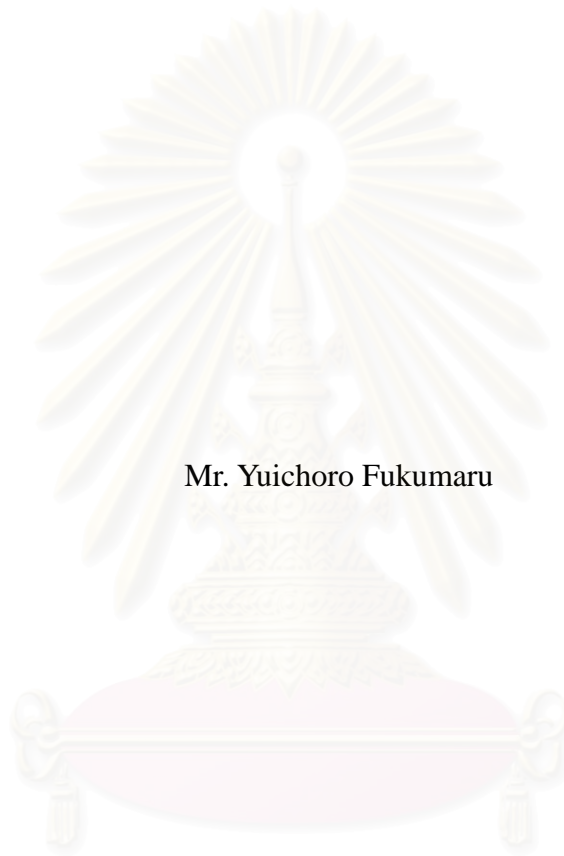


**ENVIRONMENTAL MANAGEMENT OF JAPANESE COMPANIES IN THAILAND
: THE CASE OF ELECTRICAL AND ELECTRONICS INDUSTRIES**



Mr. Yuichoro Fukumaru

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย
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วิทยานิพนธ์ฉบับนี้ทำการศึกษาการจัดการสิ่งแวดล้อมของบริษัทญี่ปุ่นในประเทศไทย โดยศึกษาบริษัทในอุตสาหกรรมไฟฟ้าและอุตสาหกรรมอิเล็กทรอนิกส์ที่เป็นทั้งบริษัทผู้ป้อนสินค้า และบริษัทผู้ค้ารายใหญ่ โดยมีวัตถุประสงค์ในการศึกษา คือ 1) เพื่ออธิบายถึงการบริหารจัดการสิ่งแวดล้อมของบริษัทญี่ปุ่นในประเทศไทย โดยเปรียบเทียบกับบริษัทญี่ปุ่นที่ประกอบการอยู่ในประเทศญี่ปุ่น 2) เพื่อทดสอบว่าสิ่งใดเป็นปัจจัยสำคัญที่ทำให้บริษัทญี่ปุ่นเริ่มการบริหารจัดการสิ่งแวดล้อมในประเทศไทยและยังปฏิบัติมาอย่างต่อเนื่อง 3) เพื่อศึกษาถึงผลกระทบของการบริหารจัดการสิ่งแวดล้อมของบริษัทญี่ปุ่นในประเทศไทย ว่าจะส่งผลกระทบต่อการแข่งขันของบริษัทญี่ปุ่นในตลาดของไทย ซึ่งในการศึกษาค้นคว้าครั้งนี้ใช้ระเบียบวิธีการศึกษาแบบการวิเคราะห์เชิงคุณภาพ โดยการสัมภาษณ์ผู้บริหารโดยตรงหรือผู้ที่มีหน้าที่โดยตรงในการดูแลการจัดการสิ่งแวดล้อมของบริษัทญี่ปุ่น

ผลการศึกษา พบว่า การจัดการสิ่งแวดล้อมของบริษัทญี่ปุ่นในประเทศไทยในปัจจุบันมีการพัฒนาขึ้นเมื่อเปรียบเทียบกับในอดีตที่ผ่านมา และไม่มีบริษัทใดที่อาศัยความหละหลวมทางกฎหมายสิ่งแวดล้อมของไทยเป็นแรงกระตุ้นในการเข้ามาประกอบการ โดยปัจจัยสำคัญที่บริษัทญี่ปุ่นยังคงดำเนินการจัดการสิ่งแวดล้อมในประเทศไทย เนื่องจากประเทศไทยมีกฎหมายการจัดการสิ่งแวดล้อมบังคับใช้กับบริษัทญี่ปุ่น นอกจากนี้ ทุกบริษัทสามารถเพิ่มความสามารถในการแข่งขันได้โดยการดำเนินการจัดการสิ่งแวดล้อม รวมทั้งยังพบว่าบริษัทที่ได้รับการวิจัยในครั้งนี้ ส่วนใหญ่ใช้กลยุทธ์ในการพัฒนากระบวนการผลิตที่มีความแตกต่างจากบริษัทอื่นมิใช่การลดต้นทุน

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.....ทรัพยากรธรรมชาติ.....

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This study focuses on environmental management of Japanese enterprises in Thailand, including supplier and assembly companies. The industry researched is the electric and electronics industry.

This research has three objectives: 1) to describe the environmental management practice of Japanese companies in Thailand as a comparison with the companies operated in Japan; 2) to examine what are the important factors for Japanese companies to start and keep implementing environmental management in Thailand; and 3) to study the impact of implementing environmental management on competitiveness of Japanese companies. The method used in this study is descriptive analysis based on interviews to companies' executives or person being in charge of environmental department by using the questionnaire. Moreover, three hypotheses are tested in this study, which are cost reduction hypothesis, pollution haven hypothesis and competitiveness hypothesis.

In terms of first objective, the practices of environmental management by Japanese companies in Thailand have improved. There is no company who think Thailand is pollution haven because of the lax environmental laws and standards. Regarding with second objective, the important factor to implement and keep environmental management is Thai Environmental Laws and regulations for Japanese companies. The requirement from trading partners is also important factor for the companies. With regards to the third objective, every company can enhance the competitiveness through environmental management practices. The differentiation focusing on the improvement of production process is the dominant advantage, not cost reduction, among the companies researched.

Field of Study..Environmental and Natural.. Student's signature.....

.....Resource Economics.....

Academic Year..... 2004..... Advisor's signature.....

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จุฬาลงกรณ์มหาวิทยาลัย

ABBREVIATIONS

FDI	Foreign Direct Investment
R & D	Research and Development
NEQA	National Environmental Quality Act
ONEB	Office of the National Environmental Board
EIA	Environmental Impact Assessment
PCD	Pollution Control Department
NGO	Non-Governmental Organization
TISI	Thailand Industrial Standard Institute
TC 207	Technical Committee 207
Asian NIEs	Asian Newly Industrializing Economies
TISTR	Thailand Institute of Science and Technology
EID	Electronics Industry Department
NECTEC	National Electronics and Computer technology Center
MOSTE	Ministry of Science, Technology and Environment
IC	Integrated Circuits
BOI	Board of Investment
EU	European Union
ASEAN	Association of Southeast Asian Nations
SME	Small and Medium Enterprises
SETAC	Society of Environmental Toxicology and Chemistry
UNEP	United Nations Environmental Program
OECD	Organization for Economic Cooperation and Development
CSR	Corporate Social Responsibility
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
WBCSD	World Business Council for Sustainable Development
JETRO	Japan External Trade Organization
ISO	International Organization for Standardization
OA	Office Automation
QS	Quality Standards
RoHS	Restricting the use of Hazardous Substances
CNC	Control by Numeral Console
EDM	Electric Discharge Machine

CHAPTER I

INTRODUCTION

This chapter describes the introduction of this study. Statement of problem, specific features of Japanese environmental management and historical view of Thai environmental policy are discussed in 1.1. Research question is in 1.2, objectives of the study are in 1.3 and scope of the study is 1.4. Also, hypotheses to test through this study are shown in 1.5 and significance of this study is argued in 1.6. Finally, organization of the study is stated in 1.7.

1.1 Statement of Problem

Companies of industrialized countries no longer manufacture the whole products in their own country. It has been common that the companies go out from own country to manufacture in developing country where prices and costs are relatively cheap.

The aim of Foreign Direct Investment (FDI) by industrialized countries has been the international division of labor with the advantages of cheaper production costs and prices, in order to increase the productivity. Recently, it has been expanded not only implementation of Research and Development (R & D) but also making the country as main production and sales base to the Asian market.

Japan accomplished an outstanding economic growth in 1960s and also created serious domestic environmental problems in 1970s. Then Japanese companies went out from Japan accompanied with domestic economic growth in 1970s. At the same time, environmental pollution problems had increased in developing countries especially Southeast Asian countries.

Environmental concerns which had started in the 1960s have led to various environmental management practices such as the global standard of ISO14000 and enactment of domestic environmental laws.

At present, business cannot ignore the environment. Environmental concerns are very active in industrialized countries. However, with regard to many of developing country which has increased the impetus of economic development since

the end of 1990s, even if the countries enact environmental laws, they still have a lot of matters to improve their environment because of the enforcement the environmental laws in practice and growth-oriented thoughts etc.

In case that company of industrialized country manufacture in own country, they have to consider the environmental conservation activities in business because of strict government policy and its strong enforcement power, and high consciousness of customer, holding company or other business connection.

However, in case that the company invest and start manufacturing in developing country with any reasons, the environment surrounding the manufacturing activity may be totally different from own country such as government supports, law, its enforcement power, prices, labor cost, labor skill, climate, nature resource, and culture and so on. In addition, the pressure from stakeholders against the implementation of environmental conservation activities of company may be relatively less than in industrialized country.

Originally, product quality is Japanese companies' competitive characteristic. In addition, environmental management has become one common matter to run business in today's industrial sector. The number of Japanese companies who are acquiring ISO 14001 is the largest in the world, more than European countries. It may indicate the high concern on environment by Japanese companies. It may also show the high concern on environment of Japanese government to provide high incentives for local companies to mind the environmental conservation activities.

However, companies located in developed country may not share the same concern or practice of environmental management with the same commitment. Among the Japanese companies investing in Thailand, some of the companies have high concern on environmental management by private company, while others appear to be less concerned with environmental issues. Do Thailand's polluted environment and lax environmental laws affect the implementation of environmental management of companies which are located in Thailand? On the other hand, to what extent, are Japanese companies causing environmental problem in Thailand?

When Japanese companies invested in Thailand in 1960s, they were blamed for destroying the environment in Thailand. Nowadays the problem has been no longer discussed, but whether the problem was solved or not? How was it improved?

Or whether Japanese company still think pollution haven as one of the incentives to invest in Thailand as same as before?

Thai economy recovered from the economic crisis in 1997 and grew remarkably. In terms of foreign relation of Thailand with Japan, these two countries have had a close economic relation through Official Development Assistance (ODA), technology transfer, investment and tourism etc. Especially the relation of foreign direct investment between Thailand and Japan has been very close. Japanese companies which invest in Thailand have been increasing in recent years accompanying with the growth of Thai economy.

According to the Thailand Board of Investment data, its percentage of number of start-up business in 2003 for total was 35%, followed by EU 22% and Taiwan 10%. The amount of total investment was 31,774 million baht. Business activities of Japanese companies in Thai economy also have been increasing. It has been widely acknowledged the role of Japanese investment as a driving force of the growth of Thai economy.

On the other hand, how would the contribution of Japanese companies on environment in Thailand be? How would the concerning and implementation of Japanese companies in Thailand on environment be? Has it improved since 1970s?

1.1.1 Japanese Environmental Management

Japan is the first country which experienced not only the economic growth, but also serious environmental pollution in Asia. However, environmental concerns have been increased and Japan has been increasing concerns on the environment, including environmental management practices by private sector.

A holistic view of environmental management means that setting formal rules to structure and regulate complex relations among many factors involved in environmental management is important (Yong, 2003). Such factors are, for example, strict environmental regulation, effectiveness and reliable enforcement of agency, availability of funds and technologies, political interest in environmental protection, and social norms and cultural values influencing people's concern about environment.

However, most interesting but most difficult factor relating environmental management is economic development. Comprehensive view means to understand how these factors are interdependent.

Japan ended up creating serious pollution problems as a result of the success of economic growth, and subsequently Japan succeeded in environmental management later. How have the concern of environment and environmental management been improved in Japan?

Japan as same as other countries began to make pollution control programs as a result of serious pollution problems brought by rapid economic growth. Japan enacted the first national environmental legislation in 1967 which is called Basic Law of Environmental Pollution Control. And Japan established the first independent national environmental administration in 1971.

Yong Ren (2003) summarizes Japanese success of environmental management into four factors as below. First is the use of cooperative approaches in environmental governance. Second is the integration of environmental protection with technological and economic development. Third is the development and rigid enforcement of environmental policy. And last is large-scale investment in environmental technology development and environmental protection.

Accordingly, Yong indicates four major lessons from Japanese experiences with environmental management like;

- (1) Approach environmental issues in a cooperative manner
- (2) Balance economic development and environmental protection
- (3) Build an effective national environmental policy system, and
- (4) Develop environmental finance mechanisms

In terms of ISO 14000 in Japan, the Ministry of International Trade and Industry (MITI) does not directly administer the ISO 14001 program, but MITI has helped establish what may be a less costly institutional structure through which organizations can gain information, assistance and accreditation. However, adoption of ISO 14001 is completely voluntary. No sanctions are associated with non-adoption and no direct benefits or pressure for adoption are provided by MITI or other agencies.

It is evident that the certification process is potentially complex and may entail high costs. As a result, the adoption decision is not taken lightly. Nevertheless, around the world ISO 14001 adoption levels continue to rise (Zharen, 1995; Lamprecht, 1997; Prakash, 1999).

Especially, adoption of ISO 14001 in Japan has far outstripped adoption rates in other countries (Prakash, 1999). In April 2000 the total number of ISO certified organizations in Japan was 3548, while the runner up country, Germany, had only 1950 certified organizations. Sweden and the United Kingdom were third and fourth with just over 1000 each and the United States was fifth with 750. The rate of adoption as well as the total number of certificates has increased in Japan. The number of Japanese firms adopting ISO 14001 jumped significantly from below 300 in March 1997 to over 3000 in April 2000.

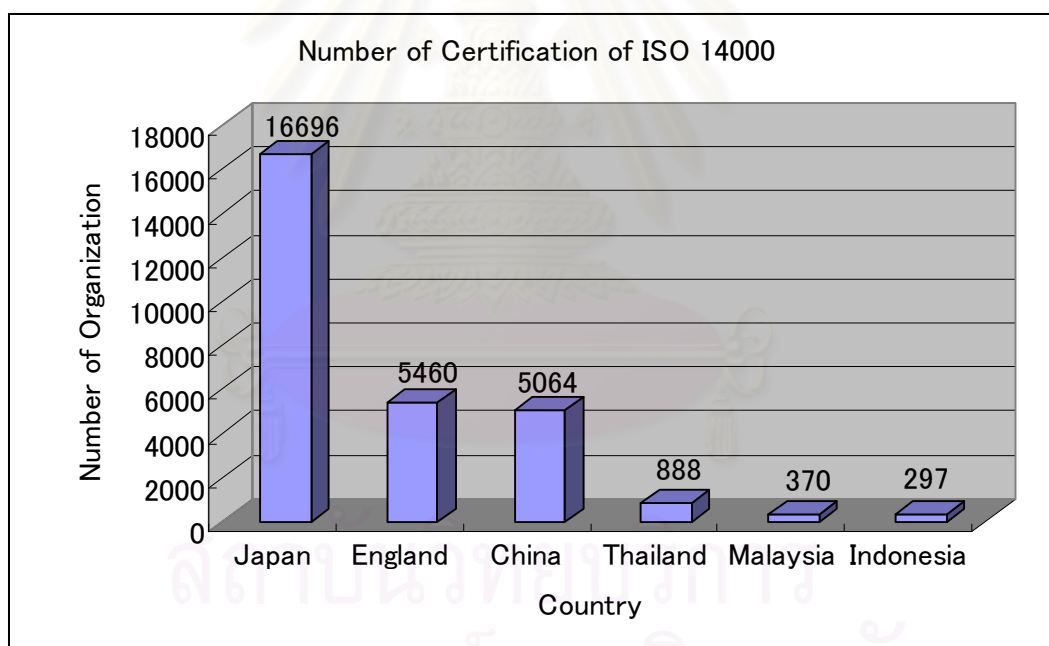


Figure 1.1: Number of Certification of ISO 14001 (Dec 2004)

(Source: <http://www.ecology.or.jp/isoworld/>)

On the whole, the ratio of certified companies of electric and electronics industry has been decreased. However, this may be brought by the increasing the companies which get the certification of ISO 14000 in other industry since 1998. More interesting thing from the figure 1.2 is that electric and electronics industry has been interested in environmental management practices through ISO 14000 earlier than other industries.

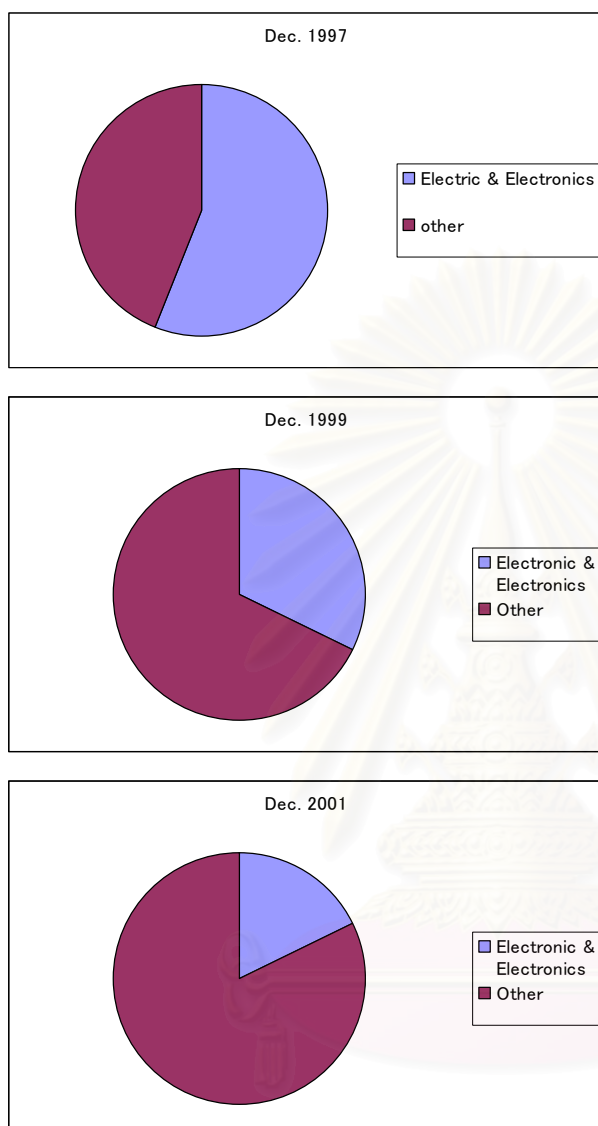


Figure 1.2: Transformation of Component Ratio of Certification of ISO 14001 in terms of Electric and Electronics Industry

(Source: <http://www.ecology.or.jp/isoworld/>)

1.1.2 Multi-National Company and Position of Thailand

Production base of multi-national companies in Thailand increased rapidly especially after the later of 1980s, which export-oriented products took a leading part. Most of the products were low- or middle-grade products. And the production process is also mainly labor-intensive assembling process relatively, mass production, with using cheap labor cost in Thailand as a market competitive power.

