recovery, treatment, and disposal into account (U.S. EPA- Pollution Prevention).

Pollution Prevention at the 3M Corporation: Case Study Insights Into Organizational Incentives, Resources, and Strategies conducted by Michele Ochsner, Caron Chess and Michael Greenberg describes the efforts of the 3M Corporation, which is famous for its voluntary Pollution Prevention Pays program initiated in 1974. 3M has developed a broader P2 scope than the EPA. The corporation not only prevented waste by source reduction techniques but also conducted waste recycling and recovering for sale, which is not included in EPA's P2 definition. Operationally, stemming from recognition of increased amounts of product failing to meet product specification, the corporation identified a tracking system to monitor the volume and costs of waste products, then charged each product line the cost of handling and disposing its waste streams. Hence, accurate allocation of environmental costs was achieved. In addition, reduction of waste costs means increase of process engineer salary. Technically, the corporation invested approximately 15% of the one billion R&D budget to improve the environmental impact of its products and processes by modifying core technologies and introducing new products. Organizationally, information exchange among sites and technical staff is important to expand the success and foster the program's implementation.

In summary, MNCs' role of economic development and environmental protection is critical to developing countries, especially to ASEAN members. Yet, CP performance among MNCs located in ASEAN region is not well studied. This research, therefore, hopes to develop and

evaluate an overall picture of CP practices among MNCs within ASEAN region on a basis of identifying the interaction among between MNC subsidiaries, NCPCs/CP organizations and other stakeholders.

Chapter 3: Methodology

This chapter provides a general concept of how the data supporting the thesis were collected. Information sources, collection method, and data analysis are the main issues discussed in the chapter.

3.1 Information Sources

Data and information used for this work are based upon critical analysis of online research articles on MNCs' environmental trends and performance in developing and ASEAN countries. Qualitative data have been obtained for analysis mainly based upon information from UNEP/UNIDO, ASEAN's NCPCs/CP organizations, MNC subsidiaries and other relevant regional and local organizations as well as current and existing data from the articles.

3.2 Data Collection

Information to support thesis conclusions on the CP practices among MNCs in Southeast Asia was obtained through four surveys specifically developed for

MNCs operating within the ASEAN region (Survey A);

NCPCs/CP Organizations (Survey B);

UNEP/UNIDO (Survey C); and

- Stakeholders (in the U.S. and Southeast Asia) (Survey D).

The surveys were constructed in website format. Introductory email and faxes were sent to the subjects to ask for their participation and direct them to the websites. Details of each survey are provided in Appendix A.

A total of 92 surveys were sent to the four groups of subjects. The distribution of surveys is summarized in Table 1.

Table 1: Summary of survey distribution

Country/Organizations	**Survey A (MNCs)**	**Survey B (NCPC/CP)**	**Survey C (UNEP/UNIDO)**	**Survey D (Stakeholders)**
Indonesia	6	1		3
Malaysia	3	1		2
Philippines	2	1		14
Singapore	2	1		1
Thailand	7	1		16
Vietnam	2	1		0
India		1		1
Other Asian countries				3
U.S.				1
UNIDO/UNEP			2	0
Others			0	20
Total	22	7	2	61

Survey A - Survey on Cleaner Production Practices at Multinational Corporations

This survey was sent to 22 facilities of 22 MNCs identified from pharmaceutical and chemical industries and participants of the Third Asia-Pacific Roundtable for Cleaner Production. The preference for pharmaceutical and chemical industries is based on a personal interest in these types of industries and to narrow down the margin of the research. On the other hand, the preference for participants within the Third Asia-Pacific Roundtable for Cleaner Production focuses on businesses which have expressed their concern for CP, and the availability of contact information. Survey A consists of seven sections and 27 questions, including:

1. *Awareness* (5 questions): This section focuses on the understanding of how CP concept is perceived within the company.

2. *Implementation* (11 questions): This section seeks information of the current performance of CP practices in terms of drivers, and technical aspects as well as success and challenges.

3. *Performance Measurement* (3 questions): This section is developed to understand how CP practices are measured regarding waste reduction and financial benefits.

4. *Continual Practices* (2 questions): This section focuses on how continual implementation of CP practices is performed.

5. *MNCs' Cleaner Production Practices and National Cleaner Production Centers/ Cleaner Production Organizations* (2 questions): This section helps identify the support from the CP Organizations towards the company as well as the company's point of view towards the operations of these organizations.

6. *MNCs' Cleaner Production Practices and Local Industries* (2 questions): The involvement of local industries in the company's CP practices and information dissemination is the main theme of this section.

7. *Expectations*: This section looks for any further opinions that are not discussed within the survey.

A copy of this survey is available in Appendix A.1.

Survey B - Survey on Cleaner Production Practices at National Cleaner Production Centers/Cleaner Production Organizations

A total of seven surveys were sent to six NCPCs/CP Organizations of six ASEAN countries and one CP center in India. Inclusion of India's CP center into the survey is due to the recognized success and comprehensive implementation of the center within the NCPCs established under the

UNEP/UNIDO project, as well as the consideration of geographic and cultural characteristics between India and ASEAN countries. This helps provide a further perspective towards the covered issue. Survey B includes seven sections and 22 questions.

1. *Policy* (3 questions): This section seeks to understand the policy of the NCPCs/CP orgranizations, focusing on the industrial segment, and driving forces of the center/organizations.
2. *Implementation* (4 questions): This section looks for the institutionalization of the center/organization, and tools/approaches that are used to perform its CP projects.
3. *Performance Measurements* (3 questions): Successful and challenging factors as well as the average number of CP projects implemented annually are the information gathered within this section.
4. *NCPCs/CP Organizations and Local Industries* (3 questions): The influence and interaction of the center/organization towards local industries is covered under this section.
5. *NCPCs/CP Organizations and Multinational Corporations* (5 questions): This section focuses on the cooperation of the center/organization and multinational corporations' facilities and the point of view towards CP practices at these facilities.
6. *NCPCs/CP Organizations and the Government* (2 questions): This section helps understand the role of local government and international organizations in supporting and promoting CP practices
7. *Expectations* (2 questions): This section looks for any further opinions that are not discussed within the survey.

A copy of this survey is available in Appendix A.2.

Survey C - Survey on UNEP/UNIDO and Cleaner Production Practices

Survey C was distributed to UNEP's Regional Office for Asia/Pacific and UNIDO's Headquarters in order to gather information regarding the effectiveness of CP implementation within ASEAN countries. UNEP and UNIDO are the host organizations of the NCPC/CP programs worldwide, therefore, their opinions are significantly important to the results and conclusions of the thesis.

The survey contains eight questions focusing on the evaluation of the NCPC/CP programs, challenges facing UNEP/UNIDO and the role of local government in promoting the project, and the point of view towards the expansion of the Vietnam NCPC to the rest of the region. A copy of this survey is available in Appendix A.3.

Survey D - Survey for Stakeholders on Cleaner Production Practices

Survey D was disseminated to stakeholders within the U.S. and Asia in order to gather their opinion and viewpoints on the implementation of CP. Participants of the Third Asia-Pacific Roundtable for Cleaner Production were the major contacts for this survey. The stakeholders vary in a wide spectrum consisting of university professors, government authorities, representatives of academic and research institutions, other U.S. and regional organizations such as the U.S. EPA, the United States-Asia Environmental Partnership, and Asian Development Bank (ADB). Stakeholders play a critical role in social and economic activities, therefore, obtaining their opinions on CP issues provides a broader involvement, avoids bias, and ensures the objectivity of the survey results and thesis conclusions.

There are four questions within this survey which focus on the stakeholders' point of views towards CP and P2, and the application and encouragement of CP in Southeast Asia.

3.3 Data Analysis

Data collected through the four surveys was gathered and classified in groups of specific topics. These topics are relevant to the sections within individual surveys which are listed in the above paragraphs. Tables are used to aid the analyses of the four surveys. The data are analyzed by comparisons of the responses in order to identify the consistency and diversity of participants. The analysis provides answers to each topic as well as the overall picture of CP practices among MNCs within Southeast Asia.

Chapter 4: Results

This chapter contains the original results of the four surveys. The information is provided anonymously.

4.1 Survey Responses

4.1.1 Responses to the Cleaner Production Practices at Multinational Corporations Survey

There is only one response out of 22 for this survey, despite efforts to obtain MNCs' participation in the survey. The response is assigned as M1 and Table 2 summarizes the results of Survey A.

The completed Survey A response is provided in Appendix B.1.

4.1.2 Responses to the Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations Survey

This survey received three responses out of seven. The three responses are assigned as N1, N2 and N3. Table 3 illustrates the results of the Survey B.

The completed Survey B response is provided in Appendix B.2.

4.1.3 Responses to the UNEP/UNIDO and Cleaner Production Practices Survey

There are two responses out of two for this survey. This is the most successful result in terms of the percentage of surveys sent and returned responses. U1 and U2 are assigned to the responses. Table 4 exhibits the results of the Survey C.

The completed Survey C response is provided in Appendix B.3.

4.1.4 Responses to the Survey for Stakeholders on Cleaner Production Practices

There are twelve responses for this survey out of a total of 61 sent. The information from the participants is very fruitful and diversified. In order to systematically analyze and understand stakeholders' opinions towards CP practices, all responses are classified in the following three groups:

* *Group 1-Businesses:* The two responses in this group are companies that do not have facilities within Southeast Asia region. They are assigned as SB1 and SB2.

* *Group 2- Institutions:* The six responses in this group include academic, financial and social institutions. They are assigned as SI1 to SI6.

* *Group 3- Government Agencies:* The four responses in this group are assigned as SA1 through SA4. They include government agencies of the U.S. and ASEAN member countries.

Table 5 summarizes the results from Survey D and the completed Survey D response is provided in Appendix B.4. The table exhibits the aggregate comments of responders according to the group in which they fall. However, some responders may disagree with others within a group.

Table 2: Results from Survey A - Cleaner Production Practices at Multinational Corporations

Survey A	M1
Awareness	M1 describes the company's CP practices as comprehensive. CP understanding is initiated at the top management level and CP is integrated into the business as stated in its environmental policy. M1 strongly agrees that the CP is vital to company and it must be effectively implemented in the company's facilities. P2 is not applied within the company.
Implementation	CP is implemented in order to reduce the generation of environmental pollution, reduce raw material and energy consumption, and improve productivity. The company applies a systematic approach to CP methodology on a voluntary basis and performs recycling, source reduction, and process modification in terms of CP techniques. In detail, recycling focuses on onsite recovery and use, and source reduction focuses on input material change, better control process, equipment modification, and technology change. The company pursues long-term CP projects which require high investments, a long payback period and technology availability but it also faces obstacles of financial problems and the lack of human resources to perform CP practices. However, the company experiences support from management, participation of employees, and information and experience sharing as the success factors during CP implementation. The main challenges from CP practices fall into extra workload, productivity decrease, and the increase of labor and equipment costs. Unfortunately, the company does not find any motivation from the government to achieve CP implementation.
Performance Measurements	In order to evaluate CP practices, the company uses the rate of raw material consumption over production and the rate of energy consumption over production. The total financial benefits obtained through CP projects return on investment are approximately 10-20% while the total pollution reduced through CP projects is less than 10%.
Continual Practices	Generally, CP financial benefits are absorbed into the company's accounting budget and CP practices are implemented sequentially, i.e. a new project gets started after a successful one is completed.
MNCs/ CP Practices and NCPCs/CP Organizations	The company does not receive any support from the host country's NCPC/CP organizations regarding CP practices, however its opinion is that the country's CP organizations are effective and successful.
MNCs' CP Practices and Local Industries	The company involves its suppliers with CP practices as part of written contracts and disseminates CP success among local industries through information provision.
Expectations	The company expects information and technical support as well as financial support from the local government and industries, and CP centers.

Table 3: Results from Survey B - Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations

Survey B	N1	N2	N3
Policy	The three responses highlight the **priorities** of their centers as (1) introducing CP to concerned parties, (2) technical supporting for demonstration projects, and (3) CP information distribution. The three responses show local small and medium industries as well as local large industries as **targets**. The main **driving force** for promoting CP performance in the countries of the three responses is public concerns.		
	MNCs' facilities are among targeted industries and mandatory regulations are also among the main driving forces for promoting CP performance.	N2 takes legislative lobbying into its priority and describes more about its priority as capacity building at various levels to sustain the CP program in the country and region.	Identical to N1.
	N1 also focuses on financial support for demonstration projects as its priorities.	Identical to N1	
		Market pressure, self-benefit, better social and environmental performance of clients, and occupational health and safety are among the main driving forces for promoting CP performance.	Market pressure is also a main driving force for promoting CP performance.
Implementation	According to the three responses, the most useful **CP tools/approaches** in the country are successful demonstrations. Typically, the three centers/organizations approach the targeted industries to initiate CP projects. The three responders perform CP practices at industries in the **role** of (1) consultation, (2) technical support, and (3) human resource support.		
	N1 considers encouragement and voluntary measures as useful CP tools/approaches. Another option to initiate CP projects is that industries approach N1 for information.	Same as N1. Additionally, N2 uses a cluster approach wherein employers' organizations are made responsible for CP dissemination as a useful CP tool/approach. N2 approaches targeted sectors at the beginning then a mix approach occurs. N2 also provides in-company CP training programs for all levels of employees as part of CP projects at industries.	

Table 3: Results from Survey B - Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations (Continued)

Survey B	N1	N2	N3
Implementation	N1 belongs to a consulting firm.	N2 belongs to UNEP/UNIDO.	N3 belongs to government institutions.
		N2 approaches on targeted sectors at the beginning then a mix approach occurs. N2 also provides in-company CP training programs for all levels of employees as part of CP projects at industries.	
Performance Measurements	The three response agree on the most **important factors** in successful CP projects are: (1) change of management attitude and (2) involvement of employees The greatest **barrier** to successful CP projects is lack of unity in terms of CP practice promotion.		
	N1 includes (1) increase of financial and environmental benefit, (2) improve-ment of technology performance and approach, (3) enhancement of CP awareness, and (4) improvement of environmental protection as the most important factors in successful CP projects.	Identical to N1	
	Increasing the environmental performance index under government regulations is another important factor in successful CP projects.	Improvement in product quality as well as working environment quality is also an important factor in successful CP projects.	
	Financial burden is another barrier.	Identical to N1. In addition, N2 also sees lack of awareness and over emphasis on production are barriers.	N3 also sees lack of awareness and over-emphasis on production are barriers.
	N1 conducts more than 20 CP projects annually.	N2 conducts about 5 to 20 CP projects annually.	N3 conducts more than 20 CP projects annually.