In 1990s, not only price competition but also competition of differentiation were keener and the component of the products also increase relatively high value added product. On the other hand, a part of low- and middle-grade products were transferred to China or Vietnam to find lower labor than Thailand.

Also, the major trading country of products and parts diversified further. With regard to export, it reduced the export to America which was main country to export till that time, and on the other hand, increased export to Japan and ASEAN region especially Singapore. Besides, with regard to import, it declined the ratio to import from Japan and America and increased from ASEAN region.

Thailand has been a labor-intensive production base of international division of labor, which operates producing parts and assembling product. Moreover, Thailand has gradually enhanced the role of being supply base whose products are composed of high value-added products including electronics products among Asian region especially ASEAN region.

1.1.3 Thai Environmental Policy

Thailand's first policy on environment was Factory Act of 1969. This Factory Act decided basic policies to prevent industrial pollutions. Under this policy, the Ministry of Industry had responsibility for setting and enforcing emission standards.

Then, in 1975, Thai government passed the Enhancement and Conservation of National Environmental Quality Act (NEQA). The Office of the National Environmental Board (ONEB) was established under NEQA as an environmental monitoring agency. The main objective of NEQA was to oversee and manage the environment by prescribing the role of ONEB as an advisor to the Prime Minister with regard to environmental policy (Sunee, 1994). Also, NEQA initiated Environmental Impact Assessment (EIA) to observe the environmental impacts by development activities such as construction of new factory in terms of industrial sector. At that time, Thailand is one of the few countries which set EIA earliest in Asia. ONEB had increased concerns on the environmental policies and regulations among industrial sector. However, because they lacked the power to exact the policies, the enforcement had been insufficient.

The National Economic and Social Development Board's seventh plan (1992-1996) established specific environmental improvement targets for the first time. To meet the targets of the seventh plan, the government integrated environmental criteria into Board of Investment promoted privileges for foreign country investing in Thailand and revised the NEQA of 1975 in 1992 (Michael. Rock, 2002).

NEQA of 1992 is Thailand's first comprehensive environmental framework law. NEQA of 1992 carried out a reform of environmental administration and started new programs for some important policies. First of all, NEQA of 1992 established three new offices taking the place of ONEB. First is Pollution Control Department (PCD) for setting emissions standards and monitoring and enforcing those standards. Second is Office of Environmental Policy and Planning for developing a national environmental plan and administering EIA. And third is Department of Environmental Quality Promotion for enhancing public education on environmental protection and proving specialized environmental knowledge to other government agencies (Limanon, 1999).

Secondly, the government set an Environmental Fund, and financed five billion baht from government budget to the aid. Also, NEQA of 1992 took Polluter Pays Principle in order to hold polluters to strict civil liabilities and criminal penalties. This environmental aid is also regulated to be supplemented from penalties or service levied on polluters under the Polluter Pays Principle.

Thirdly, NEQA of 1992 appears to provide for strong command-and-control regulatory framework by granting the PCD the authority to set standards and to monitor and enhance them (Michael, 2002). The PCD also has the authority to require plants to install pollution control equipment, and it can fine them up to four times the daily cost of operating such equipment (Sunee and Canino, 1998). And the enforcement work of PCD is concentrated into specified pollution prevention area.

In addition, NEQA of 1992 enhances Non-Governmental Organization (NGO) participation in environmental matters by granting them the legal right, and it legally approved a citizen's right to know the national environmental plan and to participate to its establishment.

However, all of these policies have not worked well in practice, because of overlapping responsibilities for monitoring and enforcement as well as limited resources to carry out these tasks (Michael, 2002). Moreover, there are some factors contributing to the failure of implementation policies such as the lack of human resource, corruption etc.

To make matter worse, Thailand lacks an emission permit system, and the PCD continues to lack full legal authority to inspect and enforce its emission standards. World Bank reported on industrial pollution management in Thailand as below;

Public institutions responsible for environmental management are highly segmented with little coordination among them. Compliance and enforcement functions are split among the Departments of Industrial Works, Pollution Control, and land Transport. This has led to poor implementation of the National Environmental Quality Act. Moreover, current enforcement efforts suffer from inadequate procedures, institutional overlap, insufficient staff capability, a lack of incentives, and weak monitoring and reporting capability (World Bank, 2000).

Thai government also has promoted the ISO 14000 environmental standard of International Standard Organization to provide a stimulus to environmental cleanup since early of 1996. Thailand Industrial Standard Institute (TISI) within the Ministry of Industry has been very active on the ISO's Technical Committee 207 (TC 207), which developed the criteria for ISO 14000 certification. But so far, their effort does not seem to be having much effect. As of December 2000, 302 companies in Thailand over ISO 14000 certificated, most of them are multi-nationals, and all but 24 were certificated by other rather than by TISI.

What would Thai government need to succeed in promoting environmental management? Michael (2002) stated that the limited success of Thai government's efforts to employ internal and external pressure on polluters suggests that this tactic may not work in the absence of a more effective command-and-control regulatory agency.

Martin Janicke and Helmut Weidner (1997) argue that in order to understand why a nation succeeds in managing environmental problem, one must consider a number of factors and their complex interactions. In this article, although this issue

will be not discussed in detail, there is room for reconsidering this matter.

1.2 Research Questions

This study aims to answer the following research questions.

- 1) What are the incentives for Japanese companies to implement environmental management in Thailand?
- 2) Have Japanese companies enhanced competitiveness by implementing environmental management in Thailand? And what kind of advantage do Japanese companies get by performing environmental management?
- 3) Does ISO 14001 make any contribution to enhance differentiation of companies' product in market?
- 4) Does Thai Environmental Law affect Japanese companies to implement environmental management?

1.3 Objectives of the Study

The specific objectives of this research are:

- 1) To describe the environmental management practice of Japanese companies in Thailand as a comparison with the companies operated in Japan,
- 2) To examine what are the important factors for Japanese companies to start and keep implementing environmental management in Thailand, and
- 3) To study the impact of implementing environmental management on competitiveness of Japanese companies.

1.4 Scope of the study

The scope of this research is delimited to electrical and electronics industries such as household electric appliances, electric industrial machinery, manufacturing and processing electric and electronics parts companies and so forth. The target companies of this study are 100% Japanese ownership companies or joint venture companies which Japanese company cooperates with other nationalities' company in any proportion of the ownership ratio. In the companies researched, some of the selected companies mainly target on the local market in Thailand, others aim to export their products to Japan or other countries.

1.5 Hypotheses

Recently, the concern about environment has been growing in domestic and international markets. And it is often insisted the importance to realize sustainable development with long-perspective by industry sector. A number of previous researchers proved that environmental management by industrial company has a possibility to create economic benefit. This research will test the following hypotheses:

H1: Pollution haven is an incentive for Japanese companies to invest in Thailand

H2: Environmental Management practiced by the Japanese companies in the Thai market enhances the company's competitiveness

H3: The company achieves cost reduction by implementing environmental management practices.

1.6 Significance and Justification of This Study

The market of electric and electronics industry has been severer than before because of the growth of Chinese products. The products which have short life time and cheap price have been purchased well. The Japanese companies in the electric and electronics industry have performed model changes of products with very high cost for research and development. However, on the other hand, it may be that the characteristic of Chinese products meet the needs to buy new products and easily to dump old products.

Japanese companies are confident of the quality of products. However, they are defeated by China in the price competition. However, there is new field of competition, which is environment. Concerns on environmental impact through companies' activities have been increased globally. Whether are Japanese companies able to win in this competition on environment? Do the companies enhance the competitiveness through its environmental management practices?

Many Japanese electric and electronics industry have invested in Thailand as one of the biggest production bases in Asia. Therefore, this research will focus on electrical appliances and electronic products companies.

Although these industries are comparatively not so polluting industries in Thailand at present, this research aims to study the economic benefit by implementing environmental management. Hence, the most important point for this research is what the companies have been concerned environmental sufficient business and how do they deal with pollutions through environmental management practices in Thailand, not the size of pollution.

1.7 Organization of the Study

The organization of this study is as follows. Chapter 1 is introduction. The introduction discusses the context of implementation of environmental management by Japanese multinational companies in Thailand. The background of electric and electronics industry is in Chapter 2, describing the circumstances of the industry in Thailand from historical perspective. Conceptual framework for this study is stated in Chapter 3.

Chapter 4 shows research methodology. Chapter 5, research findings, examines the environmental concern and practices of each company in three aspects, environmental management practices, important factors affecting environmental concern of company, and competitiveness. The overall analysis of the Japanese companies is discussed in Chapter 6. Finally, Chapter 7 draws conclusion of this study.

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CHAPTER II

BACKGROUND OF ELECTRIC AND ELECTRONICS INDUSTRY

Electric and electronics industry has various products. And production process for the products is also diverse. However, it is considered that the characteristic of the industry's production realizes the globalization of this industry. This chapter talks about the background of electric and electronics industry.

2.1 Introduction of Electric and Electronics Industry

Electric and electronics products are composed of many kinds of products for private use and industrial use. Moreover, in terms of a kind of product, there are a lot of old and new products such as a product with the forefront of technology and a mature and standardized product. The standardized product tends to be produced in mass-production with relatively low cost. On the other hand, the product of the forefront's product is usually produced a little. Electric and electronics industry has diverse characteristics in terms of the amount of production as well.

In respect of production process, there are a great variety of type such as capital-intensive process, machine processing process, and labor-intensive assembling process and so forth. In addition, each process can be organized with various level of technology from leading technology to old matured technology.

Such production process of the industry from a part to the finished product is able to be technically separated. It is not necessary to unite these separated processes for rationality or energy-saving. Furthermore, it is not in need of an enormous investment in plant and equipment and a large scale of infrastructure. Additionally, it doesn't rely on accumulations of materials or parts like automobile industry.

Because electric and electronics industry has many assembling process of the labor-intensive, the cost of investment in plant and equipment are relatively lower as comparison with material industry. Moreover, the products are generally small. Therefore, the transportation cost is also cheap. Hence, the industry is able to be located in disperse more than other industries.

In terms of the part of capital intensive, because electric and electronics industry tends to develop the technology quickly and to accelerate the obsolescence of the equipment, they don't need to invest the whole equipment in the first investing place. In recent years, because the automation of the assembling process has advanced in electric and electronics industry, it has been located in disperse in local area to get large area and cheaper labor force (Syu, 1997; Matsubashi, 1988).

As stated above, electric and electronics industry is relatively free to be located and not be restricted in one place. Since the industry has this characteristic, it has possibly to adopt the product and the production process to the condition in the country which the firm invested. In real, electric and electronics industry already invested in Asian country in 1960s in the situation of internationally keen competition among developed countries. And then, the industry set up a lot of production bases in various areas in the variety of field. At present, electric and electronics industry is one of the industries which advanced international division of labor in the company and realized global development of the industry.

2.2 Electric and Electronics Industry in Thailand

The development of electric and electronics industry in Thailand has been generated by foreign investment rather than by own initiative. This occurred during the period of export promotion rather than import substitution. Anupap (1997) said it was mainly because of two reasons. Firstly, the government was more active in encouraging foreign investment rather than assisting local industries. And secondly, foreign investors were already looking for ways to cope with their currency appreciation. In addition, Thailand had cheap labor and low overhead costs to offer (Anupap, 1997) (see Appendix 3.3 and 3.4).

Japan and the Asian NIEs chose Thailand not only as a new production base but also as an export base for Southeast and Far East Asian countries. The industry is changing from merely assembling consumer electronics for domestic consumption, to the producing electronics components and assembling high value-added electronic products for the export market.

2.2.1 Policy Framework

The manufacturing sector in Thailand began development when Thai government adopted the import-substitution policy, and continued growing in the export promotion development phase. The component of industrial output has gradually changed from consumer goods into industrial products. The manufacturing sector is moving away from the manual mode of production to machine intensive production methods. Labor-intensive industries are also moving out of Bangkok to up country or neighboring countries, which have lower wages.

2.2.1.1 Policy of Trade Protection

Trade protection policy can reduce the trade deficit and unemployment of own country. In addition, tariff barriers of local market are able to protect and facilitate the development of the local manufacturing industry. The tariff barriers, in fact, tended to protect Japanese joint ventures while functioning to earn coveted government revenue. A shield of protectionism did nothing to promote basic and supporting industries of the industry (Anupap, 1997).

Thai government has reduced various tariff lines after yielding to international pressures of the bilateral agreements. In 1994, the government slashed tariff rates from maximum of 100 percent to 30 percent and categorized rates into six levels compared to 39 levels in the past (Anupap, 1997). The new six categories are as below;

- 0 percent: for products which tariffs are waved according to government policy such as medical instruments;
- 1 percent: for raw materials, electronic components, and vehicles for international transportation;
- 5 percent: for primary and capital products such as machinery, tools and computers;
- 10 percent: for intermediate products;
- 20 percent: for finished products; and
- 30 percent: for products which need special protection.

Therefore, in 1994, tariffs on a number of components were reduced from 35 to one percent, although not all parts and components were covered. In 1995, the government also reduced software tariff down from 20 to five percent and at the same time enacted a copy rights law. Furthermore, Thailand was committed to the AFTA agreement aiming to reduce tariffs down to zero to five percent in 2000.

2.2.1.2 Policy of Investment Promotion

Investment promotion policy played a leading role for the development of electric and electronics industry. Although the investment policy has made to industry-specific promotion, still the industry benefits a great deal from investment incentives. Due to its fast growth, the government, via the Board of Investment, has paid more attention to the industry, giving more incentives to boost up its supporting industry such as precision stamping, die casting, surface treatment, mould and die making, and other electric and electronics components are important supporting industries (Anupap, 1997).

The highest privileges were given as follows;

- Exemption from corporate income tax for eight years regardless of zoning
- Exemption from import duties on machinery for projects in Zone 3 and 50 percent reduction for Zone 1 and Zone 2
- 100 percent foreign ownership is allowed

2.2.1.3 Policy of Technology

The research practices of a department within the Thailand Institute of Science and Technology (TISTR), the Electronics Industry Department (EID), have been insignificant to the industry so far. Although the objectives of the department were to enhance the capabilities of local firms in manufacturing electronics components, testing electronics products, and giving advice on electronics control systems, they were not met.

The National Electronics and Computer technology Center (NECTEC) was established in 1985 as one of the three technical centers under the Ministry of Science, Technology and Environment (MOSTE). It is another government bureau to assist private enterprises in attaining commercial technologies. Various products areas and technologies were identified as being priority areas, such

as electronics materials, integrated circuits, computer systems, and computer software. Nevertheless, its achievement was limited by the inadequacy of research personnel and weak collaboration from private firms, because of the lack of communication between the private and public sectors and the inflexibility of administrative and financial management (Anupap, 1997)

2.2.2 Industrial Development

The development of electric and electronics industry in Thailand can be divided into five phases. The first phase is the period of the import substitution policy during 1961 to 1970. Japanese joint ventures started assembling consumer electric and electronics such as transistor radios and monochrome televisions during this period. The second phase is the transition from the import substitution policy to the export orientation policy during 1971 to 1980. American firms started packaging Integrated Circuits (IC) in Thailand, which were mainly for export. The third phase is the period of export promotion during 1981 to 1985. Japanese and American firms exported various electric and electronics components from Thailand. The fourth phase is the period of rapid export growth during 1986 to 1990, when Japan and the Asian NICs moved their export bases to Thailand. The fifth phase is the period of building up supporting industry during 1991 to 1995. Small and medium sized factories from Japan and the Asian NICs followed their contractors to Thailand (Anupap, 1997) (see Appendix 3.1 and 3.2).

2.2.2.1 Former Import Substitution Phase in 1961-1970

From the beginning, the bulk of investment in the industry came from Japan. This was in part a result of tax incentives and tariff barriers provided and imposed by the government to create import substitution industries and to reduce trade deficit. The government of policy import substitution began in 1961 with the establishment of the Board of Investment (BOI) and the enactment of the first Investment Promotion Act which was followed by others in 1962, 1966 and 1968. Due to tax incentives and the sheer size of the protected market, 10 firms were inaugurated in this period. Nevertheless, the industry was mainly dominated by five Japanese joint ventures. The five Japanese joint venture firms were Sanyo Universal Electric (Sanyo), National Thai (Matsushita), Kan Yong Electric manufacturing (Mitsubishi), Thai Toshiba Electric Industry (Toshiba), and Hitachi Consumer Products (Hitachi). Except for one small Thai firm assembling radio transceivers, all firms concentrated on

consumer products such as transistor radios and monochrome televisions.

The industry grew during this period to largely three reasons. The first is the sheer size of the protected market. The second is government promotion of radio and TV broadcasting stations. And the third is the fact that monochrome televisions and transistor radios were relatively new products in Thailand at that time.

2.2.2.2 Latter Import Substitution Phase in 1971-1980

With the revision of the Investment Promotion Act in 1972 onwards, government policy switched towards export promotion. This aims to turn the economy away from an import substitution mode of development to an export oriented development policy. In line with this policy, 32 new firms entered the industry. Apart from the pressured of international competition, zero tariffs on materials, machinery, and equipment plus cheap labor, attracted three American firms to invest in IC packaging for exports. Subsidiaries of multinational corporations such as National Semiconductor, Signetics and Data General set up their plants in Thailand in 1974. Japanese investment was rather low during this period. Investment from other countries came in after firms such as Philips set up their plants to manufacture televisions and telephone sets.

The industry during this period grew due to the huge volume of production and export of ICs, which changed the industry form the assembly of consumer products for domestic consumption to electric and electronics components for export.

2.2.2.3 Export Promotion Phase in 1981-1985

Government policy during this period shifted fully to export promotion. The modified Investment Promotion Act sought to encourage more foreign investment in order to earn foreign exchange to tackle the trade deficit, and to alleviate unemployment. There were 36 firms established during this period, of which a number were world electric and electronic producers. For instance, three affiliates of the Minebea group of Japan were set up. Minebea Thai started producing miniature ball-bearings, stepping motors, and fan motors in 1982.

During this period, foreign direct investment was predominant. More interestingly, investment in this period was apparently higher than the total investment

of the past two decades. In addition, it was the first time that a number of electric and electronics products had been locally produced using parts and components in Thailand rather than merely assembled.

2.2.2.4 Rapid Growth Phase in 1986-1990

After the appreciation of Japanese Yen and dollar, investment from Japan, Taiwan, and other Asian NICs soared steadily. There were around 368 firms operated in this period. Apart from expansion of the existing firms, new foreign investment have continually moved to Thailand and dominated total investment.