Table 3: Results from Survey B - Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations (Continued)

Survey B	N1	N2	N3
NCPCs/CP Organizations and Local Industries	The three responders **influence** large and small national companies with successful and persuasive CP projects. They disseminate **experiences** to other industries and stakeholders by (1) direct communication, (2) seminars or conferences, and (3) periodical or journals.		
NCPCs/CP Organizations and Local Industries	N1 influences large and small national companies with support from the national and local industry regulatory agencies and by subsidized CP projects.	N2 influences large and small national companies with support from the national and local environmental and industry regulatory agencies and by establishing regional and local CP centers close to users and using a cooperative approach of CP circles for effective outreach.	
	N1 uses bulletins to disseminate experiences to other industries and stakeholders. N1 considers CP mailing lists, seminars, and conferences as the best communication methods.	N2 considers sector-specific CP clinics in industrial parks/clusters of similar industries as the best communication method.	
NCPCs/CP Organizations and Multinational Corporations	N1 influences MNCs into looking at CP practices when there is (1) appearance of risk of environmental problems and (2) a consequence of environmental violations.		
	N1 influences MNCs' CP practices by using economic tools. They describe how to save the money during the process industry.		
	N1 sees benefits from MNCs' CP performances as (1) experience sharing, (2) initiation and distribution of CP practices among other MNCs or local industries, and (3) technology transfer.		Identical to N1
	N1 obtains technical and human resource supports from MNCs.		N3 obtains technical support from MNCs.

Table 3: Results from Survey B - Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations (Continued)

Survey B	N1	N2	N3
NCPCs/CP Organizations and Multinational Corporations	N1's point of view regarding CP practices of MNCs is relatively good, but needs more guidance, dynamic, motivation and support.	N2 is unaware of the CP practices of MNCs.	Identical to N1
NCPCs/CP Organizations and the Government	The three responses show consideration for the main **role of the government** in terms of gaining policy support on CP practices as cooperative. The three responses show the **attitudes of international organizations** towards the center's performance as being (1) supportive and (2) cooperative.		
	N1 also considers the main role of the government in terms of gaining policy support on CP practices as supportive.		Identical to N1
	N1 also considers the main role of the government in terms of gaining policy support on CP practices as authorized.	Identical to N1	
Expectations		N2 expects the local government and industries, multinational corporations, and other international organizations to create a policy framework conducive to promote and develop a CP program at national and regional levels. N2 adds further comments on the increasing role of NCPCs/CP organizations in the implementation of international conventions related to CP.	

Table 4: Results from Survey C - UNEP/UNIDO and Cleaner Production Practices

Survey C	U1	U2
Evaluation of the Progress of the NCPC Program	Successful. Different success rates in different countries but generally the centers are successful.	Successful.
Establishment of NCPCs/CP Organizations	UNEP/UNIDO CP development strategies.	Availability of establishment fund. UNEP/UNIDO CP development strategies.
Major Challenges of the NCPC Program	- financial obstacles; - technical availability; and - support from local government. There is a difference between obstacles to the NCPC program and the CP efforts in general. The above refers to the NCPC program. In addition, the lack of a market economy (or competitive culture - as in the case of Vietnam) is a major obstacle.	- financial obstacles; - trained human resources; and - support from local government.
Comments on the Effectiveness of NCPCs	- financially effective and fulfilling primary objectives; and - expanding its activities as a consulting firm with independent finance. There are differences among centers. The Indian center is very efficient and effective but China and Vietnam are still struggling. This may be related to the age of each center. The Indian center is the oldest and most successful one.	The response is very center-specific. An overall comment is that many of the NCPCs still do not have a very wide "name recognition", i.e. they have not created a wide CP network as one might have hoped. Financial sustainability is also another important issue. While all the centers that no longer have UNIDO financing still survive, some survive better than others. I believe that CP is a difficult service to sell. For instance, U.S. P2 centers are mostly funded by government funds.
Impact of NCPC Performance on CP Practices and Policy within a Country	- gain credibility through persuasive CP practice demonstrations among local industries; and - involve a wide range of industrial and governmental parties.	Again, this is very center-specific. All NCPCs have raised awareness, although compared to the universe of enterprises, institutions, and individuals out there to be made aware, they have probably only touched the tip of the iceberg.

Table 4: Results from Survey C - UNEP/UNIDO and Cleaner Production Practices (continued)

Survey C	U1	U2
Impact of NCPC Performance on CP Practices and Policy within a Country	Policy issues are of concern but NCPC impact is limited. UNEP and UNIDO have more influence, e.g. via the International CP declaration.	NCPCs gain credibility through demo projects, but again only a very small percentage of industry has been touched. Some NCPCs have been very successful at involving key players, others less so. Some NCPCs have helped to include CP into environmental legislation.
Extension of a Network of NCPCs within the Region	Yes, UNEP/UNIDO would extend a network of NCPCs within the region. The limiting factor is access of funding. Thailand recently established a CP center with funding from ADB. This center is not part of the UNEP-UNIDO network but is still expected to interact. In the longer perspective, we anticipate more centers and some centers extending their activities to other countries (e.g. the Vietnam center may work in Laos).	Yes, UNEP/UNIDO would extend a network of NCPCs within the region. We have wanted for several years to open an NCPC in the Philippines and Indonesia. We simply have never found a donor.
Using the NCPC in Vietnam to be a Model for Others	No, the NCPC in Vietnam cannot be a model for others. See above.	No, the NCPC in Vietnam cannot be a model for others. Vietnam has a very particular political and institutional set-up, so I do not believe it could really be a model. Of course, the principles would be the same.
Further Comments or Explanation		

Table 5: Results from Survey D - Survey for Stakeholders on Cleaner Production Practices

Survey D	SB (Business)	SI (Institution)	SA (Government Agency)
Cleaner Production vs. Pollution Prevention Concepts	- No contradiction between CP and P2. - Both approaches are necessary and complement one another. Only with CP, the standards cannot be reached. - CP technology should incorporate pollution free technology, converting polluted materials into saleable/useful byproducts.	- CP is one of the core pillars of the 3P (Profit, Planet, People) sustainability concept. CP leads to more responsible corporation management. - CP is a better wording than P2, since it is more proactive. It covers a wider scope of concepts and activities than P2 does. - P2 is more limited; it only focuses on less waste and emissions. CP relates more to the products themselves. - CP and P2 are very important for the whole world, not only for the industrial or manufacturing sector, but also for business, service, and primary (resource) industry, and everyone. - CP was initiated by UNEP and is known in the European Continent, while P2 is better known in the U.S. - From corrective to preventive.	- Both are interchangeably used by various Asian organizations. CP aims toward manufacturing processes and P2 is broader covering all activities, or CP is a subset of P2. Both concentrate on source reduction. - Both government and private sector engage CP concepts to response to the continuing environmental degradation. - CP is not broad enough. It is a small subset of P2 and sustainable development. P2 includes other sustainable concepts and should be adopted as the international standard. - An excellent tool to improve environmental performance.
Current CP/P2 Performance among MNCs within the ASEAN Region	- Resource prices are too low to force enterprises to implement CP. Building up a capacity for CP is not enough. More emphasis on policies to establish a legal framework (with market based instruments) to support CP -Few responsible MNCs appreciate a well-structured CP/P2 program.	-The current CP/P2 is still weak due to technology, not the organizational development. - Most MNCs are actively promoting CP in this area, although some of them do not want to share their experience with the others due to the most significant achievements in CP associated with new changes in the production methods or design, which are confidential.	- MNCs within the ASEAN region are very responsible to the environment due to the corporations' environmental policy. Nearly all of them got ISO 14001 certification. - CP/P2 has been currently carried out among ASEAN countries including regular meetings and establishment of the Asia-Pacific Roundtable for CP.

Table 5: Results from Survey D - Survey for Stakeholders on Cleaner Production Practices (continued)

Survey D	SB (Business)	SI (Institution)	SG (Government Agency)
Current CP/P2 Performance among MNCs within the ASEAN Region	- MNCs in ASEAN region focus on selling technology and separate Pollution Control technology, making expensive deals on both counts. The preliminary priority of MNCs in the ASEAN region is to do business. There is a strong silent understanding among MNCs.	- MNCs use the same standards in non-US plants as they do in U.S., but with skepticism. - MNCs are actively participating in CP and P2 practice, especially Japanese and German related corporations. Their efforts together with the government will form a very important base for SMEs to join. - The market drives MNCs to adopt it. - Dual standard at home and offsite.	The Asian Development Bank assisted 6 countries to carry out a study on the Promotion of CP Policies and Practices, including Philippines, Indonesia, Vietnam, India and Thailand. - MNCs are generally doing better than host country companies. - It is not moving quick enough.
Encouragement of the Participation of MNCs in CP/P2 Efforts	- Apply pressure on MNCs. - A blueprint of the technology offered by the MNCs is to be studied in advance by the local governments, and local NGOs.	- A CP policy dissemination analysis should set the floor for further awareness raising, education and network development for further elaboration of the concept. - Consumer support is one of the key issues to promote CP. Consumers here mean private and corporate buyers. Therefore, supply chain pressure and public education are all very important. - Economic incentives by raising the cost of waste disposal, stronger regulations and enforcement, and strong NGO's with access to media. These three things have encouraged P2 in U.S.	- Do not need to encourage the MNCs to participate because CP is part of their corporate strategic plans. - A number of activities should be done to encourage the participation of corporations in CP including: * Improve outreach to SMEs * Strengthen legislation and incentives; * Support for adoption of CP; * Increase awareness of CP in financial institutions; * Improve transparency by encouraging environmental reporting of Asian businesses; * Continue CP promotion and networking; and

Table 5: Results from Survey D - Survey for Stakeholders on Cleaner Production Practices (continued)

Survey D	SB (Business)	SI (Institution)	SA (Government Agency)
Encouragement of the Participation of MNCs in CP/P2 Efforts		- In addition to demonstration plants, training, government incentives and support, and encouragement from large companies, it is important to implement networking, integration, benchmarking, coordination so that the effects can be more quickly multiply to the SMEs and through the SMEs. - Integration of national policies, strategies, and action plans are ideal. - Stronger national policy to internalize the externalities: * Significant driving force from command and control; * Supporting driving force from market-based incentive; and * Less stick, more carrot policy system.	* Expand focus of CP to other non-manufacturing such as tourism. - Provide an agenda that matters to the corporations, not just the policymakers. Provide incentives to the corporations. - Build institutional capacity.
Suggestions on the Institutionalization of CP/P2 in the ASEAN Region or other Developing Countries on Market-based or Government-based Incentives	- Government based incentives. - Awareness program through media, school level, inter-governmental regional seminars would assist in government's decisions. - Multilateral discussions.	- In principle a mixture of both. which model is preferable, depends on the national situation, but anyhow both stakeholders should see their optimal place in the development.	- To be more competitive in the global market. Each ASEAN country needs to incorporate P2 as a country's development master plan. It is not important to set up a new agency to take care of CP policy. However, networking is crucial for success of the policy.

Table 5: Results from Survey D - Survey for Stakeholders on Cleaner Production Practices (continued)

Survey D	SB (Business)	SI (Institution)	SA (Government Agency)
Suggestions on the Institutionalization of CP/P2 in the ASEAN Region or other Developing Countries on a Market-based or Government-based Incentives		- Government leadership and investment is crucial. Government support has to have a critical mass. A little bit of money here and there usually does nothing. The experience in Taiwan can be adopted by other ASEAN countries - Both are very important to help SMEs to practice CP and P2. Again, the trade departments and associations should coordinate and integrate the market-based incentives. The EPAs, national productivity organizations (NPOs) should coordinate and integrate the government-based incentives.	-To strengthen capabilities of the Asia-Pacific Roundtable for CP would be a good way of getting countries in Asian interested. - Provide significant awards or marketing rights to those who produce the most energy efficient or sustainable products and services.
Further Comments or Explanations		- Re-synchronize government policies from "measurement" at end-of-pipe to performance-measurement of product/process. - Generate significant (currently still insignificant) business competence of CP capability. - Appropriate adjustment of externalities internalization among ASEAN neighbors to create balanced fair-game environment on industrialization.	- Useful information on CP among multinational corporations in the Asia-Pacific region can be found in a book named " The Status Report CP in Asia Pacific" Prepared by UNEP, the Asia-Pacific Roundtable for CP and Thailand Environmental Institute.

Table 5: Results from Survey D - Survey for Stakeholders on Cleaner Production Practices (continued)

Survey D	SB (Business)	SI (Institution)	SA (Government Agency)
Further Comments or Explanations		- Complete brainwashing at educational sector to influence the product design, process innovation, and resource recovery throughout the entire Life Cycle Assessment. - There are many tools for CP and P2 such as Environmental Management System, Life Cycle Assessment, Design for the Environment, etc and there are many similar terms such as waste minimization, good housekeeping, green productivity, etc to achieve the same purpose. So the implementation must be flexible and needs good integration and coordination to achieve multiple effects and good results.	

4.2 Result Summary

The survey results reflect the general information and points of view of MNC subsidiaries, NCPCs/CP organizations, UNEP/UNIDO and stakeholders towards the CP practices of MNCs within the ASEAN region. The following summary of the results highlights key themes.

4.2.1 Survey A - Cleaner Production Practices at Multinational Corporations

The only response of Survey A provides very specific information on CP practices of a single MNC subsidiary. However, this shows the interest of the responder, a company located in Thailand, towards CP practices and the basic idea of how CP is implemented at the facility. The company reports that it conducts CP practices consistently, at a mature level of CP methodology developed by UNEP/UNIDO as discussed in the Chapter 2 – Literature Review.

The interaction of the company with the country's CP organizations does not meet the company expectations for support. The company describes these CP organizations as effective and successful.

Information and technical and financial support are the key expectations that the company has of local government, industries and CP centers.

4.2.2 Survey B - Cleaner Production Practices at National Cleaner Production Centers/ Cleaner Production Organizations

Forty-two percent of NCPCs/CP organizations responded to the survey, and are believed to generally represent the interests and views of NCPCs/CP organizations in the ASEAN region. The three responses have major similarities regarding policies, implementation, performance measurements, interaction with local industries, and the host governments. In spite of similarities,

the differences between a UNEP/UNIDO's NCPC and a general CP organization are quite obvious.

Two responders (N1 and N2) belong to a consulting firm and government institution respectively, and are not UNEP/UNIDO NCPCs. Their clients are mainly local industries and MNCs' subsidiaries. The third responder, N3, is an NCPC which belongs to UNEP/UNIDO and focuses only on small and medium industries. This confirms the UNEP/UNIDO's strategy of promoting and supporting CP practices among local industries. N3 also illustrates a mature UNEP/UNIDO's NCPC which is finally driven by a goal of financial self-sufficiency. This is the ultimate purpose of the NCPC program: establishing an effective NCPC with a capability of financial independence as consulting firms without external funding.

4.2.3 Survey C - UNEP/UNIDO and Cleaner Production Practices

In general, UNEP/UNIDO evaluate the NCPC program as successful. The establishment of these centers is based on the criteria of UNEP/UNIDO's CP development strategies and the availability of third-party funding which plays a key role in the extension of the NCPC network worldwide. There are also challenges facing the program such as financial obstacles, technical availability, trained human resources, support from local governments, and the unique cultural, institutional and economic characteristics of each country. It is important for the NCPCs to gain credibility among local industries through successful demonstration projects.

4.2.4 Survey D - Survey for Stakeholders on Cleaner Production Practices

The three groups of stakeholders including business, institutions, and government agencies express very diverse ideas on the CP issues not only among the groups but also within each group. There is a conflict between the importance of CP and P2 concepts. Opinions toward CP

performance among MNCs within the ASEAN region vary in a wide range from (1) MNCs do not perform CP at all, (2) MNCs perform CP with limitations, and (3) MNCs do perform CP, but information and experience cannot be shared due product sensitivity and process-related issues.

The stakeholders suggest ways to encourage CP practices among MNCs by improving customer awareness on environmental issues, enhancing of economic incentives, government support, and promoting CP networking. However, there is also an opinion that it is not necessary to encourage MNCs to participate in CP because it is part of their corporate strategic plans.

Government-based and market-based incentives, awareness programs, multilateral discussions, and incorporation of CP into a country's development master plan are major ideas offered by responders on the institutionalization of CP in the ASEAN region.

In brief, responses to the four surveys illustrate overall comments on CP practices among MNCs in Southeast Asia and the performance of NCPCs/CP organizations. The responders also provide constructive and informative ideas of how to promote and institutionalize CP within ASEAN member countries. UNEP and UNIDO also contribute their comments on the effectiveness of NCPC/CP programs and express challenges as well as the impact of current CP practices toward local industries and governments.

Chapter 5: Discussion

Discussions of the implication, understanding, and limitations of the survey data are important to the results of this research. Therefore, this chapter is dedicated to the discussion of individual topics of the four survey results and the integration of the findings of this thesis.

5.1 Cleaner Production Practices at Multinational Corporations

5.1.1 Achievements

The results of Survey A-Cleaner Production Practices at Multinational Corporations provide a very unique situation of one MNC subsidiary. It is necessary to emphasize that the company is the only MNC to respond to the survey. The motivation here can be explained by the fact that the company expresses its interest and seriousness in CP practices by integrating CP into its manufacturing and administrative systems, and seeks an opportunity to approach potential sources of information, technology, and financial support from the diverse participants of the Third Asia-Pacific Roundtable for Cleaner Production. Being an MNC subsidiary located in Thailand, the company is more likely to be familiar and willing to adopt and implement CP practices. However, the company does not receive any CP support from either the Thai government or the country's CP organizations despite performing CP practices at a mature level.

M1 reports that CP practices are systematically embedded into its environmental policy. CP understanding is initiated from the top management level with the aim of not only promoting but also an effective CP program effectively. At a level of comprehensive awareness, the company realizes the vital role of CP practices to its operation. Regarding the implementation of the company's CP practices, M1 understands the very basic, but crucial, concepts of CP methodology:

reduction of environmental pollution, raw materials and energy consumption, and productivity improvement. More importantly, this systematic approach to CP methodology is voluntary, even though Thailand's policy apllies a command and control system in order to enforce environmental regulations. This movement goes beyond the typical trend of environmental regulatory compliance within the ASEAN region's industries.

Using CP methodology, the company achieves well-developed CP practices through a wide range of CP core techniques such as recycling, source reduction, and process modification. CP practices within the company reach a higher level of the CP hierarchy, focusing upon onsite recovery, input material change, better control process, equipment modification, and technology improvement. This is contrast to my observations during a CP project in Ho Chi Minh City, Vietnam where industries new to CP approach achieved improvement more through basic CP practices such as improved house-keeping activities.

The initiation of CP practices normally originates from a change of management attitudes towards environmental aspects. Then, effective and successful CP practices should be integrated into a company's environmental management system, in which employee involvement plays a critical role. M1 is typical of this approach. In a short report, *Vietnam Cleaner Production Centre-Cleaner Production Untold Stories,* at UNEP's Sixth International High-Level Seminar on Cleaner Production, the Vietnam NCPC concludes an important lesson on the involvement of top management and employees.

"*Lesson Learnt:*

...

- *The involvement of the top management and their commitment is crucial.*

...

- *It is important to make the Team Members from the company realise and express that Cleaner Production is good for them* (UNEP Vietnam Cleaner Production Centre – Cleaner Production Untold Stories, p.1)."

On the other hand, the company still faces challenges from extra workload, productivity decrease, and increase of labor and equipment costs. This can logically be explained by the fact that CP practices are not completely absorbed into the entire environmental management system, a lack of human resources, and the fact that environmental accounting and finance is not thoroughly applied at the company.

Financial investment and technology availability are typical challenges facing industries during CP implementation. Theoretically, CP practices helps gain benefits from waste. It is possible to achieve initial improvement through simple and no-cost CP solutions. However, the improvement becomes more difficult and requires more financial and technical efforts in order to accomplish identified CP solutions. Most of the industries in the Ho Chi Minh City CP project faced this obstacle during the solution implementation phase of the project. The industries were able to implement CP solutions which were classified as short-term, no cost/low investment and short-term payback period, and medium-term with a medium investment and medium payback period. These solutions allowed the CP project participants to achieve significant improvements in both economic and environmental benefits.

However, the situation became more difficult when industries had to struggle with CP solutions that required high investments and a long payback period. M1 in this study pursues long-term CP projects with high investments and a long payback period but it also faces the difficulties of financial problems and human resources to perform CP practices. At this point of CP practices, external support from the government or CP organizations is extremely important to the existence

of established CP programs. Once the project is closed, it is difficult to reopen if there is not a strong motivation from both internal and external pressures. Unfortunately, M1 does not receive any support from the government. Support from the government can be seen as economic incentives such as tax reduction on CP products or CP technology.

In order to evaluate the success and effectiveness of a CP project, typically the rate of raw material/energy consumption is compared to the rate of production before and after implementing CP practices. The difference between the before and after pollution load in discharges, emissions or waste is also helpful. Finally, the interpretation of these factors must be reflected in the amount of dollars or the return on investment. M1 uses the rate of raw material/energy consumption over production to evaluate its CP practices. The results are fairly low: only 10-20% return on investment and less than ten percent in total pollution reduced. Table 6 shows the results of reduction of pollution loads from several CP case studies.

Table 6: Reduction of pollution loads through Cleaner Production projects

Company	Organic Load	Waste water volume	Gaseous Emissions
Six companies of the CP project in Ho Chi Minh City, Vietnam	20-35%	20-66%	30-70%
Curtigran Ltd., Colombia	50%	N/A	N/A
Raval Paper Mills, India	63%	22%	N/A

Sources: UNIDO and International Network for Environmental Management

CP methodology emphasizes continual improvement of CP practices. It is important to maintain the implementation of CP solutions at a higher level of performance over time. Financial benefits from previous CP projects can leverage the implementation of a follow-up project. This is why savings is a critical index for evaluating CP practices. By separating these benefits from traditional financial systems, a company can review the effectiveness of its CP program as well as

identify environmental costs actually expended in the discharge, rather than the products. This concept can be related to environmental accounting and financing. M1 implements CP practices sequentially which means a new project gets started after a successful one is completed. However, the company absorbs CP financial benefits into its accounting budgets which can partly explain the perceived financial problems.

As mentioned above, M1 does not receive any motivation or incentives from the government. In addition, it also does not receive any support from Thailand's CP organizations, although its opinion is that the CP organizations within Thailand are effective and successful. Thailand is the most dynamic country within the ASEAN region in promoting CP practices. Approximately two-thirds of the participants at the third Asian-Pacific Roundtable for Cleaner Production were from Thailand. The UNEP Regional Office for Asia/Pacific from which CP is disseminated throughout the region is the located in Thailand and a wide range of CP organizations are established in the country. Thailand also receives support from the Asian Development Bank in order to promote CP practices.

> *"... Another technical assistance project, which is regional in scope, aims to promote cleaner production policies and practices in five selected DMCs: India, Indonesia, Thailand, Philippines, and Viet Nam* (Cruda)."

Four possible reasons why the company does not receive support from either the government and CP organizations in Thailand include:

- M1's industry type may not be a targeted concern for these entities, who may pay attention to more polluting industries;

- The environmental performance at the company fulfils the requirements of the government agencies, who may be more concerned about companies with more environmental problems;
- A voluntary CP efforts places the company into a non-prioritized category for the CP organizations; and
- The government and CP organizations may focus more on local industries more than MNCs.

Regardless, the company still expects information as well as technical and financial support from the local government, industries and CP organizations because M1 believes that information and experience sharing are also described as successful factors during CP implementation. This aspect relating to networking among industries as well as between industries and NCPCs/CP organizations will be discussed in more detail later in this chapter.

With the aim of greening the supply chain, M1 involves its suppliers with CP practices as part of written contracts. This important step confirms the company's willingness to apply a systematic approach to CP practices. In addition, the company also disseminates CP success among local industries by providing information provision. Again, networking is crucial to successful and sustainable CP programs.

5.1.2 Limitations in Interpreting Survey A

The result of this survey obviously does not represent a whole picture of CP practices among MNCs in ASEAN region. The sample that participated in the survey is not sufficient to extrapolate the results to the entire population of MNCs in the region. The fact that other MNCs refused to respond to the survey may be the result of both objective and subjective reasons. The survey may not have reached authorized personnel in charge of the concerned issues. On the other

hand, the survey content and design may not have been interesting enough to stimulate the participation of other MNCs.

In the context of these limitations, we can postulate the followings about CP practices in MNCs:

1. Positively, CP practices may be implemented among MNCs at a mature level that conforms to the corporate environmental policy. Nevertheless, information and experience may not be shared due to (1) the corporation's information disclosure policy, (2) the sensitivity of product design and manufacturing processes, and (3) competitiveness of product availability on the markets;
2. The MNCs may pursue P2 or other approaches rather than CP; and
3. Negatively, CP practices may not be applicable to MNCs in terms of unique manufacturing process characteristics and/or the corporate environmental policy.

Considering the logic of the issue, implication 1 and 2 are likely to have a higher chance of occurrence than implication 3. This can be explained by the fact that most of MNCs develop corporate environmental policy and perform a consistent philosophy on the issue throughout their facilities worldwide under pressure from either parent country or invested countries. Europe-based MNCs are more likely to adopt and effectively implement CP practices while U.S.-based MNCs are more familiar with P2 concept.

In summary, Survey A - Cleaner Production Practices at Multinational Corporations illustrates a unique picture of an individual MNC which expresses its interest in CP practices and performs CP practice at a mature level consistent with CP methodology. The survey result does not obtain sufficient information from other MNCs in order to provide a general picture of the concerned issues. However, it does bring up the implication that MNCs may implement CP practices or other environmental improvement tools but information cannot be shared among the

public. Further discussions in the next sections will provide a broader picture from external point of views towards CP practices among MNCs in Southeast Asia.

5.2 Cleaner Production Performance at National Cleaner Production Centers/Cleaner Production Organizations

The NCPCs/CP organizations that responded to the survey are different in organizational structures. This results in different policies, implementation, performance measurements, and interactions with MNCs and local industries as well as the country's government. However, common ideas can still be found regarding general priorities, clients, driving forces regarding approach to CP methodologies, and expectations for support from domestic and international organizations.

5.2.1 Organizational Structures and Priorities

Generally, the three responses include one center that belongs to the UNEP/UNIDO NCPC program, one organization belong to a consulting firm, and one organization belongs to a government institution. Their priorities are to introduce CP to concerned parties, provide to technical support for CP demonstration projects, and distribute CP information. This is typical of NCPCs/CP organizations in general. CP methodology is in the process of being accepted and absorbed into environmental management like other environmental approaches. Therefore, it is crucial for an NCPC/CP organization to obtain credibility through a step-by-step agenda. First, CP must be introduced to government authorities and industries to enhance awareness of CP concepts. Second, successful and persuasive CP demonstration projects will increase and influence interests of related parties, especially that of industries which directly perform CP. Finally, CP information must

be distributed to other industries in order to extend the practices as well as call for government incentives in promoting CP practices.

The UNEP/UNIDO's NCPC, N2, focuses on introducing CP practices to local industries. This reflects the UNEP/UNIDO's strategy of promoting and supporting CP practices within local industries. In contrast, the two responding CP organizations, N1 and N3, focus on both local industries and MNCs. This reflects a broader point of view in terms of targeting and approaching specific industry sectors.

5.2.2 Driving Forces

NCPCs/CP organizations responding to the survey have similar views concerning the main driving force for promoting CP practices. Public concern is one of the problems facing polluting industries worldwide. Taking this aspect into consideration, industries have to move beyond compliance in order to maintain the corporate image which supports market demand for their products, and a healthy stock price. Adoption of CP practices is an effective approach for industries trying to improve their environmental performance, and thus their public image.

5.2.3 Success Factors for Cleaner Production

According to the NCPCs/CP organizations responding to the survey, the most important factors in conducting successful CP projects require the change of management attitude and the involvement of the employee into the process. This opinion agrees with the response of M1 in Survey A. Moreover, the majority of the Survey B responses also agree that the increase of financial and environmental benefits, the improvement of technology performance and approach, and the enhancement of CP awareness are important factors of CP success. This reflects the initial objectives of CP as well as the conclusion of the CP project in Ho Chi Minh City, which emphasizes

the effective CP implementation requires attitude change, responsible environmental management and evaluating technology options, as discussed in Chapter 2.

5.2.4 Barriers to Cleaner Production

Survey B responders report that the lack of unity in CP practice promotion is a major barrier to CP practices. Currently, CP methodology within a country is initially promoted with external support such as UNEP/UNIDO rather than with its internal policies developed by the government. CP methodology is still not considered as a legislative concern: formal CP regulations are not developed and enforced, therefore, there is no obligation for industries to implement CP practices. It is interesting to compare CP and P2 regarding governmental incentives. As discussed in Chapter 2, P2 has already been enacted by the U.S. Congress, i.e., P2 policy has its own privilege within the U.S. context while CP is still struggling among industries and seeking incentives from government in ASEAN countries. Additionally, NCPCs/CP organizations have their own individual objectives and scope in terms of CP promotion. Therefore, they cannot find a common language for the issue.