As far as new investment was concerned, new firms such as Sharp, Sony, Mitsubishi and a large number of Japanese and Taiwanese medium-sized firms came in. They mainly concentrated on export business for various electric and electronics products such as microwave ovens, video tape recorders, floppy disk drivers, electronic watches, printers and a number of electronic components for TVs, computers, and other electronic devices were assembled.

The growth of the industry during this period was apparently a result of appreciation of Japanese Yen, along with the appreciation of other Asian NICs' currencies. As a result, the relocation of foreign investment to Thailand took place rapidly. For instance, the sum of the number of promoted projects during the first half of the decade (1981-1985) outnumbered the total of the past two decades (1961-1980). Moreover, the sum of the number of promoted projects the second half of the decade (1986-1990) outnumbered the total over the past two and a half decades (1960-1985) (Anupap, 1997).

2.2.2.5 Supporting Industry Phase in 1991-1995

As Japanese Yen and currencies of Asian NICs continued to rise, parts and components imported for local assembly become more costly. Thus, foreign firms started looking for parts and components available locally, and Thailand's policy provided more incentives for investment in supplying industry. During this period, new investment projects, of 283 out of 295, were in industries which specialized in manufacturing of parts and components. A large number of subcontractors, which used to supply parts and components for the world electric and electronic manufactures, which used to supply parts and components for the world electric and

electronic manufactures such as Sharp, World Electric, Matsushita, and Mitsubishi, moved their factories to Thailand. Metal working and plastic injection parts together with moulds and dies were the main parts produced by these firms. Investment in moulds and dies increased significantly in this period. Although the majority was foreign investment both in final product assembly and manufacturing of parts and components, a number of Thai firms were also actively involved at that time.

The growth in this period remained stimulated by foreign investment despite its decline. However, the significant change was the nature of investment which was aimed at supporting industries. This was due to the large existing electric and electronic manufactures successfully convinced their suppliers to come to Thailand in order to avoid the higher cost of parts and components imported from Japan. Also, the large size of production volume available in Thailand, and to some extent, the country's investment promotion policy, which gave higher privileges for investment in supporting industries, helped push the suppliers to Thailand.

2.2.3 Structural Change of Electric and Electronics Industry

The average growth rate of electric and electronics industry in 1980-1994, Thailand's industrialization period, was 9.2 percent annually. This was one of the fastest growing industries in the manufacturing sector. The share of the electronics industry rose rapidly from 2.0 to 2.6, 6.8 and 11.2 percent of the value-added generated by the manufacturing sector in 1980, 1985, 1990 and 1994 respectively.

As with most manufactured goods, the export of electric and electronics goods began in the 1970s. The industry's exports increased from 0.06 to 5.2, 11.58 and 17.34 percent of the country's total export in 1970, 1980, 1990 and 1994 respectively. The export value grew from 8 to 6,784, 68,325 and 196,954 million baht which became the top rank of the country's export items when combined computers and peripherals with integrated circuits and televisions and its parts.

2.2.3.1 Composition of Electric and Electronics Industry and Key Products

Along with changes in market orientation, products and production processes arising from foreign investment changed as well. Investment projects in consumer oriented products aimed at the domestic market decreased, while investment

projects in intermediate and capital products increased. Also, more complicated and higher value-added products aimed at the export market were introduced in the period after the appreciation of Japanese Yen especially in the latter half of 1980s. As far as the production process is concerned, although the majority of the production processes remained assembly in nature, more manufacturing and processing processes for components and parts began in the period after the appreciation of Japanese Yen, in particular, in 1990s.

Import Substitution Period in 1961-1970

During the period of import substitution, foreign investment mainly concentrated in the import substitution industries. Foreign firms established a number of modern industries in the country to substitute imports of final consumer products. In some particular industries, such as electrical appliances and automobiles, Japanese investment was dominant. However, products and production processes were rather simple and low value-added. Radio and television sets were the main products in this period.

Export Promotion Period in 1971-1980

During the period of export promotion, the electronics industry showed a high growth trend. Even though products introduced in this period continued to supply the domestic market, they seemed higher in value-added and complexity. Electric and electronics industry gradually moved towards production of electronics components and parts. Integrated circuits, electrolytic condensers, capacitors, fan motors, miniature ball bearing and computer cords were examples of components and parts that Thailand began to produce. Also, final goods such as video cassette recorders and printers assembled for export began production.

Nevertheless, the production process was still mainly of the assembly type. Both production of electric and electronic components and automotive parts depended on materials and parts from Japan. Some products used almost all imported parts and materials, only assembly and some testing work was carried out in Thailand. Integrated circuits were the main export item and the fast growing industry.

Export Boom Period in 1981-1990

As mentioned, after Yen appreciation from 1986 onwards, huge investment from Japan tumbled in. The Japanese continued to invest in some strategic industries such as the electric industry, including production of electrical products. In fact, Japanese investment was aimed at electrical appliance and electronic components and products. The composition of products changed, in terms of product types, and also market, and production processes. They changed from low value-added products for local consumption to more sophisticated and higher value-added products for overseas markets. The production process also changed from the assembly and simple manufacturing process to the more complex and multiple processes of manufacturing.

Products introduced in this period were significantly different from the previous period. A number of new product lines arose with new investment from Japan, particularly, supporting parts and components for final assembly. Production of electronic products and components gradually took over the production of electrical products in the previous period, for example, telecommunication equipment, computers and more sophisticated consumer products, such as microwave ovens and compact discs. Computer peripherals and parts thereof grew rapidly and extensively. Printers, keyboards, floppy disks, switching and uninterrupted power supplies, computer cords and cables were produced.

Supporting Industry Period in 1991-1995

The electronics industry during this period largely evolved into one focusing on the development of supporting industries of the electronic industry. The reasons are twofold. Firstly, there were a number of large assembly firms in Thailand requiring parts and components for assembly. Secondly, the pressure in the world market compelled those assembly firms to be more competitive in terms of cost and delivery time. This in turn required a strong supporting industry. Therefore, hundreds of supporting firms started to produce the following items, metal parts, plastic parts, rubber parts, cables and harness, motors, compressors and transformers.

In this period, the level of complexity of the production process changed along with those products mentioned. Manufacturing processes varied depending on the level of casting, machining, stamping, and plating for metal parts, injecting, blowing and extruding for plastic parts, and molding and rolling for rubber parts. Processing processes remained, to a large extent, at the same technical levels.

2.2.3.2 Ownership Structure of Electric and Electronics Industry

Investment

Comparing the ownership structure by size of investment among various countries shows that investment from the US was the largest in terms of size of investment. However, the US typically invested in a small number of projects. This is contrast to Japanese investments. Generally, the Japanese invested in many projects, resulting in the size of investment per project being smaller.

Although the profile of ownership did not change very much during the three comparative periods, the size of American investments per project decreased while the size of Japanese investments increased. The size of Japanese investments in 1990s was clearly larger than in 1980s. Furthermore, investments from Association of Southeast Asian Nations (ASEAN), in particular, from Singapore and Malaysia, were highest in the late 1980s and higher than EU's than investment.

Employment

Not only were American investments larger than Japanese, in terms of investment per project, but it also larger in terms of employment. However, investments from ASEAN countries were larger, by size of employment compared to the US, Japan or other foreign countries. This implies that investment from ASEAN countries were more labor-intensive. While the size of employment per project of American investments were moving into more labor intensive production methods, while Japanese investments were for more capital intensive projects.

Export

American investments into the electronics industry, classified by the nominal export volume were higher than Japanese. Almost all of the American investment projects were aimed for the export market. American investments were also directed to more export destined firms in the 1990s than they were in the 1980s. This is opposite to the Japanese investment where the ratio of export projects in the 1990s decreased.



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CHAPTER III

CONCEPTUAL FRAMEWORK

Firstly definitions of each term are discussed in 3.1 in order to explain the hypotheses of this study in 3.2. The definitions discussed in 3.1 are followings: environment, pollution, environmental pollution, environmental management and corporate environmental strategies to gain competitive advantage. And the section 3.2 argues each hypothesis, including pollution haven hypothesis in 3.2.1, market advantage and corporate environmental strategy in 3.2.2 and main benefits of implementing environmental management in 3.2.3.

3.1 Definition

3.1.1 Definition of Environment

United Nation Environmental Program (UNEP) defines environment as all of the external factors, conditions, and influences which affect an organism or a community. Also, it includes everything that surrounds an organism or organisms, including both natural and human-built elements.

The basic functions of environment are (1) base of natural resource, (2) supply of amenity, (3) assimilation and absorption of waste materials, and (4) life support system. These functions affect, complement and converge each other. Human beings do industrial activities and daily life by making use of these functions of environment (Ueda, 1996).

In addition, Reger Reene says that the concern must extend over any process which would affect this well-being, whether it is physical (global warming and climate change), chemical (ozone layer depletion), or biological (destruction of rain forest) (Reger, 2002).

3.1.2 Definition of Pollution

OECD states that pollution means the introduction by man, directly or indirectly, of substances or energy into the environment resulting in deleterious effects of such a nature as to endanger human health, harm living resources or interfere with amenities or other legitimate use of the environment.

3.1.3 Definition of Environmental Pollution

Form of environmental pollution is categorized into three, such as pollution of environment, destruction of amenity, and destruction of natural resource. This categorization is based on the basic function of environment which relates with human beings.

Environmental pollution means scaring and destroying the well-being and the living condition of human beings. Destruction and degradation of the basic functions of environment as stated above is considered as issues of environmental destruction and environmental deterioration (Hirai, 1999).

In this research environmental pollution means the presence of contaminant or pollutant substances in the air, water, soil etc, at a concentration that interferes with human health and welfare, or produces effects to living condition of other life.

3.1.4 Definition of Environmental Management

European Environment Agency defines that “environmental management is management of those activities of a firm that have or can have an impact on the environment” (European Environment Agency, 1998). Business activities and environment have a correlation. However, the environment becomes degraded through the business activities by over-extracting raw materials from the environment and by over-loading it with waste. Therefore, if one wants to develop the business in long term, they need to make business activities and environment coexist. Environmental management aims to find ways of carrying out business activities that reduce or halt this degradation (European Environment Agency, 1998).

In addition, the manufacture of product has substantial impacts on environment during the whole process. Environment has been affected since extracting raw material until disposing waste over the life cycle of manufacturing a product.

As a reason why firms decided to undertake the environmental management, European Environment Agency introduces ten items which could be an advantage to starting environmental management, such as cost saving, ensuring legislative compliance, anticipating future legislation, reduce environmental risk, meeting supply chain requirements, improved relations with regulators, improved public image and community relations, increased market opportunities, and employee enthusiasm.

However, thought or concerning of environmental management is much different among companies. In case of company, starting to do environmental management mostly depends on owner's or mother company's interest and decision.

The following things could be an incentive for firm to start implementing environmental management, such as legislative in the location, demand of customer, requirements of trading partner potentials to increase economic benefit or advantage in the market, and possibility to improve company image and so forth.

The theory of natural capitalism, which combines the protection of natural resources with increased profitability and enhanced competitiveness, argues that there is a need for a basic change in the standard business model being used by companies today in order to meet the needs of the changing market (Salahuddin, 2003).

In 1970s, under the pressure for company to concern environmental conservation in business activities, companies started to perform environmental management. During these three decades, corporate have changed the planning and program for environmental management. Goldman (1999) compares the typical environmental program and process between traditional type and new drivers' type. The major organizational transform of company on environmental planning and programs could be recognized by following his arguments.

Figure 3.1 illustrates the role of environmental management in traditional strategic planning processes. Goldman (1999) explains the six features of the traditional approach as below:

1. drivers for a company's business strategy include issues such as trends in the global economy, consumer preferences and stockholder demands;
2. a number of strategic plans are developed for each of the major business functions within the company;
3. the function of environmental management is to address the environmental consequences of these operational programs as efficiently and cost-effectively as possible;
4. companies develop plans regarding what products they will produce, where and how they will produce them, and where and how they will market them, and the role of environmental management is to deal with the environmental consequences of those decisions;
5. the role of environmental management generally revolves around compliance with regulations; and
6. rarely, if ever, in the traditional approach is environmental management considered an integral part of the strategic planning process, and so there is little feedback regarding the environmental consequences of business decisions that can be incorporated into the planning process.

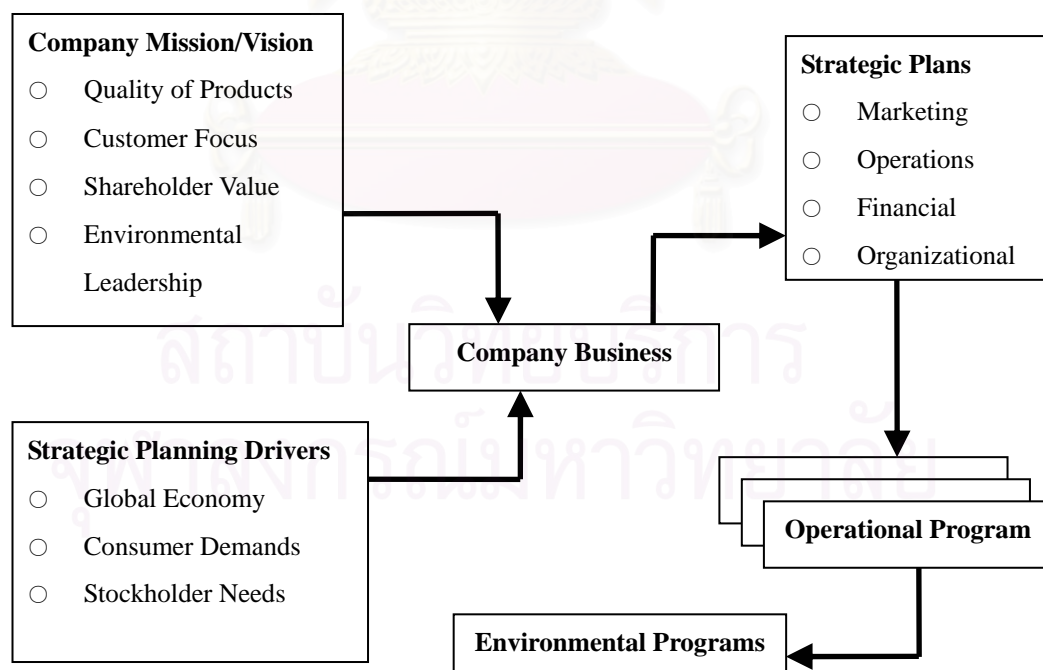


Figure 3.1: Role of Environmental Programs in Traditional Strategic Planning Process

This traditional approach has been gradually changing (Goldman, 1999). Traditional environmental management is being transformed into a vigorous form of environmental competition, involving innovative techniques to increase productivity. Many companies have realized at least some of the potential benefits of more proactive approach of environmental management, and they may have some so-called “beyond compliance” programs. These programs typically include pollution prevention, energy conservation or recycling programs.

In many cases, these programs were simply the outgrowth of personal interest of a few key people, and the recognition by senior management of some benefits from the cost-saving and public relations associated with programs. However, recently the situation has changed. The companies which recognize the role of environmental management in the broader strategic planning process and the potential for environmental management to help a company achieve its business goals of sustained profitability have increased (Goldman, 1999).

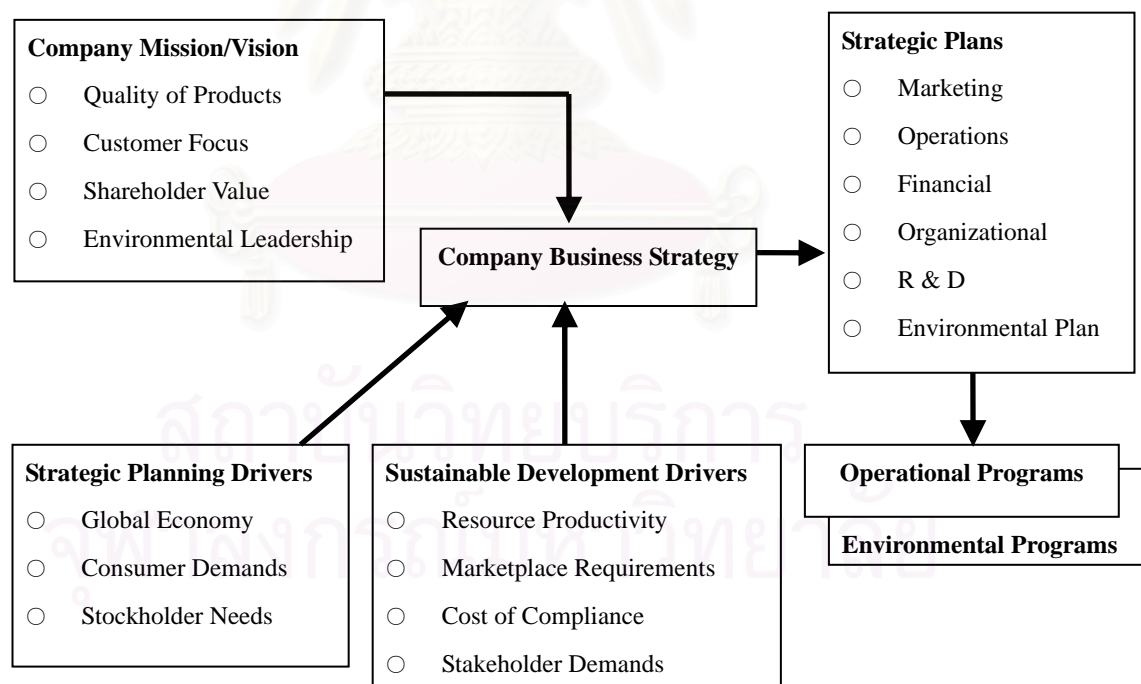


Figure 3.2: New Drivers Require Greater Integration of Environmental Planning and Programs

Figure 3.2 summarizes the new approach to strategic planning on environment. In terms of this figure 3.2, three differences with traditional approach can be indicated;

1. it is the explicit recognition of a new set of drivers, Sustainable Development Drivers, which includes the resource productivity, the marketplace requirements, the cost of compliance, and the stakeholder demands regarding environmental issues;
2. as a result of above new drivers, there is an explicit environmental component to a company's strategic plan. This, in turn, provides the basis for environmental programs that are more fully integrated into the other operational programs within the company; and
3. as additional business function within the company, Research and Development (R&D) and Environmental Plan are included.

Companies adopting the new approach of environmental programs emphasize the innovation and the pro-active management in their corporate strategy. Therefore, such companies make them better equipped to handle the changes of environmental aspects in the market and in demands of stakeholders. In addition, they pay greater attention to building relationships and partnerships across the value chain, in order to strengthen their long-term capabilities (Salahuddin, 2003).

Environmental management practices of companies are different, which depend on company's skill, knowledge, location, and government regulations. In Thailand, it is said that Japanese companies implement environmental management relatively better than local companies. However, with regard to Japanese companies in Thailand, there may be difference on performance of environmental management with the mother company in Japan.

In terms of the development of companies' concern on environment, Dodge and Welford (1996) argue five stages of development on environmental performance of companies, which is known as ROAST scale. The five points of ROAST scale are represented as below. First stage is "Resistance". The organization totally opposes the environmental values and rules. And it would be absolutely unresponsive and reactive to environmental initiatives. Second stage is "Observe and Comply". The organization observes environmental laws but actions reflect a willing attitude or lack of ability to comply. The organization starts being interested in environmental management to some extent, but its actions are still enforced through legislation or court decisions.

Third stage is “Accommodate”. The organization begins to adapt to change. This includes the above indications of proactive and responsive behaviors. Actions are no longer based entirely on complying with environmental legislation. The organization begins to exhibit voluntary behavior. From this third stage, the action of company changes from passive to active. In other words, the organization starts to regard environmental management as a good management which means organization thinks environmental management can gain some profit or some competitive advantage.

Forth stage is “Seize and Preempt”. The organization voluntarily preempts its actions with environmental concerns. It proactively engages in setting the agenda. It is responsive to the many external stakeholders. At last, fifth stage is “Transcend”. The organization’s environmental values, attitudes, beliefs and culture exhibit a total support for the environment. The organization proactively supports and is responsive to all living things. It acts in a way which is fully consistent with sustainable development. At fifth stage, the firm transcends traditional commercial performance measures and adopts strategies consistent with ecological management and sustainable development (Welford, 1996). In other word the firm at fifth stage has maximizes a profit through implementation of environmental management.

Dodge and Welford (1996) specify the strategies which a company should adopt in order to become greener or to gain competitive advantage. They indicate how competitive advantage and sustainability can be measured in the ROAST scale, which scholars so far didn’t describe or failed to indicate in their frameworks (Welford, 1996). In addition, in order to measure improving environmental performance, Dodge and Welford argue the need to define an ultimate goal towards which the organization must move. This goal may not be achievable but it will serve as an upper boundary of sustainable performance on a five point scale (Welford, 1996). The fifth stage, transcend, was the goal for them at that time. However, recently the change of the circumstances around companies has been going beyond their five point scale.

In the 21st century, business is subject to intense scrutiny from an increasingly globalized public with higher demands and expectations than ever before (Ottoman, 1998; Welford, 2003; Lewis, 2003). As a result, the concept of Corporate Social Responsibility (CSR) has emerged as a balance to the social and environmental demands of globalization (Barrientos, 2000) and free trade (Welford, 2003) and to provide a framework for corporations to address their broader social responsibilities (OECD, 2001; WBCSD, 2002).

The World Business Council for Sustainable Development (WBCSD) defines CSR as “the commitment of business to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve their quality of life” (WBCSD, 2003). In this sense, CSR becomes the means which corporations can promote sustainable development through adopting sustainable production processes and promoting sustainable consumption patterns amongst their consumers (AEC, 2001; Welford, 2003). Cadbury (2002) describes the process of CSR as comprising three levels.

Table 3.1: The three levels of CSR

Primary level	Revolves around company’s responsibility to meet its obligations to shareholders, employees, customers, suppliers, creditors, to pay its taxes, and to fulfill its statutory duties.
Second level	Concerns the direct results of company’s actions in carrying out their primary tasks and include making the most of the community’s human resources and avoiding damage to the environment. Companies should attempt to minimize the adverse effects of their actions, rather than adhere to the lowest acceptable standard.
Third level	Consists of interaction between business and society in a wider sense. Companies have to look outwards at the changing terms on which society will license them to carry on their activities. They envisage the wider consequences of their decisions and build that awareness into their decision-making process.

3.1.5 Corporate Environmental Strategies to Gain Competitive Advantage

Environmental management is not free. It requires cost, usually not so cheap. For example, it is said that the total cost to acquire the certification of ISO14001 in Japan is around four million yen, which is about 1.5 million baht. It also requires not only money but also time and human resource. Whether implementation of environmental management can compensate for the costs including time and human and even more create benefits for the company? There are researches which claim that environmental management bring benefits for company and studies talking about the advantages of implementing environmental management.

Porter's framework of the competitive forces that determine industry profitability can be used to indicate the nature of competition with regard to the environment in any particular industry (Beaumont et al, 1993; Welford, 1996). Welford (1996) made a two by two matrix which shows the various options available to companies for achieving competitive advantage by summing up strategic environmental framework of Beaumont, Pedersen and Whitaker (1993).

Porter describes two main strategies for gaining competitive advantage that are cost leadership and differentiation (Porter, 1985). Little claims that both these strategies can be applied to the environment for gaining competitive advantage. Gladwin (1993), Bostrum (1992) also think that environmental management is able to create a number of competitive advantage and economic benefits.

The economic theory on competitive advantage states that there are various factors that give rise to companies gaining an advantage over their competitors in the market place (Porter, 1985). A company's ability to differentiate its products and services, and ultimately their brand name, from its competitors is in fact one of the critical strategies advocated by competition theories (Porter, 1985). Allen and Gale (1999) argue that product competition differentiates the more competitive firms from the less competitive ones in terms of their ability to profit-maximize firms from the less competitive environment.

Competition by means of product differentiation needs that stakeholders become critical as their preferences and tastes which have influential roles to play in the market movement. Hence, it becomes crucial for companies to take into account the interest of stakeholders to gain competitiveness into account. This is line with the concept of the stakeholder society (Kay, 1996) where a firm has many stakeholders who are employee, trading partners, customers, suppliers and neighbors other than its shareholders. The welfare of stakeholders of the firm must be internalized by means of the CSR structure (Vives, 2000)

In particular, product differentiation can be achieved by providing the type of products or services that integrate the principles of environmental improvement and social responsibility (Welford, 2003; Porter and Van der Linde, 1995). This can provide new business opportunities while contributing to sustainable development (Welford, 2003).

Welford (1996) shows the five main environmental strategies for gaining competitive advantage. First is “excellence and leading edge”. This implies moving beyond compliance, viewing environmental management as good management, seizing environmentally-based opportunities that have arisen as a result of the environmental challenge and striving towards state-of-the-art environmental management (Roome, 1992). Second is “incorporation of the environmental management strategy into the overall corporate strategy”. This implies giving due weight and importance to environmental issues during the planning process and not just including it as an afterthought. The organization’s environmental policy, programs and practices should be incorporated into all the activities of the business (Welford, 1996). Third is “line driven”. Environmental management ought to be regarded as a line function rather than a staff function. Line managers should be aware of their environmental obligations and should be fully accountable for the environmental performance of their particular operations.

Forth is “the short- vs. long-term strategy”. Most companies tend to lay an emphasis on short-term gains and returns, rather than discounting long-term environmental benefits such as increases in the morale of the workers, goodwill, improvement in public image, avoidance of the cost of penalty, compensation etc. They look for short-term solutions and for an immediate financial payback on their investments. However, investments in the field of environment do not bring immediate returns and are evident only in the long run. Moreover, it may be much simpler and cheaper to clean up the existing process, the end-of-pipe technology than to develop an entirely new process or product (Welford, 1996). However, in the long run, it may be more profitable to renew the entire production process than to clean up the existing process (Bostrum et al, 1992). And lastly, fifth is “effective communication”. Communication plays a significant role in maintaining good public relations and in achieving competitive advantage (Buhr, 1991; Grayson, 1992). This exercise has greatly enhanced the company’s green image in the eyes of its stakeholders (Welford, 1996).

3.2 Hypotheses

3.2.1 Pollution Haven

Foreign direct investment, which is the acts of private businesses investing capital in a foreign country in order to produce goods or services, has contributed to a dense tissue of cross-country economic relations (Johnston, 1999).

The benefits of foreign direct investment and the reasons why many governments try to act it are well known. Foreign direct investment creates jobs and raises economic growth in the host country. In many cases it will stimulate technological innovation, increase competitiveness, improve efficiency and transfer intangible resources such as organizational, managerial and marketing skills.

Foreign direct investment can also support the broader goal of sustainable development. However, whether this happens depends on a country's framework of both environmental and investment policies, and on its vision of economic and environmental development (Johnston, 1999).

From the viewpoint of the environment in the host country, the problem is which producing polluting product by foreign multi-national companies make economic benefit for host country.

In the past, Japanese companies were blamed for the activities of foreign direct investment, which is also called pollution export, to Thailand. In 1970s, many companies in developed countries tried to go out to developing countries which have lax environmental law or weak enforcement of environmental law because production in the home country is costly due to relatively stricter environmental law and stronger enforcement power of it.

Walden (1998) introduces a comment of government environmental monitoring agencies as an example of pollution haven, "they're all the same, whether Australian, Japanese, Chinese, American. If they can do it, they would make zero investment in environmental controls." And the person shows examples of one European firm making refrigerators, which used a lower-grade, more environmentally harmful technology than the mother firm used in Europe. Moreover, Walden shows another example of pollution haven of multi-national companies around the Chao

Phraya River in Thailand, which some factories have stopped their engines at night when there is no danger of being inspected (Walden, 1998).

Under the world which globalization or border-less have been advancing, the regulation disparities among countries, regions have been used economically in the global business strategy of multi-national companies. Multi-national companies can adjust the own company's regulation in the host country. If the host country has the strict law, they can take measures to deal with it. And if the host country has relatively lax law, they can meet it even their environmental technology is high enough to act better than the standards in the host country which lower than the home country.

The so-called pollution haven hypothesis implies that competitive forces would push foreign direct investment away from countries with high environmental standards, or pull it towards those with low environmental standards. Conversely, the nation of pollution halos suggests that foreign direct investment might promote the establishment of higher environmental standards through technology transfer effects or via existing management practices within multinational and other firms (Johnston, 1999).

The pollution haven hypothesis posits that differential environmental regulations influence firm or industry level location decisions. There are two variants of the hypothesis (Zarsky, 1999). The industrial flight variant suggests that pollution-intensive dirty industries will flee the relatively higher costs of environmental compliance in home countries and relocate in where compliance costs are lower. Typically, compliance costs are conceived in terms of pollution abatement costs which are lower because standards are lower (Zarsky, 1999). However, the costs could also be lower because transactions costs of compliance are lower, even if standards are the same (Anderson et al, 1997).

The other variant puts more emphasis on the pull factor on the direct use by developing countries of low or lax environmental standards to attract foreign firms. The reduced pressure on firms to manage environmental impacts may be a central or peripheral part of investment-attraction packages (Zarsky, 1999). Some analysts argue that low or lax standards are not the result of deliberate beggar-thy-neighbor policies, but reveal true social preference.

Whether pushed or pulled dirty industries, dirty production stages, and poorly performing firms will, according to the pollution haven hypothesis, agglomerate in low-standards developing countries (Zarsky, 1999).

Environmentalists argue that the gap of standards between home country and host country will draw the worst performing firms and dirties industries to the least regulated countries, creating “pollution havens” (Zarsky, 1999). Even if not explicitly drawn by low standards firms, lacking external oversight may perform badly once they get there.

Advocates of neo-liberal globalization argue that foreign direct investment is positive for the environment because firms of home country typically possess newer and cleaner technology and better management practices. Given the lack of local technological and regulatory capability, foreign direct investment is the best way to diffuse best practice production techniques. A number of case studies have demonstrated a pollution halo effect, suggesting a slow convergence of standards upwards (Zarsky, 1999).

Host country needs to strengthen the analytical, policy and institutional capacities with respect to both FDI and the environment, home countries could assist by sharing best practice experiences in developing and implementing policy, including the role of policy tools such as economic instruments, voluntary agreements, strategic environmental assessment and environmental impact assessment (Jonston, 1999).

3.2.2 Market Advantage and Corporate Environmental Strategy

Orssatto (2001) creates a framework of business environmental strategy which includes and expands the arguments of the two scholars on competitiveness as shown above. Orssatto (2001) shows interdependence between business environmental strategy and the corporation's characteristics and business conditions in the framework. He says it is important for corporate managers to know proper analytical tools to identify situations favoring environmental investments, which are particular to their business in order to maximize the benefits from environmental investments. Identifying such circumstances is important for both the practice and theorization of environmental issues in management (Orssatto, 2001).

Figure 3.3 is the generic types of business environmental strategies which Orssatto shows. He says this decoupling of competitive advantage and competitive focus is fundamental for the identification of specific conditions in which corporate environmental strategies may improve the competitiveness of the firm. This framework applies the statement of Porter in the competitive advantage and the argument of Welford in the competitive focus. This figure is expanded with the traditional competitive strategies and recent concerns of competitiveness through environmental management practices. Orssatto (2001) says that the matrix combining these elements with the basic types of competitive advantage with which a firm seeks to achieve generates four possible strategies as represented in the figure.

He indicates that the structure of the industry in which a firm operates, its position within that industry, the type of markets the company serves, its capabilities and regulatory frameworks will determine the appropriate competitive focus (process or product and services) and the potential source of competitive advantage (cost or differentiation) for a firm (Orssatto, 2001).

Which category does the company fit? And which target should the company focus to improve the competitiveness through environmental management practices? These points can be shown with Orssatto's framework by analyzing the company's characteristics, business conditions and environmental management practices.

Cost Competitive Advantage	(1) Process-Oriented Resource Productivity	(2) Environmental Cost Leadership
	(3) Beyond Compliance Practices	(4) Eco-Oriented Products & Services
Differentiation	Process	Products & Services

Competitive Focus

Figure 3.3: Generic Types of Business Environmental Strategies

The four strategies based on the company's characteristics and business conditions are argued as follows.

Strategy 1: Process-Oriented Resource Productivity

In the early 1990s, Porter (1990) demonstrated that productivity is the key element for companies to gain competitiveness. Then, in later work, Porter and Class van der Linde (1995) asserted that companies should promote resource productivity in the form of materials savings, increases in process yields, and better utilization of by-products because waste consists, fundamentally, of an inefficient use of resources.

Orssatto (2001) says the companies in this category tend to be facing low levels of resource utilization, high processing costs and high levels of generation of by-products. Because of the low level of resource utilization, the companies have to cost to processing products and generate a lot of wastes. The companies which have a potential to create competitive advantage with business environmental strategy of process-oriented resource productivity are inclined to face with above environmental issues in their business.

In such circumstances, the focus on resource productivity not only can reduce the costs of waste management activities but may also unleash business opportunities that go beyond the current core competences of corporations (Orssatto, 2001). It may be profitable for the companies to improve the production process as a competitive focus. The improvement of production process has a potential to realize the efficient utilization of raw materials, which relates to the reduction of production cost. In addition, the company may discover business chances which have not ever noticed by reconsidering the process. The company could get profits by making a new business such as selling wastes which have been spoiled so far to other companies.

Strategy 2: Environmental-Cost Leadership in Products and Services

Design that considers the potential to reduce environmental impact of a product during its entire life cycle is not only crucial for resource productivity but it can also improve a firm's competitiveness (Orssatto, 2001).

He shows an example for the company in this context. An Italian automaker produced an eco-car which got the Automotive Environment Award 2000 during the Geneva Motor Show in 2000. The car was made from steel with innovative space frame design to be able to transport five passengers in spite of the light weight. The consumer can enjoy such benefits from fuel economy during car use. Because of its innovations in design and manufacturing techniques, the eco-car has the potential to portray both low environmental impact and the lowest price in its class.

Orssatto (2001) talks about the circumstances of companies being suitable for the strategy of environmental-cost leadership in products and services as competing on the basis of cost, which is able to transfer gains in environmental innovations to products or services. The companies tend to make effort to develop products which are good for environment, less pollution.

Some companies using life cycle assessment to know the whole environmental impact which the product makes in its life cycle can not only develop the products to reduce environmental impacts but also save the production costs. The new products also bring not only less environment impacts but also benefits for consumers the low price as well as maintenance and environmental costs of product over its life time.

The concept of environmental cost leadership is based on such characteristics. By extending resource productivity efforts to the use phase of using the products, corporations are able to explore strategies and eventual competitive advantage on the basis of the relatively low economic costs and the low environmental impact embedded in their products (Orssatto, 2001).

Corporate environmental strategies based on environmental cost leadership have the potential to generate competitive advantage in firms competing on the basis of cost, which are able to transfer gains in environmental innovations to products and services (Orssatto, 2001).

Under the reality of increasing the demand of customers and a never ending tightening of environmental regulations, the corporations in this context would have a potential to increase the competitive advantages more in the future, and to take market leadership based on these low costs at last.

Strategy 3: Beyond-Compliance Organizational Practices

Orssatto (2001) defines the corporations favoring business environmental strategy of beyond-compliance organizational practice as the companies facing the circumstances of supplying other firms in industrial markets that are under pressure to improve their environmental performance. Specific circumstances favoring the development of differentiation strategies based on organizational processes are expected to depend on the type of market served by the corporation.

The circumstances found in consumer markets normally differ substantially from those of industrial markets. In case of Thailand, the concerns on environment seem to be increasing in industrial markets recently because of businesses by environmentally-advanced countries' companies and government regulations, however, not so much in consumer market.

For companies supplying products or services to other corporations in industrial market, the certification of their environmental management systems represents a source of competitive advantage when the company is selected as a supplier on the basis of its commitments towards environmental improvements in its processes (Orssatto, 2001). The companies in this situation are suppliers not assembly companies. In case that the mother company or the customers require the

ISO 14000 and there are other suppliers selling same products in the market, if the company does not have ISO 14000, the company loses a business. That situation is same for the companies which are required to submit the reports on usage of chemical hazardous substances. Recently electric and electronics companies are enforced to follow the new environmental regulation on chemical substances of EU. The representative one is Restricting the use of Hazardous Substances (RoHS) which is the regulation of hazardous substance control to electric and electronics equipments which will be started from July 1, 2006. the regulation bans six substances in the electric and electronics products, such as lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr (VI)), polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs).

The companies have to improve the production process for proving that the products are not made with the prohibited chemical hazardous substances in its production process. On the other hand, the companies' products and companies themselves may be differentiated with companies which have yet to pay attention on environment by being enforced to change their business activities.

Organizational processes that go beyond compliance might exert indirect influence on the image of a firm and eventually impact on its market performance. Furthermore, corporate environmental strategies based on beyond-compliance practices have the potential to generate competitive advantage or at least avoid a disadvantage in firms supplying other firms in industrial market that are under pressure to improve their environmental performance (Orssatto, 2001).

Firstly the companies were urged to perform environmental practices such as ISO 14000, RoHS standard. However, after they review the production process and improve it by following the force from customers or regulations, they would find a potential to get benefit through the activities on environment, which would relate to their competitiveness.

Strategy 4: Ecologically-Oriented Products

Orssatto (2001) states firms that intend to generate competitive advantage from strategies based on eco-oriented products need to observe three basic pre-requisites: (1) consumers must be willing to pay for the costs of ecological differentiation; (2) reliable information about product's environmental performance

must be available to the consumer; and (3) the differentiation should be difficult to be imitated by competitors.

In terms of first item, from the viewpoint of company, it is important to know what consumers need. Whether is the company selling the products which bring benefits for consumers? In broad terms, a firm differentiates itself from its competitors when it provides something unique that is valuable to buyers beyond simply offering a low price (Porter, 1985). Differentiation requires at least one strong motivation for buyers to acquire the product that does not relate to its price (Orssatto, 2001).