Another barrier to the responders' CP practices is financial burden. This problem is always the most difficult for any organization when confronting availability of funding for CP-related activities. As discussed above, demonstration projects are the heart of an NCPC/CP organization. Without successful projects demonstrating persuasive economic and environmental benefits, an NCPC/CP organization definitely cannot sell CP ideas to industries and the government. CP in Vietnam is an example of this cause-and-consequence relationship. The successful adoption and implementation of CP concepts through industrial pollution projects across Vietnam led to the establishment of the Vietnam NCPC in April 1998.

These projects absolutely need to be funded at the beginning phase, before the NCPCs/CP organizations can achieve financial independence. This explains why market pressure is considered

as a priority by N2 and N3. Although N2 is an example of an ultimate, mature and successful NCPC under the UNEP/UNIDO's NCPC program, it still faces financial problems when changing from a supported phase to a financially independent phase.

It is clear that UNEP/UNIDO's goal is to initiate and help build an NCPC within a country but it cannot financially support the NCPC in the long run. The NCPC must drive itself to a goal of financial self-sufficiency and become capable of financial independence as an consulting firm without external funding. Therefore, NCPCs/CP organizations must take this issue into consideration to ensure a stable and effective operation on a long-term basis.

5.2.5 Interaction with Multinational Corporations

The responses of N1 and N3 provide a closer look at how they interact with MNCs. They agree that MNCs perform effective CP practices, but need more guidance, dynamic motivation, and support. These concerns relate to (1) government-based incentives of providing guidance and/or regulations that leverage CP practices, and (2) market-based incentives of customer expectations for environmentally-friendly products and also environmentally-conscious manufacturing process.

However, N1 makes efforts to influence MNCs only as a result of environmental risk, or environmental violations. This can be considered to be an objectively weak point of an NCPC/CP organization in general. The NCPCs/CP organizations should be more active and effective approaching industries prior to such problems. This would be more in keeping with the preventative methodology of CP itself.

In terms of two-way interactions, both MNCs and N1 gain mutual benefits. MNCs gain benefits from N1 by seeing the key issue of CP practices for MNCs –saving money. In turn, N1 obtains benefits from MNC CP performance such as experience sharing, initiation and distribution of CP practices among other or local industries, technology transfer, and human resource and

technical support. Therefore, NCPCs/CP organizations can take advantage of MNC CP practices by providing successful CP information to concerned parties, and improving local industries' technology application in order to sway government incentives for CP practices.

5.2.6 Interaction with the Government

The responders consider the role of ASEAN governments and international organizations as cooperative. ASEAN governments and CP-supported international organizations can envision CP benefits not only from local industries but also from MNCs. Governments should integrate CP practices into the countries' development policy and legislative systems. If so, ASEAN governments can gain more support from international organizations and establish a dynamic market for CP practices. This strengthens domestic CP capability and expresses the governments' willingness to promote CP concepts.

The responses also show an expectation for the local government and industries, MNCs and international organizations to create a framework conducive to promote and develop CP programs at national and regional levels. This movement will embrace concerned parties and enhance CP practices at a higher and broader level, resulting in a more effective and efficient performance.

In summary, NCPCs/CP organizations of the ASEAN region adopt CP methodology from UNEP/UNIDO to market CP practices to MNCs and local industries. They still need significant demonstration projects that can verify the economic benefits of CP practices in order to gain credibility and legislative support from governments. NCPCs/CP organizations also have to enhance their priorities of sustaining their operations with financial independence. More interactions with MNCs will result in potential advantages of promoting CP practices as well as information dissemination and technology transfer.

5.3 National Cleaner Production Center Program by UNEP/UNIDO

UNEP/UNIDO are optimistic about the progress of the NCPC/CP program. The established NCPCs reflect the UNEP/UNIDO's CP development strategies as well as the availability of third-party funding. The latter aspect limits the expansion of the NCPC network. Without a third-party donor, CP practices cannot be funded and the NCPC cannot be established. Survey responders view funding as a major challenge of the NCPC program, along with other challenges of technical availability, trained human resources, and support from local governments.

5.3.1 National Cleaner Production Centers vs. a Country's Characteristics

The responses point out that the host country's cultural, politic and economic characteristics affect the success of its NCPC, especially in the case of Vietnam and China. As discussed above, the Vietnam NCPC was established as a consequence of persuasive demonstration CP projects. Nevertheless, the effectiveness of the center is currently a major concern. First, the Vietnam NCPC is fairly young in comparison with the other NCPCs. Therefore, the center still faces problems in terms of promoting CP issues, especially when it lacks totally-funded projects, such as demonstration projects. Second, the center still has a long way to go in order to gain more credibility among industries and the government. U2 mentions this problem as "name recognition" of the NCPCs and mentions that the CP network is also not strong enough to link CP practices within a country, within a region and worldwide.

Concerning political aspects, the foundation of Vietnam, as well as China, is established from a communistic theory which does not encourage a totally competitive market economy. Government-owned industries occupy a major percent of the market. These industries are operated in a centralized method that limits an empowered decision process of local management, especially

concerning environmental issues. Therefore, management cannot provide timely decisions on CP-related issues, resulting in slow and passive reactions to the urgency of CP implementation and the efficiency of CP promotion and development.

Economic development has a higher priority than other concerns in developing countries, especially in Vietnam. It is not easy for economic development and environmental protection to go hand-in-hand in such a situation. Trade-offs must be made and usually the environmental aspects take a back seat. As a result, the government loosens environmental requirements in order to promote domestic and foreign investments. Industries, therefore, may not embrace CP practices as they should, in order to reduce current expenditure. The current command and control environmental policy in Vietnam focuses on end-of-pipe impacts rather than in-process impacts. National numerical environmental standards are used to evaluate the environmental performance of industries. Therefore, industries prefer to deal with end-of-pipe treatment rather than interfere with their manufacturing process, where CP practices mostly provide improvement.

Lack of encouragement from a market economy eliminates the competitiveness among industries for customers. Instead, complaints from the neighbors of industries appear more frequently in the media than information on environmentally-friendly products. Therefore, customers cannot distinguish which products are manufactured using a CP process and which products are manufactured with an old-fashioned and polluting process.

As a result, Vietnam society adopts a passive culture, rather than a competitive culture. This type of culture weakens the latent capability of moving forwards and the outlook for sustainable development. The society is more accommodating to immediate economic development at the expense of environmental protection, rather than embracing and balancing both of these important aspects of sustainable development.

5.3.2 Encouragement of National Cleaner Production Centers/ Cleaner Production Performance

The responses show that although NCPCs certainly achieved credibility through demonstration projects, this reflects a minority of the whole industrial population within the ASEAN regions. One of the responders believes that NCPCs should extend their effort to influence government policy. By doing this, NCPC and CP concepts gain more opportunity in seeking government policy support on developing a CP framework. UNEP/UNIDO should also influence ASEAN's environmental policy by promoting the adoption of CP into ASEAN country members' development strategy. This could overcome the limitation of impacts on policy issues within individual countries.

The establishment of the Vietnam NCPC might not be a good model for other countries in the region due to its unique characteristics. However, the CP center established in Thailand with ADB funding will bring another perspective of CP practices within the region. Hopefully, the center in Thailand will effectively interact and collaborate with UNEP/UNIDO's NCPC network.

There will be a diversity of CP approaches, but basically CP methodology is the same and the ultimate purpose is to improve environmental performance. Therefore, more concerns and efforts from industries and the governments will help promote and develop CP practices not only within MNCs, but the rest of industries located in ASEAN region. This also opens a new approach to other sources for funding CP practices, and reduces the reliance on UNEP/UNIDO support.

In summary, survey results from UNEP/UNIDO responses are consistent regarding the challenges and effectiveness of NCPC performance in the ASEAN region. The results identify the limitation of the Vietnam NCPC in terms of using it as model for other ASEAN countries. However, UNEP/UNIDO still expect expansion of the NCPC network if funding is available. While UNEP/UNIDO faces financial obstacles for program funding, the establishment of a CP center in Thailand under the auspices of ADB is a good sign for CP practices in the region. This

definitely encourages CP practices in Thailand, the most dynamic country in the region regarding CP-related activities, as well as other countries in the ASEAN region.

5.4 Cleaner Production and Stakeholders

The stakeholders who participated in the Survey D provide a wide spectrum of opinions regarding CP practices at MNCs in the ASEAN region. The classification of the stakeholders in three groups of business (SB), institutions (SI), and government agencies (SA) allows comparison of the similarities and contrasts among them on the issues of CP/P2 concepts, CP performance of MNCs, encouragement of MNCs' participations in CP practices, and suggestions on the institutionalization of CP within ASEAN region.

5.4.1 Cleaner Production vs. Pollution Prevention

Theoretically, CP and P2 have the same approach to reduce wastes and improve economic and environmental profit. In other words, they represent the movement from corrective to preventive actions and are excellent tools to improve environmental performance. In practice, industries may combine the two concepts to reduce the limitations as well as enhance the advantages of each concept. In light of cooperative aspects, SB and SI agree that there should not be a contradiction between CP and P2. Both concepts are important not only to manufacturing industries but also services and other social activities.

However, geographical distance makes CP unknown in the U.S., and P2 unknown in Europe and in Southeast Asia. The introduction of CP concepts through UNEP/UNIDO places a higher level of CP conceptualization worldwide than that of P2 which is mostly favored in the U.S. UNEP/UNIDO have more influence in developing countries than the U.S. and the support of

UNEP/UNIDO on CP practices is recognized for more than a decade in several countries with significant success.

Taking the influence of CP and P2 into consideration, it is interesting to note conflicting views among SI and SA responses. SI responders, mostly ASEAN-based organizations, views P2 as more limited than CP. SA responders, mostly U.S.-based agencies, considers P2 to be the broader concept and CP to be only a subset of P2. SA responders use a stronger tone of voice regarding the importance of P2 over CP than SI responders do when comparing the two concepts. This can be explained by the fact that most of the SA responses belong to U.S. agencies and provide government standpoint on P2, and SI responses belong to institutional organizations who may be more rational when viewing the difference between CP and P2.

The different perception of CP and P2 among stakeholders indicates the lack of information sharing among concerned parties as well as the difficulties of accepting and adopting an approach that is different from current conventions. As a result, this leads to different points of view about the CP performance of MNCs in ASEAN countries.

5.4.2 Multinational Corporations and Cleaner Production Performance

As a consequence of the different understandings of CP and P2, survey results demonstrate in a wide range of opinions. This reflects inconsistent and skeptical attitudes among stakeholders concerning MNCs' CP practices particular and MNCs' environmental performance in general.

Aseem Prakash et al. explain in their research, *Multinational Corporations and International Environmental Policy,* why MNCs need to invest internationally. The obvious reason is to enhance MNCs' internalized advantages instead of selling their technology to foreign firms. However, the underlying reason behind these investments relates to the avoidance of stringent environmental regulations at home and the advantage of legally polluting in the invested countries.

"... *MNCs can legally relocate to pollution-havens and export their outputs back to their parent countries* (Aseem Prakash, et al., p.129)."

With this in mind, the SB survey participants comprised of business stakeholders conclude that few responsible MNCs appreciate a well-structured CP program. In turn, a SI response states that current CP practices remain weak due to technology availability, not organizational development. SA responses confirm the responsibility of MNCs in the ASEAN region towards environmental policy. A reasonable explanation for these different opinions about MNCs' CP practices is that MNCs are actively promoting and implementing CP, but information and experiences cannot be shared due to confidentiality about concerning changes in product design and manufacturing processes.

5.4.3 Encouragement of Cleaner Production Performance

Regarding the institutionalization of CP in ASEAN countries, the responders suggest incorporation of CP into a country's development strategy. A development strategy that embraces CP would strengthen the capability reaping CP benefits without affecting economic development. The responders also report that it is crucial to utilize networking and multilateral discussion and cooperation among ASEAN countries themselves as well as among ASEAN and other international counterparts and organizations. The capabilities of the Asian-Pacific Roundtable for Cleaner Production need to be strengthened in both magnitude and quality standpoints in order to get more and diverse involvement of relevant parties as well as improve the outcomes of promoting CP practices.

In summary, stakeholders express concerns about CP practices among MNCs in ASEAN countries in different aspects. There are conflicts about the importance of CP and P2 concepts due

to the influence of UNEP/UNIDO on CP practices worldwide. CP practices are implemented at MNCs but information and experience may not be shared. As a result, there are skeptical attitudes among stakeholders towards CP practices at MNCs in the region and this may generated from the lack of communications. Therefore, networking and multilateral discussions among ASEAN countries and between ASEAN and international organizations are crucial to improve the situation. These incentives are among other government-based and economic based incentives such as enhancement of public CP awareness, incorporation of CP practices into a country's development strategy and finally, the strengthening of the Asian-Pacific Roundtable for Cleaner Production capabilities of promoting and developing CP practice in the region.

5.5 Cross-findings

The discussions of the four survey results provide an overview of CP practices among MNCs in ASEAN countries. CP and P2 still confuse people in terms of the level of importance towards environmental performance. The lack of communication among MNCs and their stakeholders results in skeptical attitudes of whether or not MNCs carry out effective CP practices. However, some MNCs are implementing CP practices as part of their corporations' environmental policy.

The interaction between MNCs and NCPCs/CP organizations in the region is limited, even though NCPCs/CP organizations play a key role in promoting and developing CP in their countries as well as the region. The NCPCs/CP organizations priorities pay more attention on local industries than MNCs. They face funding obstacles, are obligated to improve and expand their activities to gain more credibility among industries, strive for legislative support from the governments in order to ensure an effective operation and, seek to be financially independent as consulting firms without external funding.

With its worldwide influence on CP practices, UNEP and UNIDO obtains success in promoting CP practices in ASEAN and other developing countries through the NCPC and CP programs. Nevertheless, limited funding sources and obstacles from host countries' political, economic, and cultural characteristics hold back the initiative.

The governments play a key role in successful CP adoption and implementation in the region. Incentives based on governments' development strategies and market needs would drive public awareness and the institutionalization of CP not only in MNCs but also in local industries and other sectors of the society.

Chapter 6: Conclusion

The implementation of CP in Southeast Asia through the support of UNEP/UNIDO achieved initial success through demonstration projects and the establishment of the Vietnam NCPC as well as other CP organizations in the region. However, CP practices confront obstacles in terms of promoting CP issues to industries as an effective tool for improving environmental performance.