In industrial market, the benefit of buyer from their purchase are normally translated into cost savings, better performance of the product as an input for other industrial processes and cost reduction of risk management. On the other hand, in consumer market, the attributes associated with the products allow companies to charge higher prices than competitors who lack concerning on environment in business. In the specific case of ecological privilege, differentiation will occur when a product is able to provide greater environmental benefits or imposes smaller environmental costs than similar products (Orssatto, 2001).

With regards to second item, it is asking whether the product has ever been certified by any authoritative and trustworthy organizations on what the product is good for environment or produces less impacts on environment. This will improve company image in the market. And it also increases the reliance of their product and their company itself. Moreover, in terms of third item, the innovated technology of the product needs to be guaranteed by any regulation or patents. The companies have less motivation to develop, if there is no reliable law system in the country to protect the copy of the innovated technology. These innovations of the company contribute to enhance the competitive advantage in the market.

Table 3.2 is summary of the Orssato's hypothesis on interdependence between business environmental strategy and the circumstances embedded corporation.

Table 3.2: Interdependence between business environmental strategy and the characteristics and business circumstances of the corporation

	Strategy	Characteristics and Business Circumstances of the Corporation
1	Process-Oriented Resource Productivity	Facing low levels of resource utilization, high processing costs, and high levels of generation of by-products
2	Environmental-Cost Leadership in Products and Services	Competing on the basis of cost, which are able to transfer gains in environmental innovations to products or services
3	Beyond-Compliance Organizational Practices	Supplying other firms in industrial markets that are under pressure to improve their environmental performance
4	Ecologically-Oriented Products	Satisfying following three conditions: (1) the willingness of consumers to pay for the ecological attributes of products; (2) reliable information about product's environmental performance must be available to the consumer; and (3) barriers to imitation by competitors

In addition, Orssatto (2001) argues the interrelations among these categories. In real, companies activities are very diverse. Their product, business condition, market, and policy are totally different. Of course, their performances of environmental management are different. Some companies have already implemented good environmental management. Other just started concerning environment in business activities. That is why it is difficult to put the company into only one category. The activity of company may go beyond the Orssatto's category. Hence, it is useful to talk about three mix strategies which includes two categories as example. Orssatto (2001) also shows the need to consider the companies activities beyond the one category.

It is considered that following three mix strategies will be fitted by companies in practice. First mix strategy is where includes the strategies both Process-oriented resource productivity and environmental cost leadership. Efforts towards resource

productivity in the industrial process can significantly help firms to develop strategies based on environmental-cost leadership. Cost reduction in production process and optimization in utilization of materials can contribute to the reduction of the final price of a product, increasing its chance to compete in the market.

Because this is a zone of high potential to generate environmental and economic costs savings, only firms that are able to radically redesign their organizational processes and products are possible to explore its full potential.

Second mix strategy is where includes the strategies both process-oriented resource productivity and beyond-compliance organizational practices. Likewise, beyond-compliance practices also have the potential to expose hidden opportunities in process-oriented resource productivity. Companies that put efforts towards achieving best environmental practices create the conditions favorable to the simultaneous development of both strategies, resource productivity in processes and beyond compliance organizational practices. A company working towards improvements in process-oriented resource productivity can facilitate the development of an environmental management system and reduce its overall implementation costs.

For suppliers of industrial firms that are subject to high pressure to improve their environmental record and to reduce costs, efforts towards both resource productivity and beyond compliance practices might be the most hybrid environmental strategy.

And third ix strategy is where includes the strategies both beyond-compliance organizational practices and ecologically-oriented products. The ecological differentiation of products and services can actually be based on the characteristic of the processes employed in their production. For example, the company adopted the strategy of beyond compliance environmental practices. The company changed the market with its innovative technologies. The company accumulated several ecological prizes from big organizations. Such organizational achievements spurred customers to identify the company's products with the overall image of the company. The firm was able to incorporate an image of ecological responsibility and took advantages of organizational practices to the products and services sold by the company.

3.2.3 Main Benefits of Implementing Environmental Management

Goldman (1999) says that there are two major reasons why environmental considerations need to be incorporated into business functions. First reason is there are many people interested in environmental issues associated with all business processes within a company, and these people have a great deal of influence over the long-term success of a company. Second one is there is recognition both that many business processes beyond manufacturing affect the “primary” environmental impacts of air, water and land emissions and that to cost-effectively manage these impacts requires consideration of all those business processes. A company must strive to innovate all aspects of its operations including the business models, the internal organizational structure, profit areas, partnerships, its brand name and of course the overall corporate strategy (Low and Cohen Kalafut, 2002).

There are a number of economic benefits from environmental considerations (Bostrum et al, 1992). Given the internal and external demands to improve the environmental performance of a company, those companies that achieve high standards of environmental performance will benefit in a number of ways to enhance the company’s competitive advantages. Welford (1996) indicates the examples of the benefit as follows:

- Improved materials efficiency;
- Improved product quality;
- Increased staff commitment;
- Improved community relations;
- Positive pressure group relations;
- Improved media coverage;
- Cheaper finance;
- Lower insurance premiums;
- Reduced risk exposure; and
- Assured present and future compliance.

In addition, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) indicate the benefit of implementing ISO 14001 as follows:

- Improvement of cost control by increasing eco-efficiency;
- Reduced consumption of materials and energy;
- Achievement and maintenance of compliance with environmental regulations;
- Assurance of an organization's commitment to environmental management;
- Good public relations;
- Satisfaction of investor criteria and improvement of access to capital;
- Enhancement of an organization's image and market share;
- Meeting of clients' requirements concerning the environmental performance;
- Reduction of incidents that result in liability;
- Improvement of working environmental and staff morale;
- Demonstration of reasonable cost;
- Obtaining insurance at reasonable cost;
- Improvement of trade and market access; and
- Improvement of industry-government relations.

Many of these benefits are directly related to cost reduction and are not inconsistent with principles of profit maximization. But those benefits also reflect a more ethical approach to business where due care and responsibility towards the environment is integral parts of doing business (Welford, 1993).

Moreover, Welford (1993) discusses the benefits of the environmental management strategy in six factors with the example of waste management. First is the proactive measure for legislative pressures or social pressures on environment are able to prevent the future legislative penalties or fines and blame from public. Proactively addressing the increasing legislative pressures will integrate present and future compliance levels into the design of the technologies and techniques applied. This will be less expensive than a reactive approach where technologies and techniques will have to be revised in order to comply with legal obligations (Welford, 1993).

Second is the cost less for environmental management within the company. It includes the costs relating to the identification, separation, collection, monitoring, handling, storage, transportation and administration of the waste stream, the necessary health and safety measures and the associated environmental risks and liabilities (Welford, 1993). Third is new business opportunity. The waste management strategy may suggest new areas of utilization for waste materials within other areas of the company or may reveal the potential for selling waste products as a raw material to other industries (Welford, 1993).

Fourth is the development of technology and contribution to the others. For example, the process of developing waste minimization solutions in one company, lessons will be learned and technologies will be developed which may have potential for transfer to other companies in a similar position. The increased costs and expenditures of environmental protection in one company are reflected by increased revenues in another. Environmental protection is a zero-sum game (Welford, 1993). Fifth is the risk hedge and enhancing image and brand value (Bixner et al, 1999; Welford, 2003). On the other hand, Porter and van der Linde (1995) argue that environmental regulatory drivers improve the competitive ability of companies by forcing them to adopt resource efficient strategies.

And last is the financial benefit. The financial benefits, cost reduction, result in the firm from good environmental management such as saving energy, recycling wastes, reduction of waste. As industry and consumer awareness of environmental performance increase, then the marketing and stakeholder benefits of the environmental management strategy become more available (Welford, 1993).

CHAPTER IV

RESEARCH METHODOLOGY

This chapter discusses research methodology. Sample selection is referred in 4.1. Data collection is mentioned in 4.2 which compose of three parts, questionnaire, interview and secondary data. At last, three analysis methods used in this study are discussed in 4.3, descriptive analysis in 4.3.1, analysis on pollution haven hypothesis in 4.3.2 and analysis on business environmental strategy in 4.3.3.

4.1 Sample Selection

Eight Japanese companies of electric and electronics industry in Thailand are selected to be surveyed for this study. The selected companies have manufactured a large variety of products in Thailand, such as household electric appliances, electrical parts, car electronics, electric machinery and industrial electrical parts and so on. Some of the companies mainly target on the customers in Thailand, others aim to export their products to Japan or other countries. The companies to be researched can be divided into two groups, supplier which supply their products, not final product, to customers and assembly which buy parts from suppliers and assembly to sell in the consumer market.

In the market, there are less assembly companies and a lot of suppliers. Among the suppliers, there are three levels, first supplier, second supplier and third supplier, which is shown in figure 4.1. The third supplier produces small parts, such as screw. And the second supplier buys the parts from third supplier. The second supplier produces bigger products with the parts of third supplier and supply to the first supplier. The first supplier buys parts and products from the second supplier and sometimes from third supplier. The first supplier assembles parts and produce much bigger and sophisticated product which is not yet final product with the parts from second and third suppliers. Then the first supplier supplies their products to the final assembly company who produce the final product to sell in the consumer market. Assembly company assembly the parts and product to produce the final products. And they sell in the consumer market and export to the international market. They have usually famous brand name.

The size of companies is also various from company having about 300 workers to company having more than 3,000 workers. In addition, this research focuses on the firms locating in central part of Thailand, near Bangkok. Because the number of Japanese firms locating around central area are large enough for this research.

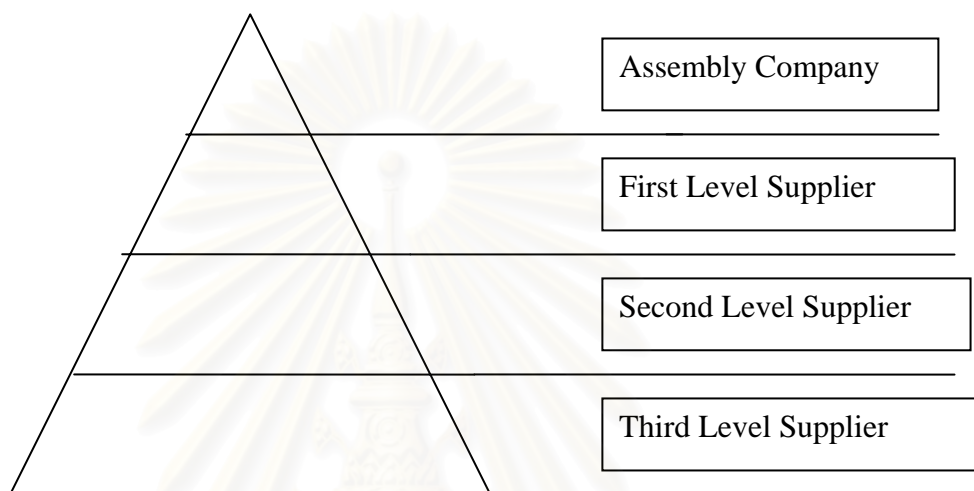


Figure 4.1: Market Structure

Companies are selected from two sources. One is the book, Factory Directory in Thailand 2003, which includes 2,570 of main factories' data classified into 24 business categories, especially in industrial estates. Another is the list of Japanese companies from the chamber of commerce of Japan in Thailand. The companies have entered Thailand with 100% of ownership by Japanese holding companies in Japan or joint venture with Thai or other nationalities' companies. There were four supplier companies and four assembly companies.

4.2 Data Collection

4.2.1 Questionnaire

The questionnaire has questions for multi-answer, question for selecting the degree of importance for each item and yes or no question. In terms of yes or no question, the grey zone is analyzed based on the story and the information which the interviewee talked in the interview.

4.2.2 Interview

The companies to interview are contacted by following ways, calling to the company and sending electronic mail as a direct way to contact, and looking for a person who knows the selected company and asking the person to contact the selected company as an indirect way to contact. Companies' executives, factory managers and employees in environmental department being in charge of environmental issues of the company are interviewees.

Interviews are performed following the questionnaire (Appendix 1). Questionnaire is sent to the interviewees in advance and interview is operated at the company. Interviews are conducted for around one hour. And the interviews are recorded on tape unless the interviewee objected. There are interviewees both Japanese and Thai being able to understand English in most cases. Therefore, the questionnaire is prepared for two languages, in Japanese and in English. The interview is also conducted in Japanese, English and Thai, which depend on the interviewees' request. The questionnaire consists of the questions as follows: background of the company, incentives to invest in Thailand, incentives to start environmental management, environmental conservation activities, corporate environmental strategies and cost of environmental management.

4.2.3 Secondary Data

In addition to interview survey, the secondary data is collected through the internet, corporate brochures, newspapers, magazines and corporate reports, which include organizational chart, company history, financial reports in terms of company's environmental cost, the economic and environmental management activities of the company,

The secondary data is also collected from Japanese Chamber of Commerce in Thailand, and Japan External Trade Organization (JETRO), Ministry of Industry, the Board of Investment in Thailand, relevant Japanese research institutions, and websites of companies and the research center of the Japanese companies in Japan.

4.3 Analysis Method

4.3.1 Descriptive Analysis

To ensure the particular environmental management of each company and to analyze the environmental management among Japanese companies in Thailand as a whole, the data and information obtained in interviews are analyzed in two steps. Firstly the analysis of the each company level is done, which is in chapter five, and the overall analysis is performed by dividing the eight companies into two group, supplier and assembly, which is in chapter six.

One company's analysis is the investigation of each company's practices on environment. The specific items are as follows: the company's profile, environmental management practices, important factors affecting environmental concern of company and competitiveness. Whole companies' analysis is the summarized conclusion of each company's case analysis of eight researched companies. And the answer from the questionnaire and interview will be summarized and analyzed in the chapter. In the chapter six, to test each hypothesis will be done. For the pollution haven hypothesis, each company is judged with the above four items by counting the score. If the score is over ten, the company is regarded as those who investing in Thailand is pollution haven. If the score is between seven and nine, the company is even. If the score is four to six, it means that the company considering investing in Thailand is not pollution haven.

Analysis of companies' environmental management practices will be operated by following the topics;

1. Company Profile
 - 1.1 Overview of the Company
 - 1.2 Production Process of Company
2. Important Factors Affecting Environmental Concern of Company
 - 2.1 Incentives, Stakeholders
 - 2.2 Law, Standard
3. Environmental Management Practice
 - 3.1 Objectives to Implement Environmental Management
 - 3.2 External Environmental Strategies and Practices of Company
 - 3.3 Internal Environmental Strategies and Practices of Company
 - 3.4 ISO 14000

4. Competitiveness, Benefit
 - 4.1 Cost Reduction
 - 4.2 Differentiation
 - 4.3 Other Benefits
5. Pollution haven
6. Competitiveness Hypothesis

4.3.2 Analysis on Pollution Haven Hypothesis

The scoring scheme is used to judge whether the company invested in Thailand for the reason of pollution haven. Table 4.1 shows the four questions to ask each company about pollution haven. The scoring range is from one to three. The large number means the company has more potential to think investing in Thailand as pollution haven. And small number refers to the less potential of it. The score will be considered based on the company's history, business and environmental performances, thoughts, regulations and so on. At last, if the total score of the company is over ten, the company is regarded as those who exactly investing in Thailand as pollution haven. If the score is seven to nine, the company is even, which means the company has a potential to invest in Thailand for the sake of Thai environmental laxer law and standards. If the score is four to six, it means that the investment of the company in Thailand does not relate to pollution haven at all.

Table 4.1: Factors to judge the companies' activities relating to pollution heaven

1	Incentive to Invest in Thailand Whether are the lax law and regulations incentive for the company to invest in Thailand? (If Yes 3, If No 1)
2	Environmental Policy within the Company Does the company set the environmental policy as one of the business policies of the company? (If Yes 1, If No 3)
3	Environmental Standards Does the company use the stricter standard more than the Thai standard? (If Yes 1, If No 3)
4	Environmental Technology Does the company get instruction on environmental management from the head quarter in Japan or operate technology transfer of environmental management? (If Yes 1, If No 3)

Table 4.2: Score to Judge the Pollution Haven

Score	Judgment
4 - 6	Not Pollution haven
7 - 9	Even
10 - 12	Pollution haven

In terms of the first question, the data source is the question number 1.8 in the questionnaire. If the answer is Yes, it means that the company invested in Thailand because of the laxer law and regulations than Japan. Also, if the answer is No, it means when the company invested in Thailand, the company did not focus on the cost advantage brought by the laxer environmental law and regulations in Thailand.

Regarding to the second question, the data source is the question number 2.1 and 2.3 in the questionnaire. If the answer is Yes, it accounts that the company recognizes the importance of the environmental policy and sets it as one of the business policies in the company. And if the answer is No, it intends that the company does not acknowledge the importance of environmental policy and have not had any environmental policy within the company policy.

With regard to the third question, the data source is the question number 2.7 and 2.21 in the questionnaire. If the answer is Yes, it means that the company set the stricter standard more than Thai standard. And if the answer is No, it shows the company uses the laxer standard less than Thai standard.

Finally, in terms of the forth question, the data source is the question number 2.2 and 2.10 in the questionnaire. If the answer is Yes, it refers to the company operating the environmental management technology whose standard is same as head quarter in Japan does. The technology may be brought to Thailand through the instructions from head quarter or technology transfer from Japan. Also, if the answer is No, it means that the company have not had the environmental technology as same as head quarter in Japan does. The company uses the lower standard of environmental technology than head quarter in Thailand.

4.3.3 Analysis on Business Environmental Strategy

Business environmental strategy of each company is analyzed based on the framework of Orssatto (2001). The analysis is based on the company's characteristics and business condition, performance of environmental management practices, regulation and standards within the company, future plan and so on. The framework is shown in figure 4.2.

Cost Competitive Advantage	(1) Process-Oriented Resource Productivity	(2) Environmental Cost Leadership
	(3) Beyond Compliance Practices	(4) Eco-Oriented Products & Services
Differentiation	Process	Products & Services

Competitive Focus

Figure 4.2: Generic Types of Business Environmental Strategies (adopted from Orssatto, 2001)

Data source for this analysis is the questions in the questionnaire of 2.1, 2.4, 2.12, 2.15, 2.16, 2.19, 2.22, 2.26 and 2.27. This analysis is mainly carried out by the descriptive analysis based on the answers of the above questions in the questionnaire. Each company is analyzed on the competitive focus which includes process and products and services and the competitive advantage which are cost and differentiation. The focus and advantage of each company are discussed with the overall perspectives of the company including investigating its characteristics, the market condition, activities for ISO 14000 as one of the environmental management practices of the company, incentive and objective for implementing environmental management practices and so on. The typical characteristics of each strategy of the Orssatto's framework are on the Table 4.3.

Table 4.3: Typical Characteristics of Companies for Each Strategy

Strategy	Characteristics
(1) Process-Oriented Resource Productivity	<ul style="list-style-type: none"> ○ Companies facing low levels of resource utilization, high processing costs, and high levels of generation of by-products ○ Companies having a potential to get competitiveness of cost reduction through improving the production process
(2) Environmental-Cost Leadership	<ul style="list-style-type: none"> ○ Companies focusing on the improvement of products and services to improve the product's quality. ○ Companies competing on the basis of cost which brought environmental innovation of products and services
(3) Beyond Compliance Organizational Practices	<ul style="list-style-type: none"> ○ Companies supplying their products to other firms in industrial market, which are under the pressure of customers to improve their environmental performance
(4) Eco-Oriented Products and Services	<ul style="list-style-type: none"> ○ Companies giving environmentally good products or services to customers ○ Companies improving own company's image on good environment management and enhancing the reliance both from external and internal stakeholders

In addition, what the company managers talked in the interview and information from secondary data sources are argued for deciding the business environmental strategy which the company fits with.

Moreover, it is thought that some companies act beyond the Orssatto's framework. In the case that the company's activities on environment fit with only one strategy in the Orssatto's framework, it is defined that the company takes the pure strategy. Also, in case that the company's activities on environment fit with more than one strategy in the Orssatto's framework, it is defined that the company takes the mix strategy which refers to the zone including two or more strategies. It shows that the company covers the wide range of benefits through the environmental management practices, which relates to the competitive advantage of the company.

CHAPTER V

RESEARCH FINDINGS

The description of each company's environmental management activities and the three hypotheses are tested for each company in this chapter. The four supplier companies are described in 5.1. The four assembly companies are referred in 5.2.

5.1 Supplier Companies

5.1.1 Company S1

1. Company Profile

Overview of the Company

The mother company was established in 1918 in Japan. This company has been continuously pursuing the possibility of Electroplating and has developed various surface finishing technologies since its establishment. The technology know-how accumulated over the year has not been restricted in the field of surface processing for metals and semi-conductor parts. The company makes the improvement and develops the function of device by special coating and complex material, the development of the periphery material devices as maximum, various kind of pollution preventing technology, indispensable production technique and automatic machine system development technology.

The mother company established the group enterprise with six companies in Japan and three companies in other countries. The aim of these expansions is to realize the thought of "Market in Customer-oriented" the supply of optimum technology at the area where it is needed. With the upgraded version of computerized system and effective networking, the company is able to respond quickly in liaison with customers among the group and between each enterprise. The mother company is trying to expand into the field of electronics, information apparatus, environment related technology, and continue to support the customer's technical development from this aspect.

The company S1 was established in Thailand in 1995. This company has a policy to do production activities as same as mother company in Japan, which includes the environmental management system as well. This company is the first supplier of mostly Japanese companies in Thailand. This company also supplies their products to the other first supplier to some extent. However, because the amount of the products for other first suppliers is small against the total amount of the sales, this company is defined as the first supplier in this research.

The plating company usually do metal plating with each separated products. However, the company S1 has operated metal plating of electric and electronics parts which need high precise plating technique and high quality. The technology of the company S1 is hardly seen in Thailand. The company S1 has innovated plating machines to meet the demands. For example, the company has hoop plating system, which is the machine being able to plate products' coil altogether before cutting out. This company realizes the high precise metal plating of electric and electronics parts with the innovated technologies.

Customers of this company are those who need super-precise plating parts such as semiconductor, electric and electronics companies. This company is able to plate in many kinds of materials according to the demands of customers, which are silver, gold, tin, copper and nickel and so on.

The company S1 buys the starting material form second and their suppliers, which is mostly imported from Japan or Singapore. The company also buys raw materials from local companies which is only 20 percent. The suppliers who sell the part to the company S1 are sometimes offered from assembly companies of the company S1 to supply material to the company.

Table 5.1: Background of the Company S1

Year of Establish in Thailand	1995
Registered Capital	60 million baht
Annual Sale	30 million baht
Number of Worker	350 (Japanese 4, Local 346)
Ownership Ratio	Japanese 50%, Singapore 40% and Malaysia 10%
Quality Control	ISO 9002
Research and Development	No
Materials Supply	Import: 80% from Japan and Singapore Local: 20%
Position in the Market	First Supplier

Table 5.2: Major Products of the Company S1

Product Name	Percent of Total Sale	Percent of Export
Electric plating of electric parts	90 %	5 % (Vietnam) (Mostly company B supply to Japanese firms in Thailand)
Electric plating of car parts	10 %	

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Production Process of the Company S1

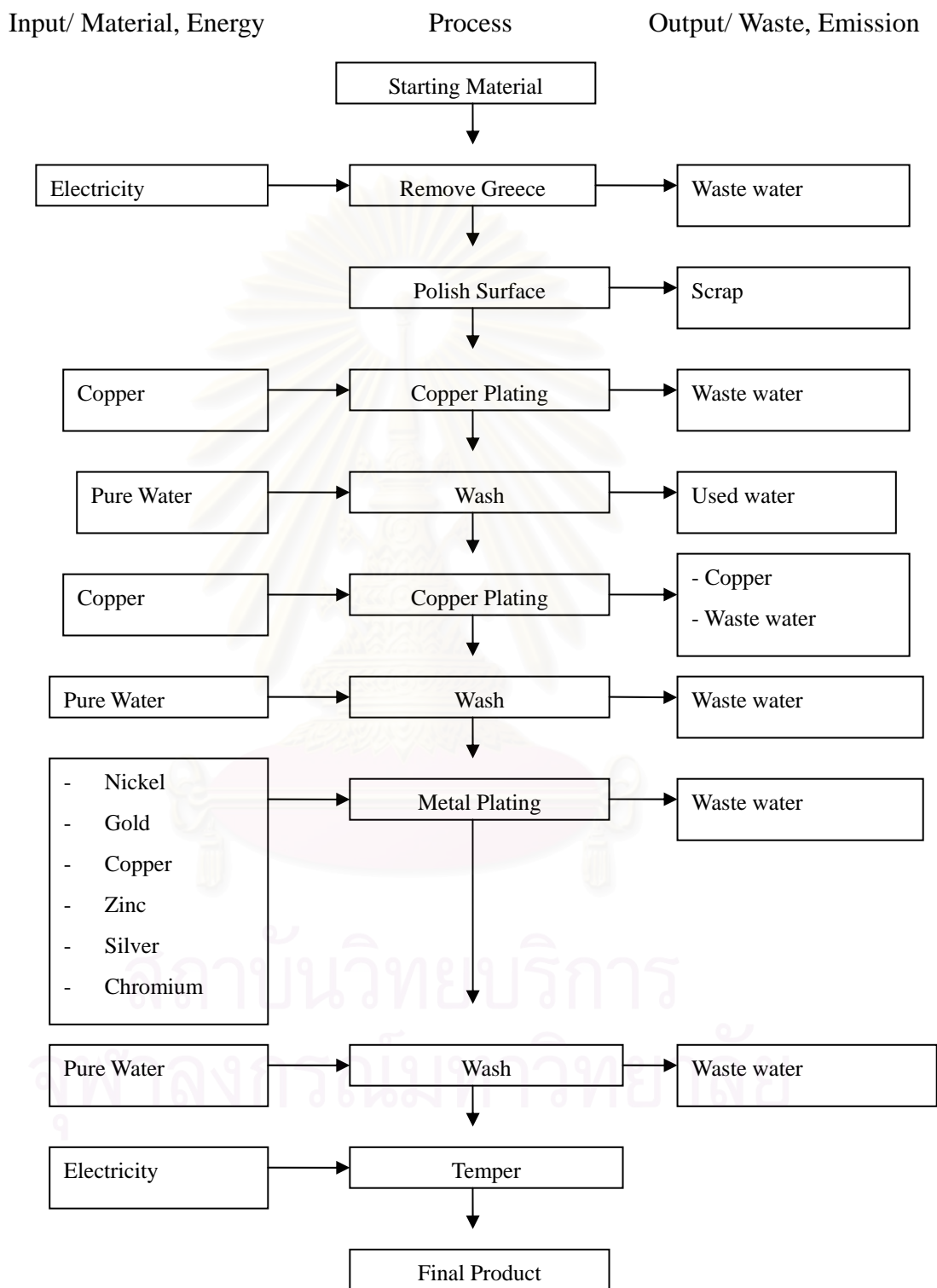


Figure 5.1 Production process of the Company S1

The main environmental effect of this company is waste water. Because the company has plated electric and electronics parts, the company washes the parts two times in the process before metal plating. The waste water from the washing stage is highly polluted with chemical substances. To clean the water, the company has a large waste water treatment system which is the same standard as equipment used by the mother company in Japan. The machine has to use a method of electrolysis to clean the water until the level being able to flush down to the public drain.

Moreover, the company is forced to meet the RoHS standard of EU to stop using specific chemical substances which the company has used. They need to use other substances. However, its costs are much higher, because the substances are still less supplied in the market.

The company separate scrap wastes into each kind of material. Scrap of brass and aluminum are sold to scrap company. The scrap will be recycled or reused to produce low quality products such as kid's toy by the scrap companies. The leftovers of the coil or scrap of soldering are sold to the press company to recycle. The scrap price is about 30 percent of the first price of material in cash.

Mother company in Japan set the environmental principle within the company and got the certification of ISO 14000 in 2000.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

There is no instruction from the mother company in Japan. Demand and instruction on environment are mainly from trading partners in Thailand. The incentive to invest in Thailand is also the demand of trading partners which asked the company to come out to Thailand because there are few Japanese plating company in Thailand.

The company thinks environmental management is one of the company's activities for contributing society and the environmental concern by companies are is going to be more important in near future. The company indicates

that although it is one of the important strategies of company, it does not relate to business chance.

In terms of stakeholders, the company pays attention on only trading partners. The most important factors for this company to start environmental management are Thai Environmental Law, prevention of future legislative law and enhancing workers concern on environment. The second important factors are requirements from trading companies and improvement of company image.

Law, Standard

Japanese executives know the law roughly, but the Thai worker being in charge of environmental issues understand it well. Although BOI promotion policy does not give any effects to this company, Thai Environmental Law is extremely important for this company. Because the wastes or waste water out from production process of plating are already regulated in the law. The management standard of waste water which the company uses is same as Japanese one.

3. Environmental Management Practice

Objectives to Implement Environmental Management

Improvement of workers' concern on environment is most important objective to practice environmental management. The next is cost reduction of raw materials and energy. However, the company claims that the circumstance for private companies to implement environmental management in Thailand is not so good, because of the lack of government activities on environmental conservation. The company just got ISO 14000, however, they said we just tried to be registered ISO 14000 to get the name of ISO, not for improving environmental conservation activities in practice.

External Environmental Strategies and Practices of Company

Because the trading partners of this company are relatively big company, the companies are particular about substances of products affecting environment. The company makes environmental report to submit to the mother company or customers, however, they do not release to the public. Because there are some information of company's secret.

In terms of buying raw materials, the company pays attention on environment depending on the material. But sometimes they buy materials without consideration on the material's environmental impact. The company has business with the companies which do not have ISO 14000 as well. If the company chooses trading companies with consideration on environment, because they are not big company, the range of business becomes narrower. However, the company thinks every company has to pay attention on environment in buying raw materials in near future.

Internal Environmental Strategies and Practices of Company

There is no environmental department within the company. However, there is Thai worker who is in charge of environmental issues of the company. This company has large equipments to clean waste water in the factory. The company does regularly environmental education within the company. Workers became to be aware of environmental managements, such as separation of waste, economize in water consumption and recycling industrial wastes, more than before by doing environmental education.

ISO 14000

The company was certificated in ISO 14000 in February, 2005. The manager said that the company became to be able to compete in the market as a company certified by ISO 14000. The company executive does not know about life cycle assessment.

This company got the ISO 14000 certification because of the requirements from customers. The customers forced the company to meet the standard of RoHS regulation of EU and to submit the report on the chemical substances used in the production process

4. Competitiveness, Benefit

Cost Reduction

Company S1 does not think the implementation of environmental management could realize cost reduction. It is just cost for the company.

Differentiation

There is no particular effect on products differentiation by implementing environmental management.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	1
2: Environmental Policy within the Company	2
3: Environmental Standards	1
4: Environmental Technology	2
Total	6: Not Pollution Haven

1. This company invested in Thailand because the customer in Japan which invested in Thailand in advance requested the company to manufacture in Thailand.

2. This company just got ISO 14000 in February in this year, 2005. The company already has environmental policy but the effect has not appeared yet. This company has operated the waste treatment system since the year of establish following the mother company's policy.

3. Company S1 uses the standards as same as Japanese head quarter to keep the same quality of products.

4. This company does not have any instruction on environment from the mother company. But they have many instructions or requests on environment from customers. The company improves the environment technology to meet the requests of customers, such as RoHS regulation.

6. Orssatto's Hypothesis

The company S1 takes pure strategy of Beyond Compliance Organizational Practices.

In the market of the company S1, recently price of raw material has been increasing because of the increase of oil price. However, the price of product has been decreasing, which may relate to the increase of product made in China in the market. Moreover, customers request the company S1 to get ISO 14000 and perform better environmental management to meet the RoHS regulation. The company needs to submit a report on the used material and used chemical substances of the product in detail. This is due to export the final product including the company's parts to Europe by assembly companies.

On the process of electric plating on electrical parts, the most polluted resource is water. They have a large waste water treatment system in the factory to clean the waste water including chemical substances from the production process until they can flush down to the public drainpipe. This company has been just certificate by ISO 14000 in February, 2005. Despite the company got the ISO 14000 with the pressures from trading companies in Thailand, the company deals with environmental issues within company better.

The price of this company's products is cheap. To get more profits, they need to do mass-production. On the other hand, recently the price of materials became high, and the price of final product became low. Company S1 has been doing business with big Japanese companies in Thailand, however, the market of the company S1 is very competitive. If the company does not pay attention to the environmental impact of their production, they will lose the business. However, if they consider environmental issues too much, they will lose material suppliers. The standing point of the company S1 is middle between assembly company and raw material supplier. For the company S1, it is very difficult to balance the level of environmental management in the market today.

Company S1 is the first suppliers of Japanese companies in Thailand. Company S1 produces products with the assembly companies' requests, which is also main incentive for them to invest in Thailand. The company does not develop the

market by themselves. The manager of the company S1 said implementation of environmental management does not relate to cost down in case of the company S1. However, they have been trying to improve their production process with environmental consideration under the pressure from assembly companies in Thailand. Therefore, this company fits with Beyond Compliance Practices of Orssatto's framework. This company is able to enhance their competitiveness by improving environmental management practices beyond the regulations under pressure of customers. Also, they have potential to develop to their resource productivity by following ISO 14000.

7. Financial Performance

The waste water treatment system took a cost of around 30 million baht. This company uses the cost about six million baht for environmental conservation per year. This cost is mostly used for operation of waste water treatment system and purchase the non-hazardous chemical substances. The environmental cost is 2.4 percent of total cost.

5.1.2 Company S2

1. Company Profile

Overview of the Company

The head office was established in 1935. The company has expanded the manufacturing products. The company started to press processing of cathode-ray tube, electric parts of car radio in 1952. Then the company expanded the business into some fields: 1) manufacturing steel press processing parts of sound, picture and computer-related equipments, 2) various of machinery assembling, 3) producing resin-treated metallic mold for video, car stereo machinery parts, OA machinery parts and mold of CRT parts. In particular, in terms of processing the outer frame of video, the company supplies 60 to 70 percent of Japanese products and about 13 percent all over the world.

In 1985 when Yen sharply appreciated, the head office of the company established a mold factory in Hong Kong with venture business with corporate of Hong Kong. However, because the Hong Kong's corporate contracting

venture business could not observe the deadline and did not perform the instruction of the head office in Japan, the company retreated after only one year. At the same time, there were needs to invest in Southeast Asia for establishing metallic press processing factory from trading partners. The company inspected Malaysia and Thailand. As a result, the company decided to invest in Thailand, because of merits on institutions of contract and tax and cheap price of labor and real estate. The head office established the first factory in 1987. The objective of investment in Thailand was to take advantage of Yen appreciation. Therefore, the company was a production base for exporting 100 percent of products manufactured in Thailand to head office in Japan. The company had only 60 workers. However, because Japanese electric big makers invested in Thailand around 1990, the demand rose extremely. The company started looking at business in Thai market and expanded the scale of manufacturing. The company increased the number of worker up to 5,000 after five years since establishment in Thailand. Then, the company completed second factory to meet the demand in 1992. The company also established another company of technology with 100 percent equity participation of the company S2 in 1995. At present the company S2 has about 3,500 workers and operates resin-treated molding which head office in Japan does not operate.

The company S2 is the first supplier. The company buys raw material and parts from second and third suppliers and produce parts to supply to assembly companies which are mainly Japanese companies. This company has grown its sales in recent years. Their business expands to world wide. They have customers both in domestic and abroad.

The head office gives high priority to education for local workers in foreign countries. The head office calls not only supervisors but also normal worker to smoothly transfer the technology to oversea factories. The period of training is three to six months for assembling worker class and one year for engineer class. Products manufactured in local factory are traded directly in local market. Products which send to Japan has been reducing. The head office in Japan focuses on the business of mold production which is high value-added and need high technique that is difficult to transfer to foreign countries. Especially designs of mold and development process are items of exclusive jurisdiction of head office in Japan.