It is important for ASEAN governments to expand their interest in CP practices and incorporate the dual economic and environmental CP benefits into the countries' development strategies. Institutionalization and effective enforcement of CP legislative systems may help the governments achieve economic development without sacrificing degradation of the environment.

CP policies as well as CP-supporting government-based and market-based incentives help encourage CP performance among MNCs and local industries. These incentives include enhancement of public CP awareness, customer education, network development, and institutional capacity building. Incorporating CP into national development strategies and policies should result in a supportive rather than a command and control attitude. A big-stick policy would not be effective in terms of promoting foreign investment and increasing competitiveness of countries in the region. Combining government and market-based incentives towards CP practices could ensure both economic development and environmental protection with few trade-offs to the environment.

Developed in Europe by UNEP, and well-known in developing countries worldwide through UNEP/UNIDO initiatives, CP is more likely to be adopted and effectively implemented by Europe-based MNCs, rather than U.S.-based MNCs which are familiar with P2. However, the research results may not reflect the initial purpose of understanding CP practices among MNCs in the ASEAN region due to the reluctance of MNCs to participate in the survey, regardless of

whether they are Europe-based or U.S.-based MNCs. The chemical and pharmaceutical industries could be more sensitive about information on product design and manufacturing processes than other industries. Therefore, chemical and pharmaceutical industries may not publicize their CP success.

The NCPC program of UNEP/UNIDO plays an important role toward adoption of CP practices within a country. Seeking new funding sources for CP practices is considered a major concern of the program. The contribution of the ADB in establishing Thailand's NCPC opens a new funding approach in a region which has been dependent upon UNEP/UNIDO initiatives. Being more effective and dynamic in activities in terms of striving for government support and industry participation could enhance the operation of NCPCs/CP organizations. It also is critical for NCPCs/CP organizations to maintain success when transferring from funded to financially independent organizations. Furthermore, the NCPCs/CP organizations can utilize their national standing to promote a CP network within their countries as well as the region in order to increase the exchange of CP information and experience among industries and stakeholders.

Stakeholders of CP practices play a catalytic role in terms of linking relevant parties and disseminating CP information through networking and multilateral discussion. The establishment and operation of the Asian-Pacific Roundtable for Cleaner Production is an illustrative example of efforts in promoting and sustaining CP practices within Asia.

The thesis results address the initial goals of understanding MNCs' effectiveness in adopting and implementing CP practices within the ASEAN region and MNC interactions with regional CP centers. However, the responses were not sufficient to provide knowledge about MNCs' CP practices and information dissemination with local industries. Further research on CP practices in Southeast Asia needs to be done in order to provide a thorough understanding of the issue. Suggestions for further studies include (1) CP practices in different types of industries and the

stratification of geographic attributes of those industries, (2) the interaction between NCPCs/CP organizations and the governments' CP policy-making, and (3) the role of the Asia-Pacific Roundtable for Cleaner Production in influencing Asian governments, industries, and NCPCs/CP organizations regarding the promotion and institutionalization of CP.

Finally, CP, as well as other environmental protection concepts, is still seeking a better position within both industry and government and in order to harmonize economic development and environmental protection. It will require effort and willingness from all parties. Hopefully, CP will be successfully absorbed into societal activities as part of sustainable development.

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Appendix A - Surveys/Questions

A.1 Survey on Cleaner Production Practices at Multinational Corporations

R·I·T Civil Engineering Technology, Environmental Management and Safety
31 Lomb Memorial Drive Rochester, NY 14623-5603 (716) 475-7318

CLEANER PRODUCTION AMONG MULTINATIONAL CORPORATIONS IN SOUTHEAST ASIA

Graduate Thesis
Master of Science in Environmental, Health and Safety Management

Nguyen P. Nguyen
Tel: (716) 242-0511
Email: npn0972@rit.edu

Survey for Multinational Corporations

Cleaner Production (CP) has been introduced by the United Nations Environmental Program (UNEP) and implemented throughout the world since 1989. The CP concept can be simply understood as the change from a conventional end-of-pipe treatment attitude towards a proactive approach to pollution prevention and production efficiency. Both government and private-sector industries in developed and developing countries have adopted the concept as a powerful tool to effectively utilize raw materials and energy and considerably reduce waste generation, hence significantly increasing financial and environmental benefits.

The Association of Southeast Asia Nations (ASEAN) countries are becoming an economic development center in Asia. Foreign investment by multinational corporations (MNCs) in the region has considerably increased during the last two decades, resulting in both economic development and environmental problems.

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Four surveys are developed to collect information from
- Multinational corporations operating within ASEAN's member countries
- National Clean Production Centers/Cleaner Production Organizations
- UNEP/UNIDO
- Stakeholders (in the US and Southeast Asia)

The survey results will be used to support thesis conclusions on the CP practices among MNCs in Southeast Asia.

Please complete the survey by March 15, 2001. A summary of the survey results will be sent to participants for reference.

Please accept my appreciation of your contribution and any further recommendations towards the survey.

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Email: npn0972@rit.edu

SURVEY ON CLEANER PRODUCTION PRACTICES AT MULTINATIONAL CORPORATIONS

Notice: Personal information provided in this survey is confidential; other information is anonymous. If you have any questions, please write to the email address above.

Instruction: Please check the most applicable answers. If there is more than one applicable answer, please briefly explain at the end of the survey.

Organization: _____

Title: _____

Location: _____

Awareness

1) Please describe your company's Cleaner Production practices?

- ☐ Limited
- ☐ Comprehensive

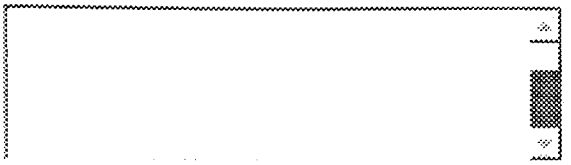
2) At which management level is Cleaner Production understanding initiated?

- ☐ Top management
- ☐ Middle management
- ☐ Supervisors
- ☐ Line employees

3) How is Cleaner Production integrated into your business?

- ☐ Stated in the company's environmental policy
- ☐ Applied partially by individual projects

☐ Other, please describe briefly



4) Cleaner Production is vital to my company and it must be effectively implemented in my company's facilities

☐ Strongly agree

☐ Mildly agree

☐ Neutral

☐ Mildly disagree

☐ Strongly disagree

5) Does your company apply the Pollution Prevention concept, Cleaner Production's U.S. counterpart, as Cleaner Production?

☐ Yes

☐ No

Implementation

6) For what reason was Cleaner Production implemented at your company? (Please check the most applicable answer)

☐ Reduce the generation of environmental pollution

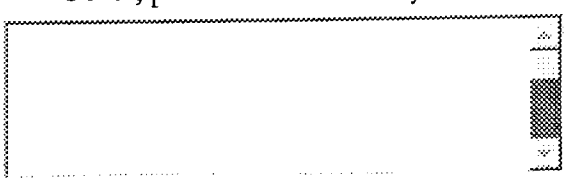
☐ Reduce raw material and energy consumption

☐ Improve productivity

☐ Increase market share

☐ Reduce liability

☐ Other, please describe briefly



7) How is Cleaner Production currently implemented?

- ☐ A systematic approach to Cleaner Production methodology
- ☐ A Routine Practical Tool

8) What factor drives your company to Cleaner Production practices?

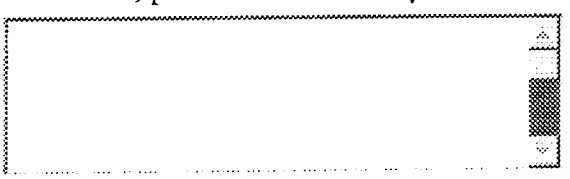
- ☐ Voluntary
- ☐ Regulatory obligation
- ☐ Public obligation
- ☐ Economic obligation

9) What is the focus of Cleaner Production techniques at your company?

- ☐ Recycling
- ☐ Source reduction
- ☐ Process modification

10) How is recycling implemented? (Please check the most applicable answer)

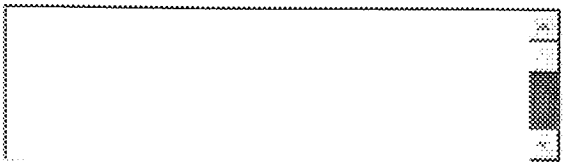
- ☐ Onsite recovery and use
- ☐ Creation of useful by-products
- ☐ Other, please describe briefly



11) How is source reduction implemented? (Please check the most applicable answer)

- ☐ Good housekeeping
- ☐ Input material change
- ☐ Better control process

- [ ] Equipment modification
- [ ] Technology change
- [ ] Other, please describe briefly

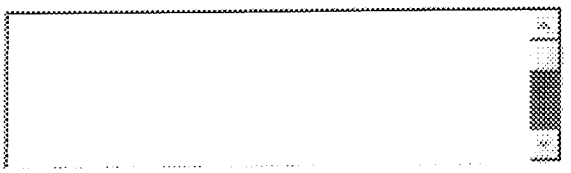


12) What type(s) of Cleaner Production projects does your company pursue?

- [ ] Short-term: requires low investment and short payback period
- [ ] Medium-term: requires intermediate investment and medium payback period
- [ ] Long-term: requires high investment, long payback period or technology availability
- [ ] Please describe briefly the benefits associated with your selection

13) What obstacle(s) have your company experienced when conducting Cleaner Production practices?

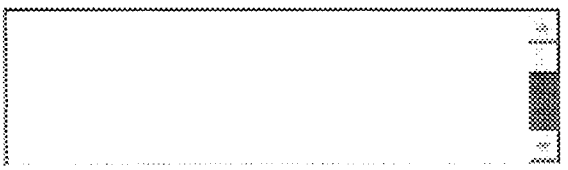
- [ ] Skeptical attitudes
- [ ] Financial problems
- [ ] Lack of technical availability
- [ ] Lack of trained human resources
- [ ] Other, please describe briefly



14) What success factor(s) have your company experienced when conducting Cleaner Production practices?

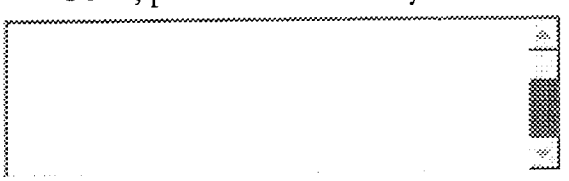
- [ ] Support from management

- [ ] Participation of employees
- [ ] Encouragement from local government
- [ ] Information and experience sharing
- [ ] Competitiveness enhancement
- [ ] Cooperative assistance from the National Cleaner Production Center or other Cleaner Production organizations
- [ ] Other, please describe briefly



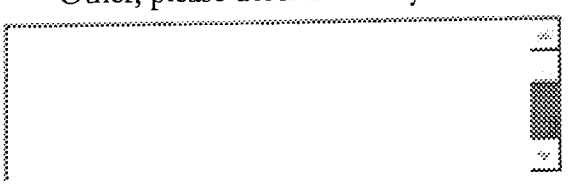
15) What challenges do your company confront during Cleaner Production implementation?

- [ ] Conflicts with the corporate environmental policy
- [ ] Extra workload
- [ ] Productivity decrease
- [ ] Increase of labor and equipment costs
- [ ] Other, please describe briefly



16) What supports from the government do your company receive during Cleaner Production implementation?

- [ ] Tax reduction
- [ ] Other, please describe briefly



Performance Measurements

17) What measurements are used to evaluate Cleaner Production practices?

- ☐ Rate of raw material consumption over production
- ☐ Rate of energy consumption over production
- ☐ Rate of pollution indicators over total generated discharge or emission (such as kgCOD/volume of wastewater, kgSO2/volume of air emission, or kg hazardous waste/total solid waste)
- ☐ Product unit costs
- ☐ Environmental costs

18) What total financial benefit has been obtained through Cleaner Production projects' return on investment?

- ☐ Less than 10%
- ☐ 10%-20%
- ☐ 21%-30%
- ☐ 31%-50%
- ☐ More than 50%
- ☐ I don't know

19) How much of the total pollution load has been reduced through Cleaner Production projects?

- ☐ Less than 10%
- ☐ 10%-20%
- ☐ 21%-30%
- ☐ 31%-50%
- ☐ More than 50%
- ☐ I don't know

Continual Practices

20) How is Cleaner Production financial benefit used?

- ☐ Absorbed into the company accounting budget
- ☐ Separated as a fund for other Cleaner Production supporting and information dissemination activities
- ☐ Other, please describe briefly

21) How is Cleaner Production practice continually implemented?

- ☐ Sequentially, after each successful project
- ☐ Several projects are conducted simultaneously
- ☐ Other, please describe briefly

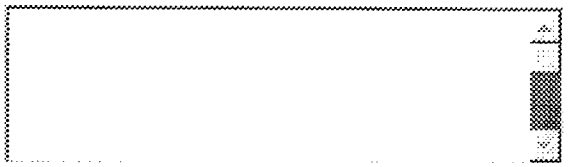
MNCs' Cleaner Production Practices and National Cleaner Production Centers/CLeaner Production Organizations

22) What supports do your company receive from the host country's National Cleaner Production Center/Cleaner Production organizations regarding Cleaner Production practices?

- ☐ Financial
- ☐ Technical
- ☐ Informational
- ☐ None at all
- ☐ Other, please describe briefly

23) What is your company's point of view regarding the operation of the National Cleaner Production Centers/CLeaner Production Organizations organizations?

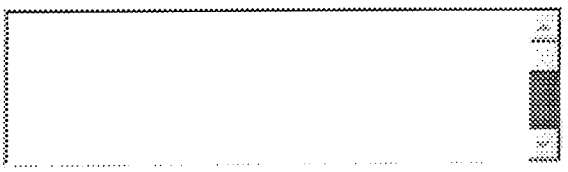
- ☐ Effective and successful
- ☐ Relatively good with a need for more guidance, dynamics, motivation and support
- ☐ Failure and needs to be reconstructed and oriented
- ☐ Other, please describe briefly



MNCs' Cleaner Production Practices and Local Industries

24) How does your company involve suppliers with Cleaner Production practices?

- ☐ As part of written contracts
- ☐ Encouragement with financial or technical support
- ☐ Not invloved
- ☐ Other, please describe briefly



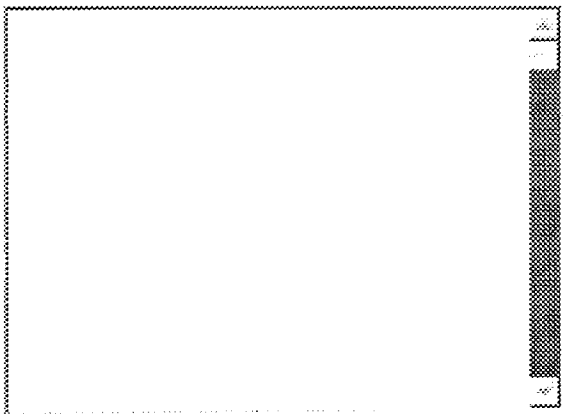
25) How does your company disseminate Cleaner Production success among local industries?

- ☐ Holding seminars or conferences
- ☐ Press releases
- ☐ Open tours

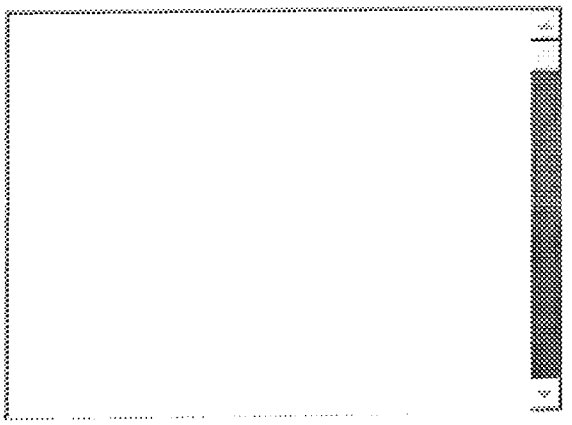
- [ ] Technical support
- [ ] Information provision
- [ ] Not disseminated
- [ ] Other, please describe briefly

Expectations

26) What expectation(s) does your company have of the local government and industries, and Cleaner Production centers?



27) Please enter any further comments or explanation.



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Thank you for your participation.

A.2 Survey on Cleaner Production Practices at National Cleaner Production Centers/Cleaner Production Organizations

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Graduate Thesis

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Nguyen P. Nguyen
Tel: (716) 242-0511
Email: npn0972@rit.edu

SURVEY ON CLEANER PRODUCTION PRACTICES AT NATIONAL CLEANER PRODUCTION CENTERS/CLEANER PRODUCTION ORGANIZATIONS

Notice: Personal information provided in this survey is confidential; other information is anonymous. If you have any questions, please write to the email address above.

Instruction: Please check the most applicable answers. If there is more than one applicable answer, please briefly explain at the end of the survey.

Organization:

Title:

Location:

Policy

1) What are your center's priorities?

- ☐ Introduce Cleaner Production to concerned parties
- ☐ Technical supporting for demonstration projects
- ☐ Financial supporting for demonstration projects
- ☐ Legislative lobbying
- ☐ Cleaner Production information distribution
- ☐ Other, please describe briefly

2) On what industries do you focus?

- Local small and medium industries
- Local large industries
- Multinational corporation's facilities

3) What is the main driving force for promoting Cleaner Production performance in the country?

- Mandatory regulation
- Marketplace pressures
- Public concern
- Self-benefit
- Other, please describe briefly

Implementation

4) To which group does your center belong?

- UNEP/UNIDO
- Government institutions
- Academic institutions
- Consultant agencies

5) What are the most useful Cleaner Production tools/approaches in the country?

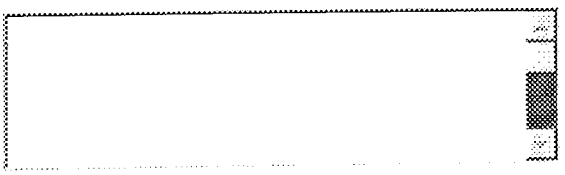
- Enforcement
- Encouragement and voluntary measures
- Successful demonstrations
- Other, please describe briefly

6) How is a Cleaner Production project typically initiated?

- ☐ Industries approach the centers for information
- ☐ The center approaches the targeted industries
- ☐ Other, please describe briefly

7) What kind(s) of Cleaner Production practices does your center perform at industries?

- ☐ Consultation
- ☐ Technical support
- ☐ Human resource support
- ☐ Financial support
- ☐ Other, please describe briefly



Performance Measurements

8) What are the important factors in successful Cleaner Production projects?

- ☐ Change of management attitude
- ☐ Involvement of employees
- ☐ Increase of financial and environmental benefit

- Improvement of technology performance and approach
- Enhancement of Cleaner Production awareness
- Improvement of environmental protection
- Other, please describe briefly

9) What are the greatest barriers to successful Cleaner Production projects?

- Lack of legislation and management support
- Lack of unity in terms of Cleaner Production practice promotion
- Lack of experience and information sharing
- Financial burdens
- Other, please describe briefly

10) How many Cleaner Production projects are conducted annually?

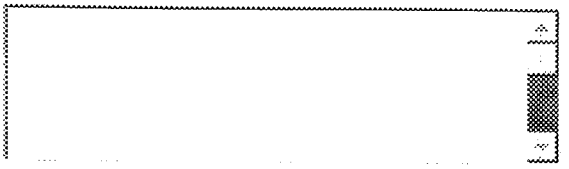
- Less than 5
- 5-20
- More than 20

NCPCs/CP Organizations and Local Industries

11) How does your center influence large and small national companies?

- By successful and persuasive Cleaner Production projects
- By support from the national and local environmental regulatory agencies

- [ ] By support from the national and local industry regulatory agencies
- [ ] By subsidized Cleaner Production projects
- [ ] Other, please describe briefly

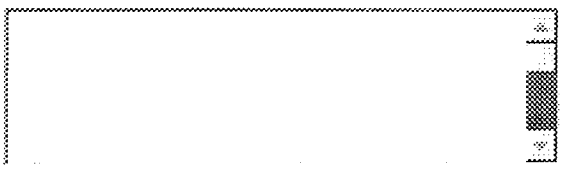


12) How does your center disseminate the experiences to other industries and stakeholders?

- [ ] Direct communications
- [ ] Seminars or conferences
- [ ] Bulletins
- [ ] Periodical or journals

13) What is the best communication method?

- [ ] Please describe briefly



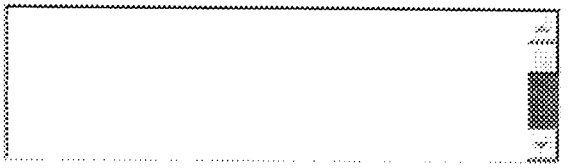
NCPCs/CP Organizations and multinational corporations

14) At what point does your center influence multinational corporation subsidiaries' into looking at Cleaner Production practices?

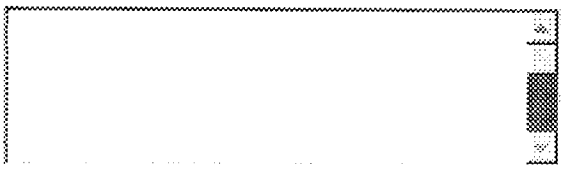
- [ ] Early intervention, at operation permission stage
- [ ] Appearance of risk of environmental problems
- [ ] As a consequence of environmental violations
- [ ] Other, please describe briefly

15) How does your center influence multinational corporation subsidiaries' Cleaner Production practices?

- ☐ Regulatory tools, please describe briefly



- ☐ Economic tools, please describe briefly



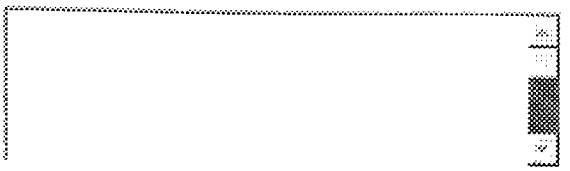
Performance Measurements

16) What benefits do your center realize from multinational corporations' Cleaner Production performances?

- ☐ Experience sharing
- ☐ Initiation and distribution of Cleaner Production practices among other multinational corporations or local industries
- ☐ Technology transfer
- ☐ Financial contribution to the center operation

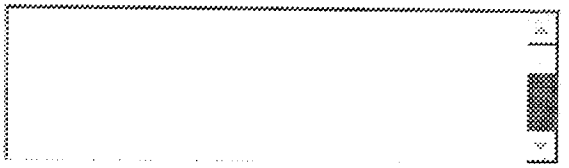
17) What supports do your center obtain from multinational corporations?

- ☐ Technical
- ☐ Human resources
- ☐ None at all
- ☐ Other, please briefly describe



18) What is your center's point of view regarding Cleaner Production practices of multinational corporations?

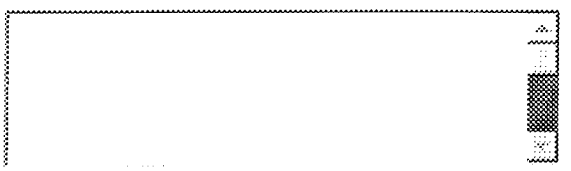
- ☐ Effective and successful
- ☐ Relatively good, but need more guidance, dynamic, motivation and support
- ☐ Unaware
- ☐ Other, please describe briefly



NCPCs/CP Organizations and the Government

19) What is the main role of the government in terms of gaining policy support on CP practices?

- ☐ Supportive
- ☐ Cooperative
- ☐ Authorized
- ☐ Not involved
- ☐ Other, please describe briefly



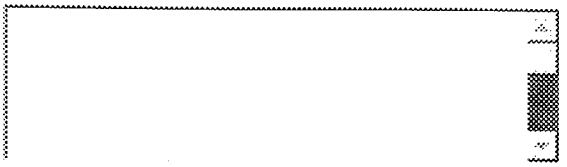
20) What are attitudes of international organizations towards the center's performance?

- ☐ Supportive
- ☐ Cooperative

☐ Authorized

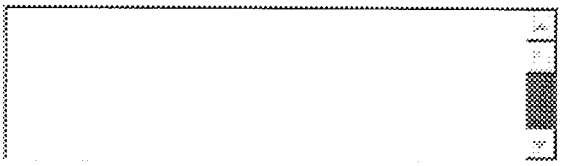
☐ Not involved

☐ Other, please describe briefly

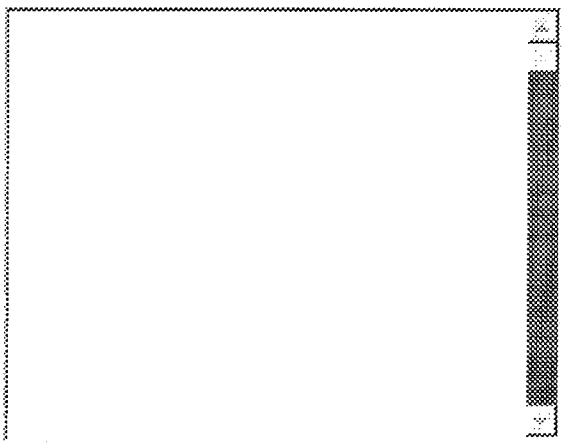


Expectations

21) What expectation(s) does your center have of the local government and industries, multinational corporations, and other international organizations?



22) Please enter any further comments or explanation.



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Thank you for your participation.

A.3 Survey on UNEP/UNIDO and Cleaner Production Practices

R·I·T Civil Engineering Technology, Environmental Management and Safety
31 Lomb Memorial Drive Rochester, NY 14623-5603 (716) 475-7318

CLEANER PRODUCTION AMONG MULTINATIONAL CORPORATIONS IN SOUTHEAST ASIA

Graduate Thesis
Master of Science in Environmental, Health and Safety Management

Nguyen P. Nguyen
Tel: (716) 242-0511
Email: npn0972@rit.edu

Survey for UNEP/UNIDO

Cleaner Production (CP) has been introduced by the United Nations Environmental Program (UNEP) and implemented throughout the world since 1989. The CP concept can be simply understood as the change from a conventional end-of-pipe treatment attitude towards a proactive approach to pollution prevention and production efficiency. Both government and private-sector industries in developed and developing countries have adopted the concept as a powerful tool to effectively utilize raw materials and energy and considerably reduce waste generation, hence significantly increasing financial and environmental benefits.

The Association of Southeast Asia Nations (ASEAN) countries are becoming an economic development center in Asia. Foreign investment by multinational corporations (MNCs) in the region has considerably increased during the last two decades, resulting in both economic development and environmental problems.

Understanding the level of CP practices among ASEAN's MNCs and National Cleaner Production Centers/Cleaner Production organizations (NCPC/CP) is important to their own development and to the environmental protection strategy of the region as well. This graduate thesis is developed with the aim of determining (1) MNCs' effectiveness of promoting CP practices among ASEAN's member countries, (2) the interaction of regional Cleaner Production centers with MNCs, and (3) knowledge learning gained through MNCs' CP practices and information dissemination among local industries.

Four surveys are developed to collect information from
- Multinational corporations operating within ASEAN's member countries
  National Clean Production Centers/Cleaner Production Organizations
- UNEP/UNIDO
- Stakeholders (in the US and Southeast Asia)

The survey results will be used to support thesis conclusions on the CP practices among MNCs in Southeast Asia.

Please complete the survey by March 15, 2001. A summary of the survey results will be sent to participants for reference.

Please accept my appreciation of your contribution and any further recommendations towards the survey.

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SURVEY ON UNEP/UNIDO AND CLEANER PRODUCTION PRACTICES

Notice: Personal information provided in this survey is confidential; other information is anonymous. If you have any questions, please write to the email address above.

Instruction: Please check the most applicable answers. If there is more than one applicable answer, please briefly explain at the end of the survey.

Organization:

Title:

Location:

1) How does UNEP/UNIDO evaluate the progress of the NCPC/CP center project?

- ☐ Successful
- ☐ Unsuccessful
- ☐ Limited achievements with further efforts, please describe briefly

2) Which criteria is the establishment of a NCPC/CP organization based upon?

- ☐ The national market needs
- ☐ Availability of establishment fund
- ☐ UNEP/UNIDO Cleaner Production development strategies
- ☐ Other, please describe briefly

3) What are the major challenges of the NCPC program?

- ☐ Financial obstacles
- ☐ Technical availability
- ☐ Trained human resources
- ☐ Support from local government
- ☐ Conflicts with the host national Cleaner Production development policy and time frame
- ☐ Other, please describe briefly

4) What are the comments of UNIDO/UNEP on the effectiveness of NCPCs?

- ☐ Financially effective and fulfilling primary objectives
- ☐ Ineffective due to unexpected influences
- ☐ Ineffective due to lack of capability to overcome expected influences
- ☐ Expanding its activities as a consultant firm with independent finance.
- ☐ Other, please describe briefly

5) In what way does NCPC performance impact Cleaner Production practices and policy within a country?