Table 5.3: Background of the Company S2

Year of Establish in Thailand	Oct, 1987
Registered Capital	220 million baht
Annual Sale	11,964 million baht
Number of Worker	3,460 (Japanese 50, Local 3,410)
Ownership Ratio	Japanese 100%
Quality Control	ISO 9001, ISO 14001, ISO/TS16949
Research and Development	No
Materials Supply	Import: 40% from Japan, Malaysia and Singapore Local: 60%

Table 5.4: Major Products of the Company S2

Product Name	Percent of Total Sale	Percent of Export
Indash 6 CD changer	60 %	80 % (Total Export of Products)
Electric Appliance Parts, Digital Camera Parts	20 %	

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Production Process of the Company S2

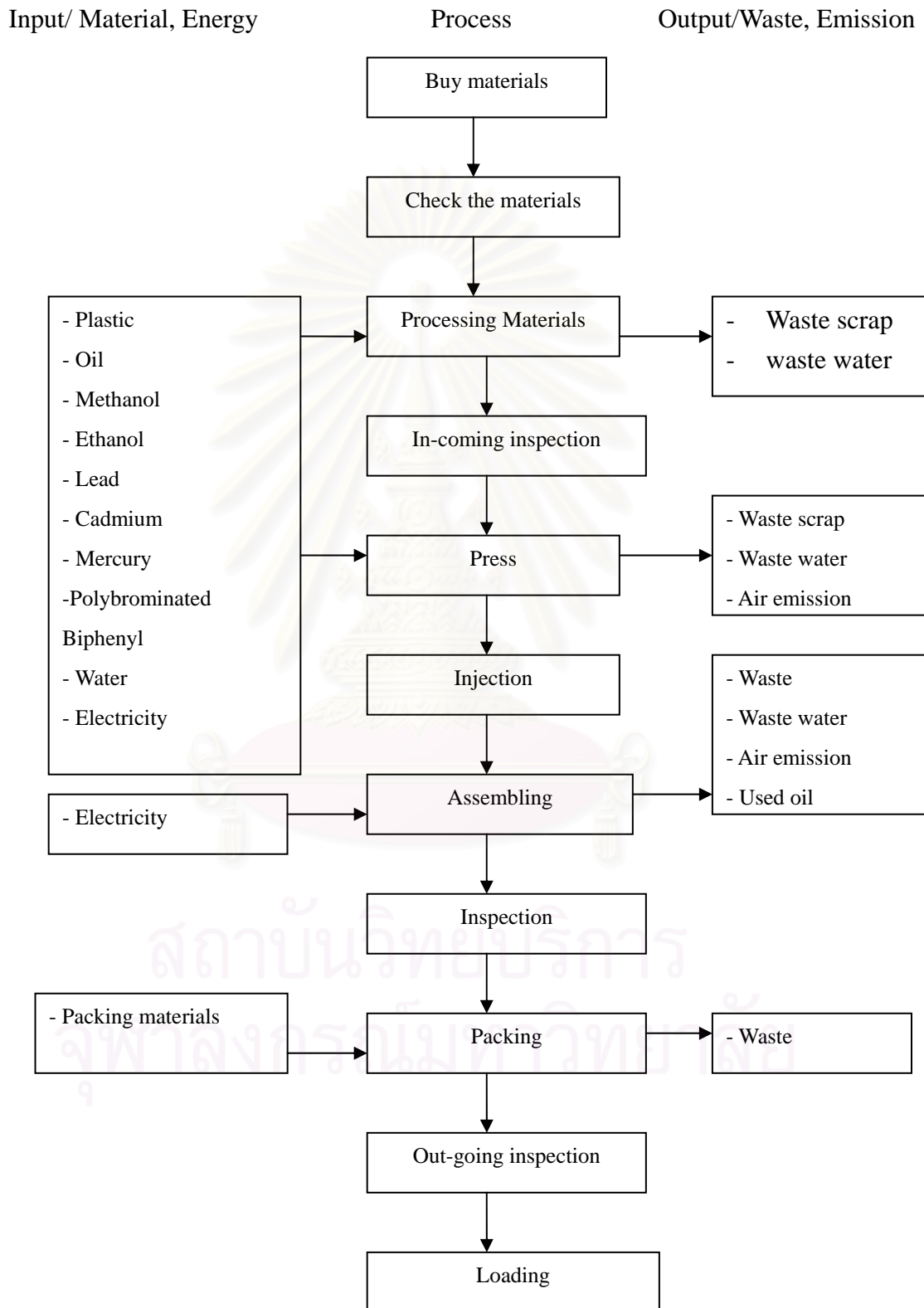


Figure 5.2 Production Process of the Company S2

Their products are indirectly sold in the international market including Europe. Therefore, this company deals with international regulations such as RoHS, WEEE and ELV.

The company S2 produces many kinds of products with various materials and chemical substances. The main environmental problem for this company is waste water. This company operates a large waste water treatment system within the company.

For air emission, the company uses the air filter in the factory. And in terms of wastes, the company sells to other companies. And the company also recycles the used oil.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

The company has been affected by the demand of trading partners rather than the head office in Japan to implement environmental management practices. Recently the trading partners require RoHS (Restricting the use of hazardous Substance), WEEE (Waste from Electrical and Electronics Equipment) and ELV for environmental quality control.

With regard of stakeholders, they pay attentions on many directions. The company planted trees near factory two years ago as a regional contribution of company on environment.

Law, Standard

The company answers the Thai Environmental Law of 1992 well and thinks it is important. Also, they feel promotion policy of BOI is important as well. However, the company follows not the Environmental Law but the demand of trading partners. Although the Environmental Law and BOI promotions do not give any effect to the company, acquisition of ISO 14000 and exemption from taxation of SME's policy are important for the company rather than the Environmental Law and BOI promotions. Company can not say that the Thai Environmental Law and BOI

promotion are not significant. However, there are other factors in real which help companies to run business including environmental management in Thailand.

This company makes own standard which is mainly based on Thai environmental law and regulations. However, they use sometimes stricter standard than it if the customer requests, such as Japanese and European customers. The company has used the standards depending on the customers' need.

3. Environmental Management Practice

Objectives to Implement Environmental Management

Objective of environmental management is mainly enhancing company's image, improving community relations and assuring present and future compliance. Product efficiency, product quality and improving workers' commitment are second important factors.

External Environmental Strategies and Practices of Company

The company considers the implementation of environmental management creates business chance and it is important business strategy of our company. The company also place it is one of the activities contributing to neighborhood of the company.

They understand the whole polluting substances of factory. They use large equipments to abate such pollutions. Although the company supplies parts to trading partners, when they buy materials or parts for production, they choose the suppliers considering environmental impacts of the materials or parts.

If trading company requires sending environmental reports, the company creates and sends it. But usually the company does not create environmental reports to release to the public.

Internal Environmental Strategies and Practices of Company

The company has an environmental policy within company. The company pays attention to dealing with waste, especially oil and water. There is a department which control and dealing with environmental issues within company. The company implements the environmental education within company every six months in order to enhance workers' concern on environment. The company also uses equipments to clean waste water, waste oil and air. The company tries to save electricity as well.

ISO 14000

The company got the certification of ISO 14000 in November, 2003. After the company got ISO 14000, the company started to set the exact number of goal for environmental management. The company reduced the amount of used of paper and start recycling the waste oil. The worker's concern on environment has enhanced and the reliance of the company also improved. The company is going to start Life Cycle Assessment from now on.

4. Competitiveness, Benefit

Cost Reduction

The company thinks that they could realize the cost down of environmental cost in total through selling the wastes and recycling the used oil. The company has used high costs for environmental management but they found a way to sell the waste to other companies and get additional revenue from it.

Differentiation

The company does not consider the differentiation of company's products by implementing environmental management, because the company answers they do the environmental management only to meet the trading companies' demands and instructions, not to compete in the market.

Other Benefits

The reliance of customers and the appreciation of regional residence are improved. The company starts selling oil which they treated as waste before and recycling the waste. They are glad to be an environmentally-friendly company which is good for society and earth after starting environmental management.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	2
2: Environmental Policy within the Company	1
3: Environmental Standards	2
4: Environmental Technology	2
Total	7: Even

1. Incentive for the company to invest in Thailand was cheap labor, tax and real estate. Company S2 was established in 1987. At that time, many electric and electronics Japanese companies invested in Thailand. Also, there were laxer law and regulations and loose enforcement on environment more than now in Thailand. This company produces a lot of wastes in the manufacturing. The incentives for the company may include cheaper environmental costs than Japan. However, this company has changed their attitudes and concerns on environment.

2. The company sets environmental policy as one of the important company's policies.

3. Company S2 sets clear objective and emission standard in number after the company got ISO 14000. However, the company sets the standards based on Thai Environmental Law. They also have ability to adopt the company which requests stricter standards. On the other hand, they also are trying to set stricter standards after achieving the old standards. Therefore, this company has been going to be better in terms of environmental management.

4. Company S2 does not get any instructions from head quarter in Japan. However, they implement and improve environmental management technology by meeting customers' requests and following ISO 14000.

6. Orssatto's Hypothesis

The company S2 takes mix strategy of both Process-Oriented Resource Productivity and Beyond Compliance Organizational Practices.

Company S2 has an environmental department and deal with environmental issues very well. The workers which is 3,450 people including Japanese 50 people also cooperate to study and implement environmental management in own position. The factory is big but it is well managed. The company releases their environmental data to outside of the company even me. The concerns on environment within company S2 are relatively high among the first suppliers. Therefore, company S2 is regards as company which does not think Thailand is pollution haven.

In terms of environmental management, the company started doing with the requests from trading companies. The company supplies their parts to not only electric and electronics industry but also automobile industry. Therefore, they need to pass several environmental standards which are used in the global market. Company S2 made a specific department on environment which has improved their management on environmental issues year by year. To date, the company creates the good environmental management system in whole production process including monitoring system and also have continued to keep ISO 14000 certification by improving their performance. One reason for company S2 to get ISO 14000 and keep it is if company S2 loses ISO 14000, trading partner will not buy the product of company S2. The certification and implementation of ISO 14000 guarantee the business of company S2 in Thailand.

In addition, company S2 produces a lot of wastes and needs large waste treatment costs. However, the company gets some additional profit by selling their waste or recycling used oil which follow their ISO 14000. Company has been increased the annual sales even after starting ISO 14000. The company just followed the law or other standards but the company has acted beyond the laws and standards and increase benefits. Therefore, the company S2 is considered as the company which concentrates on process improvement as competitive focus and use differentiation as competitive advantage, which is categorized beyond compliance practices in Orssatto's hypothesis.

This company was under pressure of customer to implement environmental management. The company starts environmental management with the requirement of customer. Because the company tried to improve their production process, the company could realize reducing wastes. Therefore, firstly company S2 fitted with beyond compliance organizational practices as business environmental strategy, but now the company also fits with the strategy of process-oriented resource productivity.

7. Financial Performance

This company pays the cost for environmental management 6,226,524 baht, which is the 0.07 percent of total cost. The company pays for waste treatment 540,000 baht and for recycling 144,000 baht. Also, the company get profit from reusing about 200,000 baht in 2004.

Interestingly, they set up the standard of our environmental management following Thai Environmental Law. But the company sometimes adapts Japanese standards if trading company requires to follow. This may realize cost saving for the compliance of regulations when the company use the Thai standards which are relatively laxer than the international standards. This is specific strategy of this company on environmental management to increase efficiency of cost saving in Thailand.

5.1.3 Company S3

1. Company Profile

Overview of the Company S3

Company S3 was founded in 1951 as the Japanese first manufacturer to specialize in miniature ball bearings. As of July 2001, the company's 50th anniversary, the group of company S3 has grown to become a leading global supplier of high-precision mechanical and electronic components, operating 32 plants and 52 sales offices in 14 countries and employing approximately 44,000 people.

Miniature and small ball bearings and electronic components are used in information and telecommunication equipments, such as computers and

household electrical appliances, such as video cameras and air conditioners. Keyboards are also manufactured at the company's plant in Thailand which is the largest manufacturing base among the group of company S3.

Company S3 supplies keyboards on an optical electron microscope basis to leading global personal computer manufacturers in desktop and notebook computers. Company S3 also market multimedia keyboards under its own brand name. There are three production bases of keyboard in the world, Thailand, China and Slovak Republic. The product volume is 2.5 million pieces per month. And its world market share is approximately 20 percent. Plant in Thailand which supplies the global market employs the company's vertically integrated manufacturing system in whole process, from machining components to final assembly are conducted in-house.

In 1982 the company S3 began manufacturing miniature ball bearing at a facility in Thailand. Since then, the company has expanded its Thai operations. Following the first facility, the company S3 established manufacturing facilities in 1984, 1988 and 1990. The total amount of production in Thailand is about 60 percent of the group company S3. The incentives for this company to invest in Thailand were the abundant supply of labor, the good labor attitudes, government promotions and culture.

The company's operations in Thailand, consisting of four production facilities, seven companies and the number of employees have grown to be the largest manufacturing base of the company group.

This company basically is the first supplier. However, the company also has a function to supply the final products, keyboard, as an assembly company. The aim of this research is to focus the environmental management practices of the company as a whole. In addition, because the majority of this company's products are supplied to the assembly companies, this company is thought as the first supplier in this study.

Table 5.5: Background of the Company S3

Year of Establish in Thailand	May 1980
Registered Capital	8,382 million baht
Annual Sale	Approximately 1,000 million baht (2004)
Number of Worker	19,011 (Japanese 200, Local 17,011)
Ownership Ratio	Japanese 100%
Quality Control	ISO 9000, QS 9000, TS16949
Research and Development	Yes (Technology and Environment)
Materials Supply	Import: 100% from Japan
Position in the Market	First Supplier (Assembly only for a few products)

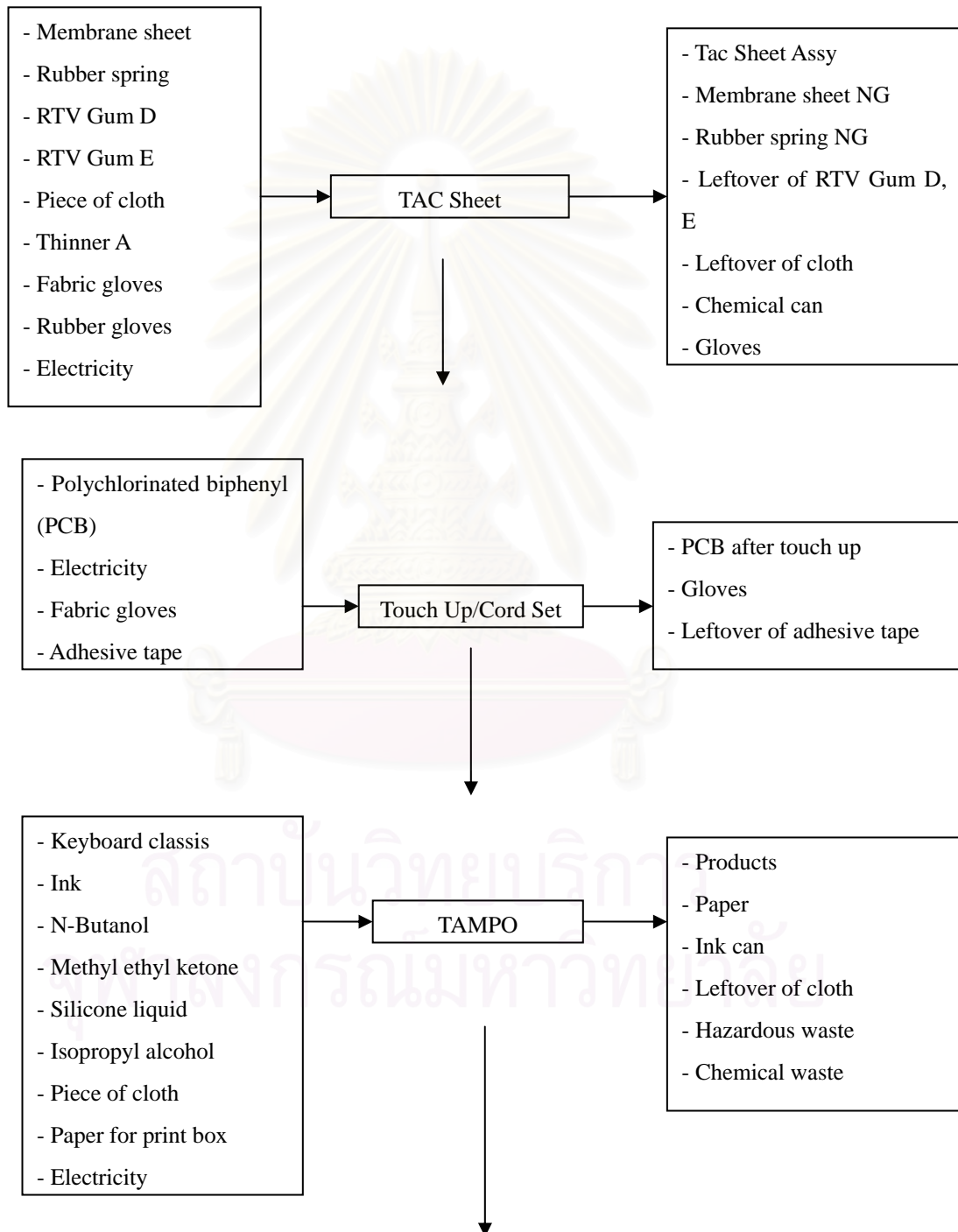
Table 5.6: Major Products of the Company S3

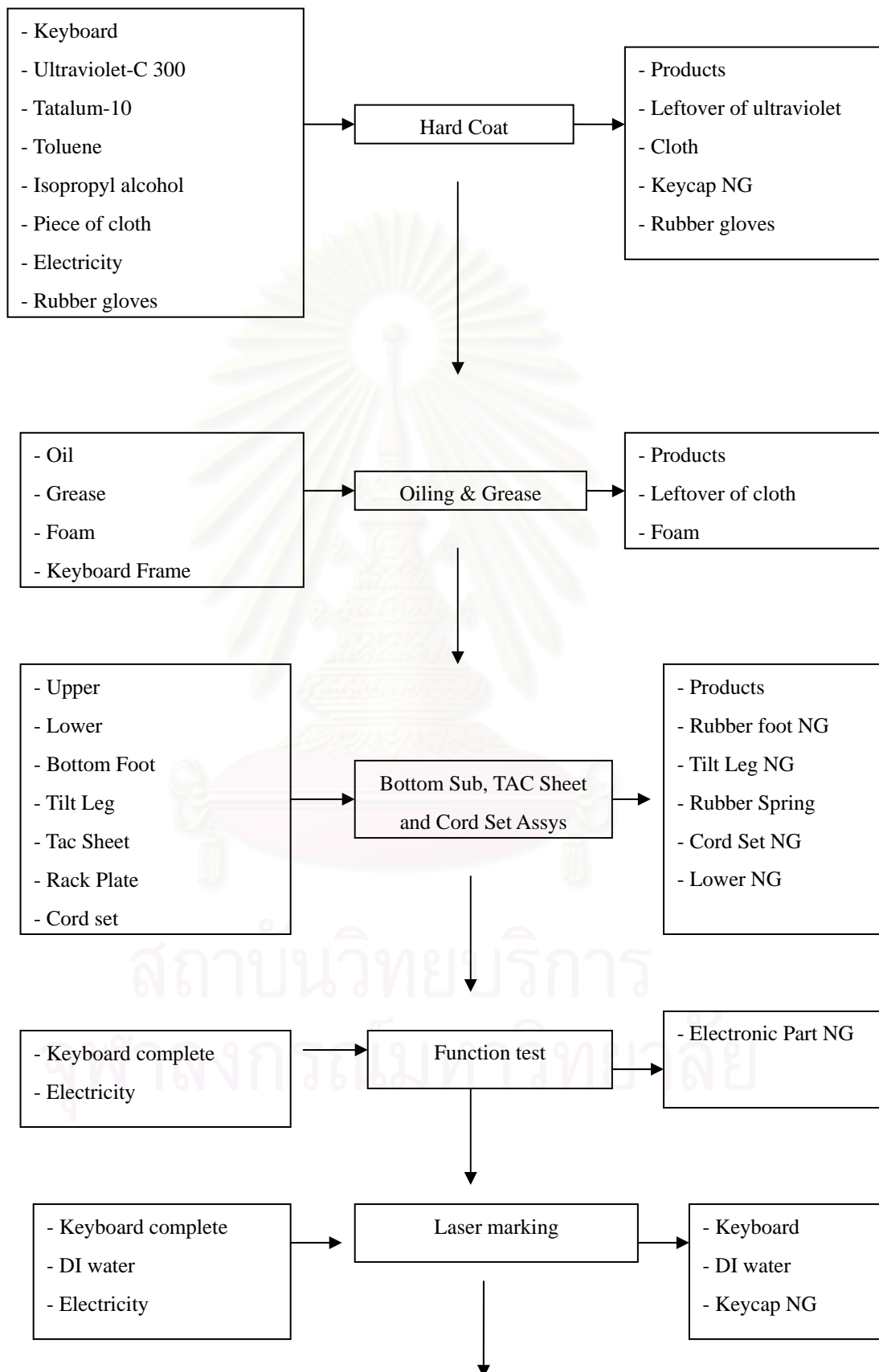
Product Name	Percent of Total Sale	Percent of Export
Computer Keyboard	n/a	100%
Ball Bearing	n/a	n/a
Speaker	n/a	n/a