- ☐ Limited to awareness enhancement
- ☐ Gains credibility through persuasive Cleaner Production practice demonstrations among

local industries

- ☐ Involves a wide range of industrial and governmental parties
- ☐ Establishes concrete and continual Cleaner Production practices
- ☐ Influences the national environmental policy by integration of Cleaner Production into environmental regulatory procedure
- ☐ Enacts Cleaner Production practices as part of operational permitting
- ☐ Other, please describe briefly

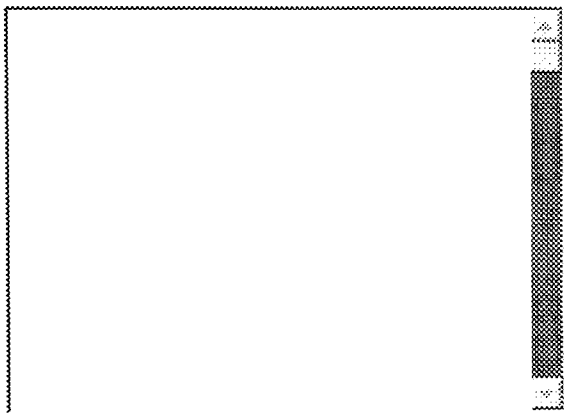
6) There is only one NCPC in the ASEAN region which was established in Vietnam. Will UNIDO/UNEP extend a network of NCPCs within the region?

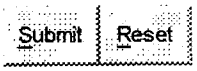
- ☐ Yes. Please describe briefly
- ☐ No. Please describe briefly

7) Would the NCPC in Vietnam be a model for others?

- ☐ Yes. Why?
- ☐ No. Why not?

8) Please enter any further comments or explanation.





Thank you for your participation.

A.4 Survey For Stakeholders on Cleaner Production Practices

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Understanding the level of CP practices among ASEAN's MNCs and National Cleaner Production Centers/Cleaner Production organizations (NCPC/CP) is important to their own development and to the environmental protection strategy of the region as well. This graduate thesis is developed with the aim of determining (1) MNCs' effectiveness of promoting CP practices among ASEAN's member countries, (2) the interaction of regional Cleaner Production centers with MNCs, and (3) knowledge learning gained through MNCs' CP practices and information dissemination among local industries.

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SURVEY FOR STAKEHOLDERS ON CLEANER PRODUCTION PRACTICES

Notice: Personal information provided in this survey is confidential; other information is anonymous. If you have any questions, please write to the email address above.

Organization:

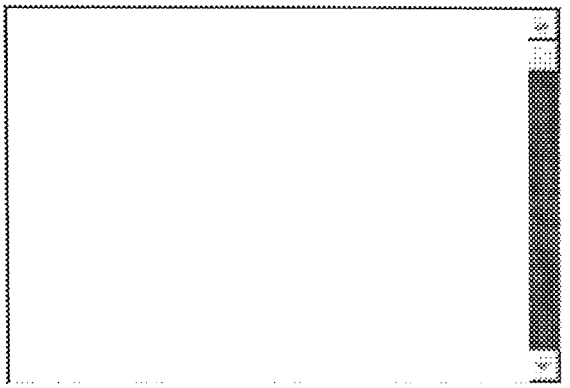
Title:

Location:

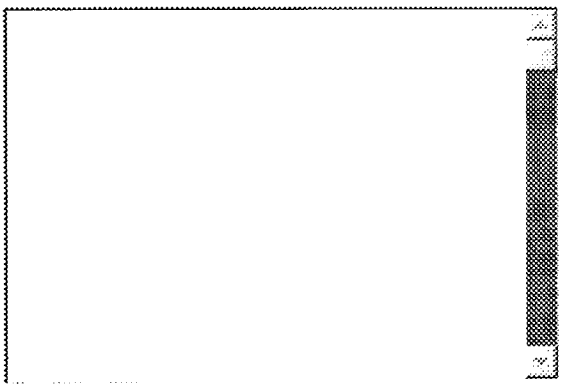
1) What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

2) a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

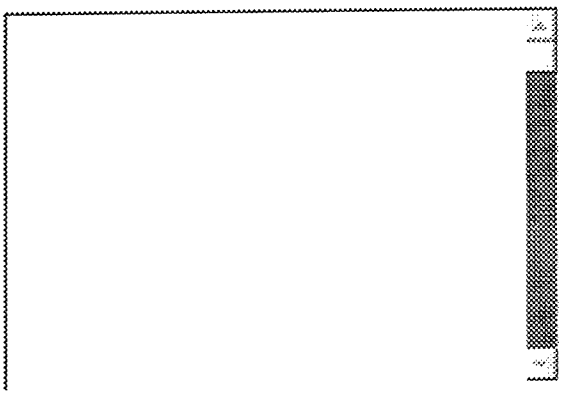
2) b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?



3) What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?



4) Please enter any further comments or explanation.



Submit Reset

Thank you for your participation.

Appendix B – Completed Surveys

B.1 Completed Survey on Cleaner Production Practices at Multinational Corporations

M1

Awareness

1 | Please describe your company's Cleaner Production practices?
Comprehensive

2 | At which management level is Cleaner Production understanding initiated?
Top management

3 | How is Cleaner Production integrated into your business?
Stated in the company's environmental policy

4 | Cleaner Production is vital to my company and it must be effectively implemented in my company's facilities
Strongly agree

5 | Does your company apply the Pollution Prevention concept, Cleaner Production's U.S. counterpart, as Cleaner Production?
No

Implementation

6 | For what reason was Cleaner Production implemented at your company? (Please check the most applicable answer)
Reduce the generation of environmental pollution
Reduce raw material and energy consumption
Improve productivity

7 | How is Cleaner Production currently implemented?
A systematic approach to Cleaner Production methodology

8 | What factor drives your company to Cleaner Production practices?
Voluntary

9 | What is the focus of Cleaner Production techniques at your company?
Recycling
Source reduction
Process modification

10 | How is recycling implemented? (Please check the most applicable answer)
Onsite recovery and use

11 | How is source reduction implemented? (Please check the most applicable answer)
Input material change
Better control process
Equipment modification
Technology change

12 | What type(s) of Cleaner Production projects does your company pursue?
Medium-term: requires intermediate investment and medium payback period

13 | What obstacle(s) have your company experienced when conducting Cleaner Production practices?
Financial problems
Lack of trained human resources

14 | What success factor(s) have your company experienced when conducting Cleaner Production practices?
Support from management
Participation of employees
Information and experience sharing

15 | What challenges do your company confront during Cleaner Production implementation?
Extra workload
Productivity decrease
Increase of labor and equipment costs

16 | What supports from the government do your company receive during Cleaner Production implementation?
Other, please describe briefly
In Thailand, we do not find any motivation from government to achieve CP implementation.

Performance Measurements
17 | What measurements are used to evaluate Cleaner Production practices?
Rate of raw material consumption over production
Rate of energy consumption over production

18 | What total financial benefit has been obtained through Cleaner Production projects' return on investment?
10%-20%

19 | How much of the total pollution load has been reduced through Cleaner Production projects?
Less than 10%

Continual Practices
20 | How is Cleaner Production financial benefit used?
Absorbed into the company accounting budget

21 | How is Cleaner Production practice continually implemented?
Sequentially, after each successful project

MNCs' Cleaner Production Practices and National Cleaner Production Centers/Cleaner Production Organizations
None at all

23 | What is your company's point of view regarding the operation of the National Cleaner Production Centers/Cleaner Production Organizations?
Effective and successful

MNCs' Cleaner Production Practices and Local Industries
24 | How does your company involve suppliers with Cleaner Production practices?
As part of written contracts

25 | How does your company disseminate Cleaner Production success among local industries?
Information provision

Expectations
26 | What expectation(s) does your company have of the local government and industries, and Cleaner Production centers?
Information and Technology support, include financial support if any.

27 | Please enter any further comments or explanation.
None of all

B.2 Completed Survey on Cleaner Production Practices at National Cleaner Production Centers/Cleaner Production Organizations

N1

Policy

1| What are your center's priorities?

Introduce Cleaner Production to concemed parties
Technical supporting for demonstration projects
Financial supporting for demonstration projects
Cleaner Production information distribution

2| On what industries do you focus?

Local small and medium industries
Local large industries
Multinational corporation's facilities

3| What is the main driving force for promoting Cleaner Production performance in the country?

Mandatory regulation
Public concem

Implementation

4| To which group does your center belong?

Consultant agencies

5| What are the most useful Cleaner Production tools/approaches in the country?

Encouragement and voluntary measures
Successful demonstrations

6| How is a Cleaner Production project typically initiated?

Industries approach the centers for information
The center approaches the targeted industries

7| What kind(s) of Cleaner Production practices does your center perform at industries?

Consultation
Technical support
Human resource support

Performance Measurements

8| What are the important factors in successful Cleaner Production projects?

Change of management attitude
Involvement of employees
Increase of financial and environmental benefit
Improvement of technology performance and approach
Enhancement of Cleaner Production awareness
Improvement of environmental protection
Other, please describe briefly
Increase the environmental performance index under government regulations

9| What are the greatest barriers to successful Cleaner Production projects?

Lack of unity in terms of Cleaner Production practice promotion
Financial burdens

10| How many Cleaner Production projects are conducted annually?

More than 20

NCPCs/CP Organizations and Local Industries

11| How does your center influence large and small national companies?

By successful and persuasive Cleaner Production projects
By support from the national and local industry regulatory agencies
By subsidized Cleaner Production projects

12| How does your center disseminate the experiences to other industries and stakeholders?

Direct communications
Seminars or conferences
Bulletins
Periodical or journals

13| What is the best communication method?

Please describe briefly
by CP mailing list, seminars and conferences

NCPCs/CP Organizations and multinational corporations

14| At what point does your center influence multinational corporation subsidiaries' into looking at Cleaner Production practices?

Appearance of risk of environmental problems
As a consequence of environmental violations

15| How does your center influence multinational corporation subsidiaries' Cleaner Production practices?

Economic tools, please describe briefly
we describe how to save the money during the process industry

16| What benefits do your center realize from multinational corporations' Cleaner Production performances?

Experience sharing
Initiation and distribution of Cleaner Production practices among other multinational corporations or local industries
Technology transfer

17| What supports do your center obtain from multinational corporations?

Technical
Human resources

18| What is your center's point of view regarding Cleaner Production practices of multinational corporations?

Relatively good, but need more guidance, dynamic, motivation and support

NCPCs/CP Organizations and the Government

19| What is the main role of the government in terms of gaining policy support on CP practices?

Supportive
Cooperative

20| What are attitudes of international organizations towards the center's performance?

Supportive
Cooperative
Authorized

Expectations

21| What expectation(s) does your center have of the local government and industries, multinational corporations, and other international organizations?

22| Please enter any further comments or explanation.

N2

Policy

1| What are your center's priorities?

Introduce Cleaner Production to concerned parties
Technical supporting for demonstration projects
Legislative lobbying
Cleaner Production information distribution
Other, please describe briefly
Capacity Building at various levels to sustain CP Programme in the country and region

2| On what industries do you focus?

Local small and medium industries
Local large industries

3| What is the main driving force for promoting Cleaner Production performance in the country?

Marketplace pressures
Public concern
Self-benefit
Other, please describe briefly
Better social and environmental performance of the clients. In addition, occupational health & safety is also one of the driving forces.

Implementation

4| To which group does your center belong?

UNEP/UNIDO

5| What are the most useful Cleaner Production tools/approaches in the country?

Encouragement and voluntary measures
Successful demonstrations
Other, please describe briefly
Cluster approach wherein employers' organisations are made responsible for CP dissemination.

6| How is a Cleaner Production project typically initiated?

Industries approach the centers for information
The center approaches the targeted industries
Other, please describe briefly
Based on the target sector, mixed approach is followed

7| What kind(s) of Cleaner Production practices does your center perform at industries?

Consultation
Technical support
Human resource support
Other, please describe briefly
In-company CP training programmes for all levels of employees.

Performance Measurements

8| What are the important factors in successful Cleaner Production projects?

Change of management attitude
Involvement of employees
Increase of financial and environmental benefit
Improvement of technology performance and approach

Enhancement of Cleaner Production awareness
Improvement of environmental protection
Other, please describe briefly
Improvement in product quality as well as working environment quality

9| What are the greatest barriers to successful Cleaner Production projects?
Lack of legislation and management support
Lack of unity in terms of Cleaner Production practice promotion
Financial burdens
Other, please describe briefly
Lack of awareness and over-emphasis on production

10| How many Cleaner Production projects are conducted annually?
5-20

NCPCs/CP Organizations and Local Industries
11| How does your center influence large and small national companies?
By successful and persuasive Cleaner Production projects
By support from the national and local environmental regulatory agencies
By support from the national and local industry regulatory agencies
Other, please describe briefly
By establishing Regional and Local CP Centres close to users and using a cooperative approach of Cleaner Production Circles for effective outreach.

12| How does your center disseminate the experiences to other industries and stakeholders?
Direct communications
Seminars or conferences
Periodical or journals

13| What is the best communication method?
Please describe briefly
Sector-specific CP Clinics in Industrial Parks/cluster of similar industries

NCPCs/CP Organizations and multinational corporations

14| At what point does your center influence multinational corporation subsidiaries' into looking at Cleaner Production practices?

15| How does your center influence multinational corporation subsidiaries' Cleaner Production practices?

16| What benefits do your center realize from multinational corporations' Cleaner Production performances?

17| What supports do your center obtain from multinational corporations?
None at all

18| What is your center's point of view regarding Cleaner Production practices of multinational corporations?
Unaware

NCPCs/CP Organizations and the Government

19| What is the main role of the government in terms of gaining policy support on CP practices?
Cooperative

20| What are attitudes of international organizations towards the center's performance?
Supportive
Cooperative
Authorized

Expectations

21| What expectation(s) does your center have of the local government and industries, multinational corporations, and other international organizations?
To create policy framework conducive to promote and develop CP programme at national and regional level

22| Please enter any further comments or explanation.
Increasing role of Centre in implementation of International Conventions related to Cleaner Production

N3

Policy

1| What are your center's priorities?

Introduce Cleaner Production to concerned parties
Technical supporting for demonstration projects
Financial supporting for demonstration projects
Cleaner Production information distribution

2| On what industries do you focus?

Local small and medium industries
Local large industries
Multinational corporation's facilities

3| What is the main driving force for promoting Cleaner Production performance in the country?

Mandatory regulation
Marketplace pressures
Public concern

Implementation

4| To which group does your center belong?

Government institutions

5| What are the most useful Cleaner Production tools/approaches in the country?

Successful demonstrations

6| How is a Cleaner Production project typically initiated?

The center approaches the targeted industries

7| What kind(s) of Cleaner Production practices does your center perform at industries?

Consultation
Technical support
Human resource support

Performance Measurements

8| What are the important factors in successful Cleaner Production projects?

Change of management attitude
Involvement of employees

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10| How many Cleaner Production projects are conducted annually?

More than 20

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12| How does your center disseminate the experiences to other industries and stakeholders?

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Please describe briefly

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15| How does your center influence multinational corporation subsidiaries' Cleaner Production practices?

16| What benefits do your center realize from multinational corporations' Cleaner Production performances?
Experience sharing
Initiation and distribution of Cleaner Production practices among other multinational corporations or local industries
Technology transfer

17| What supports do your center obtain from multinational corporations?
Technical

18| What is your center's point of view regarding Cleaner Production practices of multinational corporations?
Relatively good, but need more guidance, dynamic, motivation and support

NCPCs/CP Organizations and the Government
19| What is the main role of the government in terms of gaining policy support on CP practices?
Supportive
Cooperative

20| What are attitudes of international organizations towards the center's performance?
Supportive
Cooperative

Expectations
21| What expectation(s) does your center have of the local government and industries, multinational corporations, and other international organizations?

22| Please enter any further comments or explanation.

B.3 Completed Survey on UNEP/UNIDO and Cleaner Production Practices

U1

1| How does UNEP/UNIDO evaluate the progress of the NCPC/CP center project?
Successful
Limited achievements with further efforts, please describe briefly
Different success rates in different countries but generally the centers are successful

2| Which criteria is the establishment of a NCPC/CP organization based upon?
UNEP/UNIDO Cleaner Production development strategies

3| What are the major challenges of the NCPC program?
Financial obstacles
Technical availability
Support from local government
Other, please describe briefly
There is a difference between obstacles to the NCPC program and the CP effort in general. The above refers to the NCPC programme. In addition I would say that the lack of market economy (or competitive culture - as in the case of Vietnam) is a major obstacle.

4| What are the comments of UNIDO/UNEP on the effectiveness of NCPCs?
Financially effective and fulfilling primary objectives
Expanding its activities as a consultant firm with independent finance.
Other, please describe briefly
Again there are differences between different centers. The Indian center is for example very efficient and have a good impact but in China and Vietnam they are still struggling. I believe it is also related to the age of each center. The Indian center is the oldest and most successful one.

5| In what way does NCPC performance impact Cleaner Production practices and policy within a country?
Gains credibility through persuasive Cleaner Production practice demonstrations among local industries
Involves a wide range of industrial and governmental parties
Other, please describe briefly
Policy issues are of concern but the impact from the NCPC is limited. UNEP and UNIDO as international agencies have more influence via, e.g. the International CP declaration.

6|There is only one NCPC in the ASEAN region which was established in Vietnam. Will UNIDO/UNEP extend a network of NCPCs within the region?
Yes. Please describe briefly
The limiting factor is access of funding. Thailand recently established a CP center with funding from ADB. This center is not part of the UNEP-UNIDO network but is still expected to interact. In the longer perspective we anticipate to see more centers and some centers extending their activities to other countries (e.g. the Vietnam center may work in Laos).

7|Would the NCPC in Vietnam be a model for others?
No. Why not?
See above

8|Please enter any further comments or explanation.

U2

1| How does UNEP/UNIDO evaluate the progress of the NCPC/CP center project?

2| Which criteria is the establishment of a NCPC/CP organization based upon?
Availability of establishment fund
UNEP/UNIDO Cleaner Production development strategies

3| What are the major challenges of the NCPC program?
Financial obstacles
Trained human resources
Support from local government

4| What are the comments of UNIDO/UNEP on the effectiveness of NCPCs?
Other, please describe briefly
The response is very centre-specific. Probably an overall comment one can make, however, is that many of the NCPCs still do not have a very wide "name recognition", i.e. they have not created as wide a CP network as one might have hoped. Of course, financial sustainability is also another important issue. While all the centres that no longer have UNIDO financing still survive, some survive better than others. I think that this is because CP is actually a difficult service to sell - one has to note, for instance, that in the most market-oriented country in the world - USA - I do not believe there is one PP centre that is not wholly or nearly wholly funded by government funds.

5| In what way does NCPC performance impact Cleaner Production practices and policy within a country?
Other, please describe briefly
Again, this is very centre-specific. I would say that all NCPCs have raised awareness, although compared to the universe of enterprises, institutions, individuals out there to be made aware they have probably only touched the tip of the iceberg.
They also gain credibility through demo projects, but again only a very small percentage of industry has been touched.
Some NCPCs have been very successful at involving key players, others less so.
Some NCPCs have helped to include CP into environmental legislation - by the way, why just environmental legislation? There's piles of other types of legislation where you could insert CP.

6|There is only one NCPC in the ASEAN region which was established in Vietnam. Will UNIDO/UNEP extend a network of NCPCs within the region?
Yes. Please describe briefly
We have wanted for several years to open an NCPC in the Philippines and in Indonesia. We simply have never found a donor.

7|Would the NCPC in Vietnam be a model for others?
No. Why not?
Viet Nam has a very particular political and institutional set-up, so I do not believe it could really be a model. Of course, the principles would be the same.

8|Please enter any further comments or explanation.

B.4 Completed Survey for Stakeholders on Cleaner Production Practices

Group 1: Businesses

SB1

1|What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

There should not be a contradiction between CP and e-o-p. Both approaches are necessary and complement one another. Only with CP you cannot reach the standards.

2|a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

Main problem in the ASEAN region is still that most of the resource prices are to low to force enterprises to implement CP. Therefore, only to build up capacity for CP is not enough. More emphasis has to be made on policies to establish a legal framework (with market based instruments) to support CP.

2|b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

See above

3|What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries on a market-based or government-based incentives?

See above

4|Please enter any further comments or explanations

SB2

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
I feel Cleaner Production Technology in the true sense should incorporate Pollution free technology. This would imply any material that is likely to cause pollution is converted into a saleable / useful byproduct.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
I feel there are very few responsible MNCs who appreciate a well-structured CP PP programme. The MNCs are in business in ASEAN region of selling technology and separately Pollution Control technology -- making expensive deals on both counts. The reason is MNCs' priority in ASEAN region is to be in business first. It is often felt there is a strong silent understanding among MNCs in business
between the MNCs

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
The local government, local NGOs should apply pressure on MNCs for truly CP technologies. A blue print of the technology to be offered by the MNC is to be studied in advance by the local governments, Local NGOs.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

The local government, local NGOs should apply pressure on MNCs for truly CP technologies. A blue print of the technology to be offered by the MNC is to be studied in advance by the local governments, Local NGOs.

It should be on government based incentives. Awareness programme through media, school level, inter - govermental regional seminars, would assist in Government's decision.

We should try to associate the following along with any CP / PP efforts:
1. Choice of Environmentally Sound Technology(EST)
2. Does it generate empolyment among women
3. Can it be coupled with the existing technology
4. Occupational health and Hygiene

If you should examine the Technology for treatment of used batteries - there is not a single MNC in ASEAN region who are in business of true ESTs for Recovering Secondary lead, zinc, other metals. The local government also does not have a true collection programme.

More importantly the Basel Ban Convention has stopped transboundary movements of select metal Scrap giving rise to backyard recycling. As a result the various stakeholders, MNCs, and the local governments, NGOs should meet to discuss. The recommendations of such a meet should be fine tuned by individual governments for directives.

4 | Please enter any further comments or explanations

Group 2: Institutions

SI1

1|What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

Cleaner Production should be one of the core pillars of the 3P (Profit, Planet, People) sustainability concept. Cleaner production leads to more responsible corporation management.

2|a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

The current CP/PP is still weak, but not only in Asia. The interest in Asia is growing very quickly. However, the basis is often only on technology and not an organisational development, including vision and processes of organisation innovation development.

2|b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

A cleaner production policy dissemination analysis should set the floor for further awareness raising, education and network development for further elaboration of the concept.

3|What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

In principle a mixture of both; it depends on the national situation which model is preferable, but anyhow both stakeholders should see their optimal place in the development.

4|Please enter any further comments or explanations

SI2

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

Cleaner production is a better wording than pollution prevention, since the former is more proactive. By definition, cleaner production covers a wider scope of concepts and activities than pollution prevention.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

I believe that most multinational corporations are actively promoting cleaner production in this area, although some of them do not want to share their experience with the others. The reason is mainly because the most significant achievements in cleaner production are associated with new changes in the production methods or design, which are confidential

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

Consumer support is one of the key issues to promote cleaner production. Consumers here mean private and corporate buyers. Therefore, supply chain pressure and public education are all very important.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

Government leadership and investment is crucial. Government support has to have a critical mass. A little bit of money here and there usually does nothing. The experience in Taiwan can be adopted by other ASEAN countries.

4 | Please enter any further comments or explanations

SI3

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
I think as PP as more limited, just looking opportunities for making them with less waste and emissions. When I think about CP, I think more about re-thinking the products themselves.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
I don't know from any first-hand experience. I have heard claims from U.S. MNC's that they use the same standards in non-US plants as they do in U.S., but I'm skeptical.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
1. Economic incentives!!!! Raise the cost of waste disposal. 2. stronger regulations and enforcement. 3. Strong NGO's with access to media. These thee things have encouraged PP in U.S.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?
see 2 b

4 | Please enter any further comments or explanations

SI4

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

Cleaner production (CP) and pollution prevention (P2) are very important for the whole world, not only for the industrial or manufacturing sector, but also for business, service, and primary (resource) industry, also for everyone.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

Multinational corporations (large organizations) within ASEAN region are actively participating in CP and P2 practice, especially Japanese and German related corporations. Their effort together with the government will form the very important base for SMEs to joint.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

I think in addition to demonstration plants, training, government incentives and support, encouragement from large companies, it is important to implement Networking, Integration, Benchmarking, Coordination so that the effects can be more quickly multiply to the SMEs and through the SMEs.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

I think both are very important to help SMEs to practice CP and P2. Again, the trade departments and associations should coordinate and integrate the market-based incentives. The EPAs, national productivity organizations (NPOs) should coordinate and integrate the government-based incentives.

4 | Please enter any further comments or explanations

There are many tools for CP and P2 such as EMS, EPI, LCA, DfE, etc and there are many similar terms such as waste minimization, good housekeeping, green productivity, etc to achieve the same purpose. So the implementation must be flexible and needs good integration and coordination to achieve multiply effects and good results.

SI5

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
CP was initiated by UNEP and is known in the European Continent, while PP is better known in the U.S.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
The market drives them to adopt it - an example are the export driven firms in the Phil, like the electronics companies - they are even ISo-14000 accredited because the market demands it.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
Integration of National Policies, Strategies, and Action Plans are ideal.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

4 | Please enter any further comments or explanations

SI6

1|What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
from corrective to preventive
2|a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
dual standard at home and offsite
2|b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
stronger national policy to internalize the externalities
significant driving force from Command and Control
supporting driving force from Market Based Incentive
less stick, more carrot policy system
3|What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?
briefly touched in 2b
4|Please enter any further comments or explanations
re-synchronize government policies from "measurement" at end-of-pipe to performance-measurement of product/process
generate significant (currently still insignificant) business competence of CP capability
appropriate adjustment of externalities internalization among ASEAN neighbors to create balanced fair-game environment on industrialization
complete brainwashing at educational sector to influence the product design, process innovation, and resource recovery throughout entire LCA

Group 3: Government Agencies

SA1

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

To my opinions, these terms have been used interchangeably by various Asian organizations, but in fact cleaner production aims toward manufacturing processes and pollution prevention is more broader covering all activities. That is to say, cleaner production is subset of pollution prevention. Both terms concentrate on source reduction.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

Multinational corporations within ASEAN region are very responsible for the environment due to the corporations' environmental policy. Nearly all of them got ISO 14001 certificate.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

We do not need to encourage the multinational corporations to participate because cleaner production is part of their corporate strategic plans.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

To be more competitive in the global market, Each ASEAN country needs to incorporate pollution prevention as a country's development master plan. It is not important to set up a new agency to take care cleaner production policy. However, networking is crucial for success of the policy.

4 | Please enter any further comments or explanations

SA2

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?

To deal with pollution problems, A command and control approach has implemented in Thailand. However, the success of this approach has been limited due to a number of problems including budget limitation and ineffective enforcement. In addition economic crisis in the country is a significant factor to encourage both government and private sector to turn to CP concepts to response to the continuing environmental degradation.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?

Number of corporations on CP/P2 has been currently carried out among ASEAN countries including regular meeting and establishment of the Asia-Pacific Roundtable for Cleaner Production. The Roundtable aims at taking a stock of the progress made so far in P2 dissemination by bringing together all the stakeholders worldwide. Moreover, The Asian Development Bank assisted 6 Asian countries to carry out a study on the Promotion of CP Policies and Practices in Selected Developing Countries. The countries include Philippines, Indonesia, Vietnam, India and Thailand.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?

Number of activities should be done to encourage the participation of corporations in CP including:
- *Improve outreach to SMEs*
- *Strengthened legislation and incentives*
- *Support for adoption of CP*
- *Increased awareness of CP in financial institutions*
- *Improve transparency by encouraging environmental reporting of Asian business*
- *Continued CP promotion and networking*
- *Expand focus of CP to other non-manufacturing such as tourism*

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?

To strengthen capabilities of APRCP would be a good way of getting countries in Asian interested.

4 | Please enter any further comments or explanations

Useful information on CP among multinational corporations in Asia-Pacific can be found in a book named "The Status Report CP in Asia Pacific" Prepared by UNEP, APRCP and TEI.

SA3

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
CP is not broad enough. It is a small sub-set of P2 and sustainable development. P2 includes other sustainable concepts and should be adopted as the international standard.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
Multinationals are generally doing better than host country companies.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
Provide an agenda that matters to the corporations, not just the policymakers. Provide incentives to the corporations.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?
Provide significant awards or marketing rights to those who produce the most energy efficient or sustainable products and services.

4 | Please enter any further comments or explanations

SA4

1 | What are your opinions about Cleaner Production vs. Pollution Prevention concepts?
It is an excellent tool to improve environmental performance.

2 | a. What are your opinions on current Cleaner Production/Pollution Prevention performance among multinational corporations within ASEAN region?
It is not moving quick enough.

2 | b. And what would be done to encourage the participation of the corporations in Cleaner Production/Pollution Prevention efforts?
Sell the concept as a way of meeting business objectives.

3 | What are your suggestions on the institutionalization of Cleaner Production/Pollution Prevention in ASEAN region or other developing countries, on a market-based or government-based incentives?
Build institutional capacity

4 | Please enter any further comments or explanations