สถาบันวิทยบริการ
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Production Process of the Company S3

Input / Material, Energy Process Output / Waste, Emission





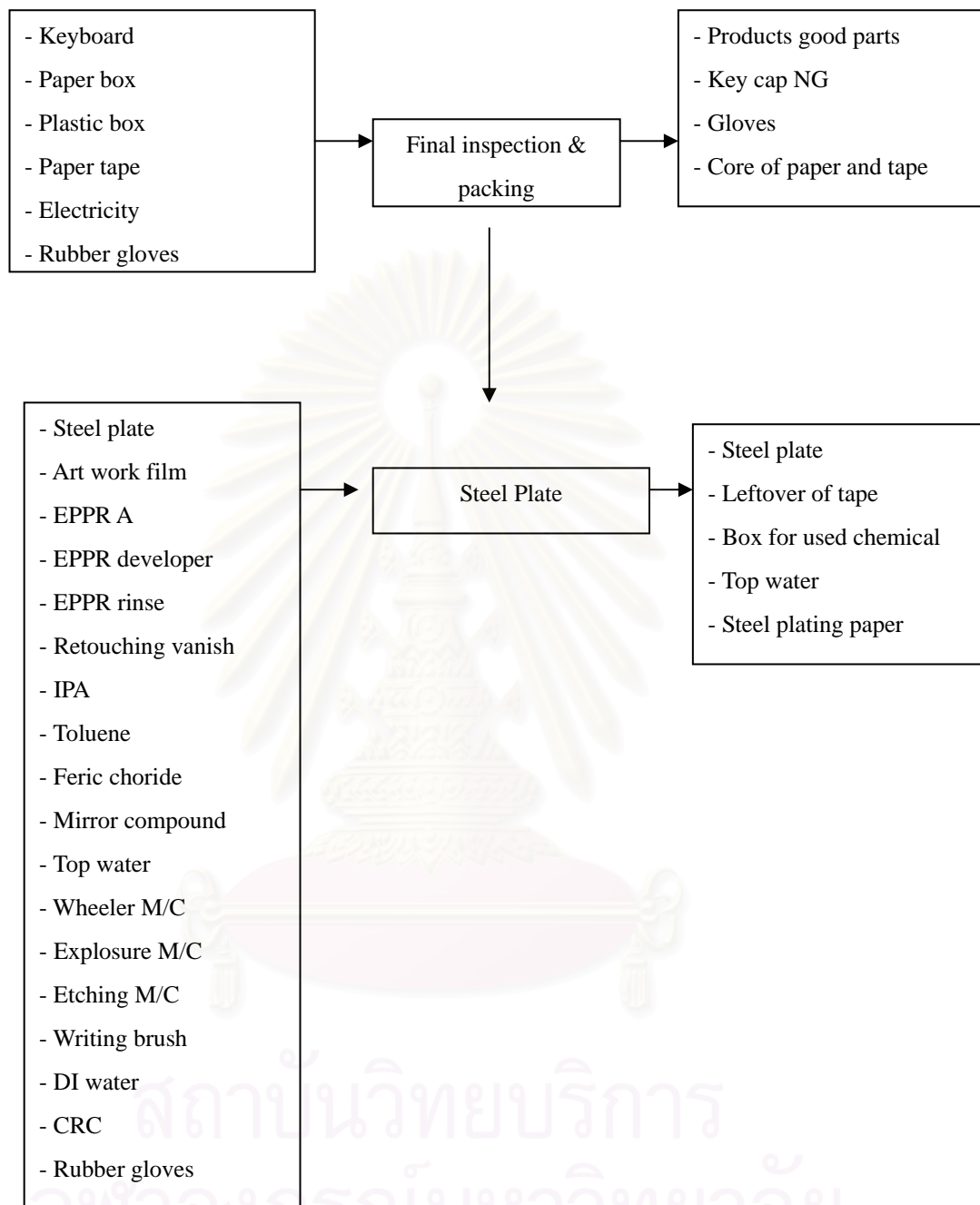


Figure 5.3: Production Process of the Company S3

This company has produced 25 products in this factory. Because it is difficult to explain the whole production processes here, the production process of only keyboard will be shown in this section.

The company S3 imports the most of the raw materials from Japan, because this company focuses on the quality of the product. They need the high quality materials for the production. However, the company also buys some materials which do not relate to the quality of the product from domestic companies. Because company S3 produces almost all components, such as frame, key, switches and membrane sheet, except for connectors and cord, in-house, the company has advantage in terms of quality, supply capabilities and cost competitiveness in the market. Especially, these products capitalize on the company's super-precision technology of machine processing. Because the company uses some volatile chemical substances such as isopropyl alcohol, they concentrate on the temperature of the work place and use air filter for the air emission.

This company devote themselves to enhance the recycle activities within the company. The company recycles the almost all materials which will be reused in the company again. However, the company also sells the wastes which have no plan to be reused in the company to other recycling companies, which includes leftover of plastic materials and copper wires.

The main environmental problem for the company S3 is the waste water. In order to manage the problem, the company established a huge waste water treatment system within the company. Also, the company tries to reduce the amount of waste which are reclaimed.

The use of water for cleaning parts during manufacturing processes and human sewage naturally gives rise to waste water. The company S3 has invested 400 million baht in the construction of four waste water treatment facilities to turn waste water discharged from plants to be pollution-free. The company has also stationed specialized staffs in charge of these facilities.

The quality of waste water after treatment is monitored and controlled by the company's laboratory analytical division licensed by the Thai Industrial Works Department to ensure the waste water satisfied the waste water standards set forth by the Department. As a result, the waste water discharged from the plant has ever caused no environmental pollution. The waste water after treatment is reused for various purposes such as forestation, fish-farming and agricultural irrigation.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

Company S3 thinks environmental conservation activities relate to business chance, one of the contributing activities for society, one of the important factors to decide the future business and one of important corporate strategies.

The indications from the head quarter in Japan cover the whole process of production. The oversea branches are forced to follow the indications. As the incentive for the company to start environmental management was mainly the request from trading partners. Company S3 pays attention on whole stakeholders.

Law, Standard

The company understands Thai Environmental Law well. And they think it is very important. Company S3 has submitted reports of waste treatment to the mother company in Japan. The promotion of BOI is also important, however there was not in past when the company invested in Thailand. The countermeasure for RoHS was already finished and started the production without the banned chemical substances in RoHS. Company S3 sets the own standard which covers the whole laws and standards in the place in which where the company's oversea production bases are all over the world. The standard has 18 banned chemical substances covering whole international standards, because the company supply the products over the world. And each factory set own targets of environmental management and struggle to get it. In terms of emission standard, the company set the own standard and objective based on the government law. However, the standard is stricter than governmental regulations.

3. Environmental Management Practice

Objectives to Implement Environmental Management

As objectives to implement environmental management, company S3 regards following things as important, such as improvement of product quality, reducing finance for material and energy and assuring the present and future compliances. The objectives have been changing after the company accomplished the

set objectives.

External Environmental Strategies and Practices of Company

The company promotes green consuming. And company S3 requires trading partners to get ISO 14000 and ISO 9000.

Internal Environmental Strategies and Practices of Company

Company S3 decides the business principle on environment. There is a department on environment in the company. The department has role to make and release annual environmental report and educate workers.

The company developed the machine to take more products from same amount of materials. And they have promoted recycle within company. The recycle measure realizes the reduction of purchasing raw materials 30 percent. To conserve the environment in the factory, the electric car, which is usually used in golf course, are driven by executives within factory.

The company creates own database to manage the data on usage of chemical substances. And whole oversea factory control the environmental data which is called Material Safety data Sheet.

ISO 14000

The company got ISO 14000 in 1997. Company S3 think ISO is basic need for companies. And the company was able to benefit in many aspects, such as reducing cost, enhancing workers' concern on environment, improving community relationships and rising external reliance of company.

4. Competitiveness, Benefit

Cost Reduction

Company S3 realizes cost reduction through environmental management practices, such as improvement of recycle ratio. In addition, the company improved the quality of machine equipments through implementation of

environmental management, which increases the recycle ratio further more.

Differentiation

The company made the products and the company itself be differentiated from other companies' products by performing environmental management.

Other Benefits

Moreover, environmental management practices bring contribution for society, improvement of company image to enhance the company's competitive advantage in the market.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	1
2: Environmental Policy within the Company	1
3: Environmental Standards	1
4: Environmental Technology	1
Total	4: Not Pollution Haven

1. Incentive is cheaper skilled labor and BOI promotion. The company has not thought the lax law and regulations are incentive for them to invest in Thailand.

2. Company S3 sets a policy and makes workers understand to do following the policy through environmental education within the company.

3. The company sets 18 banned substances which covers the whole international standards. Company S3 already stopped using the substances banned in RoHS.

4. Company S3 brought Japanese environmental management schemes. The Thai workers who can speak Japanese translated in Thai, and implement in the factories of the group in Thailand.

6. Business Environmental Strategy

The company S3 takes mix strategy of Process-Oriented Resource Productivity, Beyond Compliance Organizational Practices and Eco-Oriented Products and Services.

The company has huge waste treatment system. Because there are many Thai workers who can speak Japanese, they translated the Japanese law of environmental accounting to implement in Thailand. Company S3 performed environmental accounting in Thailand earlier than other companies. The company does not make a secret of environmental data and measures but release to public, in order to contribute Thai society.

Company S3 practices environmental management in very high level in spite of the harsh market competition. The company focuses on the improvement of their production process by setting strict own standard banning 18 chemical substances, and enhance the recycle of waste materials to increase the resource productivity.

The company S3 considers environmental protection the primary importance in conducting its business and has taken effective steps to protect the environmental at its manufacturing facilities throughout the world.

This company developed clean system with purified water and phased out the use of CFC and ethane throughout the company group in April 1993. All group companies had consumed monthly about 115 tons of specific CFC and about 210 tons of ethane as cleaning solvents in the manufacturing process. The company S3 invested about 600 million baht to accomplish the disuse of CFC and ethane.

The environmental protection agency of the US gave the group companies in Thailand and plants in Japan its 1993 annual Stratospheric Ozone Protection Award. This is the first winner of companies in Thailand for this award. Also, the agency selected the this group companies as a winner of Best-of-the-Best Stratospheric Ozone Protection Award for this company's leadership among foreign investors in Thailand, and their contribution for the elimination of the Ozone Depleting Substances in developing countries. Therefore, this company fits with the

strategy of Eco-Oriented Products and Services.

Company S3 performs over the hypothesis and realizes to show the benefits from business environmental strategies. Therefore, the company S3 also fits with the process-oriented resource productivity. Because the remarkable point of company S3's environmental management is its high recycle ratio.

7. Financial Performance

The company S3 used 632,394,146 baht for environmental management in fiscal year 2003. This company especially use much cost to develop the prevention technology of air pollution, which is about 75 percent of total environmental cost. This company recently has focused on the air emission and trying to set the treatment system in addition to the waste water treatment system.

5.1.4 Company S4

1. Company Profile

Overview of the Company

Company S4 was established in 1956 in Japan. The company has been expanding its network beyond the borders of Japan to oversea including China, Thailand, India, North America, Brazil, and the United Kingdom to be a global company.

Company S4 boasts the top global market share in motorcycle carburetors, and its automobile fuel injection systems. In addition, the company has expanded its product range. To date, the company manufactures and supplies a wide range of automobile components including air-conditioning systems and electronic control units.

The oversea branches of the company S4 in Asia which are China, Taiwan, India and Thailand have boosted the sale and increased the number of consolidated subsidiaries helped revenues 30 percent year by year.

With a strong concern for natural environment, the company S4 manufactures such environment-friendly products as components for compressed natural gas and liquefied petroleum gas vehicles and is currently developing components for fuel-cell vehicles and other products offering significant potential.

This company established in Thailand in 1994. The company S4 is the first supplier. The company S4 produces electric parts for automobile such as air-conditioning system, scroll compressor and so on. The company S4 exports the products to many Asian countries including Malaysia, Indonesia, Philippines, Pakistan and India except for Thailand. Especially air conditioning system is supplied only in Thailand.

Table 5.7: Background of the Company S4

Year of Establish in Thailand	Nov 1994
Registered Capital	72 million baht
Annual Sale	30.12 million baht (2004)
Number of Worker	19,011 (Japanese 200, Local 17,011)
Ownership Ratio	Japanese 60%, Thai 40% (Honda Automobile Thailand)
Quality Control	No
Research and Development	No
Materials Supply	Import: 20% from Japan Local: 80%

Table 5.8: Major Products of the Company S4

Product Name	Percent of Total Sale	Percent of Export
Air-conditioning system for automobile	95%	0%

Production Process of the Company S4

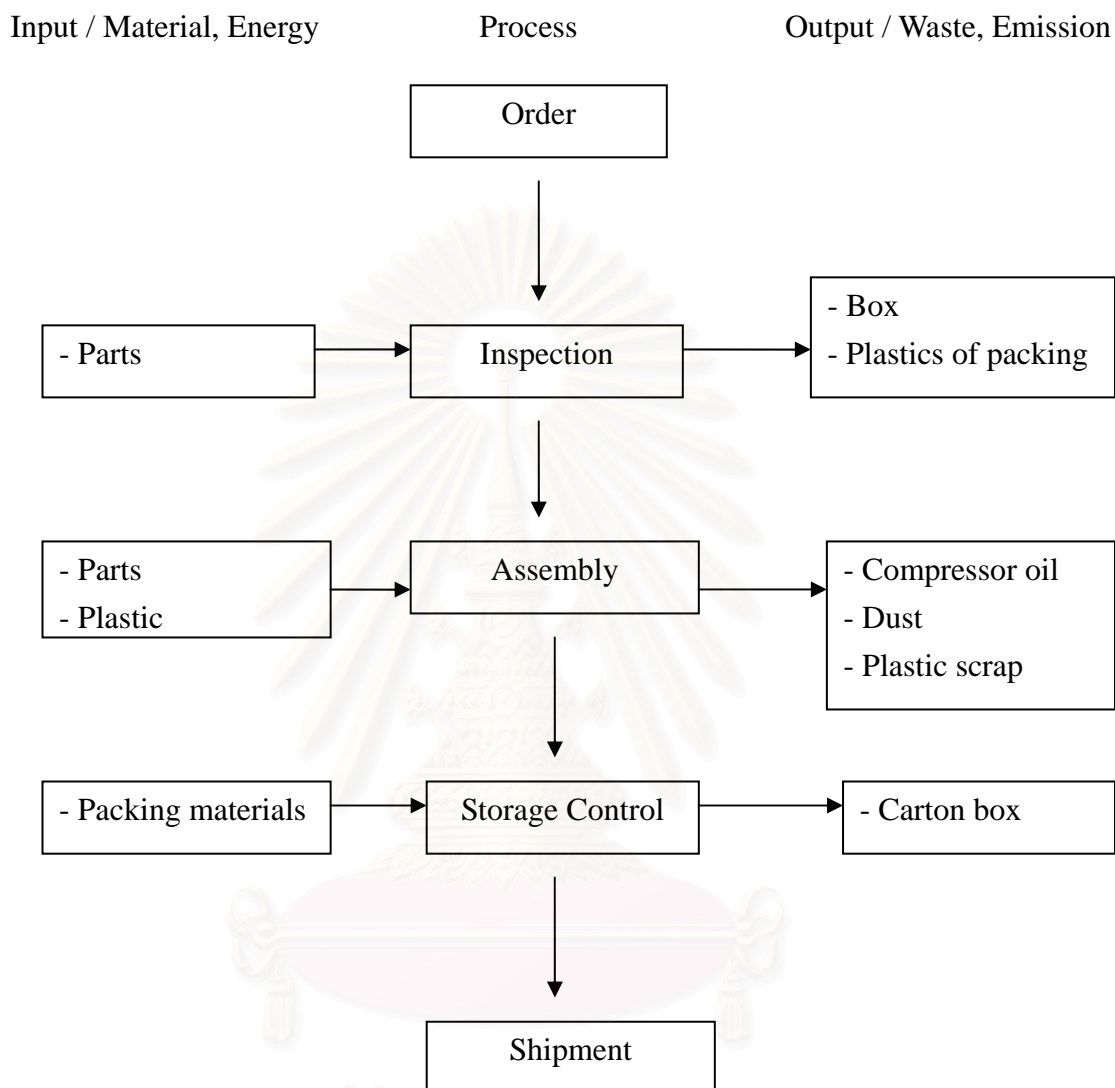


Figure 5.4 Production Process of the Company S4

This company relatively uses fewer raw materials and no chemical substances, because of the products and the business style. In terms of the waste from inspection stage, these wastes are reused or sold to local companies. there are box and plastics which is used to packing the parts from suppliers.

In assembly stage, this company use plastic as a material. The company S4 has air-filters to clean the air and dust emissions within the factory. The company sells the plastic scrap to other companies after assembling. And the company purify the used compression oil before disposing.

The company is trying to reuse the carton box discharged in the storage control stage. Waste water from restaurant and toilet are also treated be clean through the water treatment equipment before flushing down to the public drain.

This company does not use much chemical substances. However, because the suppliers have used the chemical substances which are banned in the international market, the company S4 just starts to require the suppliers to follow the regulations.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

There are instructions from trading partner and head quarter in Japan on environmental management. The most important incentive to start to prepare the environmental management practices is meeting trading company's request. Reducing environmental risks, improving community relationship and head quarter's instruction are also important.

Company pays attention on many stakeholders except for neighbors, because of the location of factory in industrial park.

Law, Standard

Company S4 understands Thai Environmental Law roughly. However, the company regards the law as important when company implements environmental management. BOI promotion does not have any important effects for the company so much. Company S4 uses the Japanese standard which covers standards in Thailand.

3. Environmental Management Practice

Objectives to Implement Environmental Management

The most important objective for company S4 is only request from trading partner. Next is the improvement of community relations, media coverage,

reduction of risk and prevent of the compliance with environmental law and regulations in the future. Because this company is the first supplier, the request of the main assembly company decides the direction of the company in the business.

External Environmental Strategies and Practices of Company

Company concerns on environmental impacts when the company buys parts from suppliers. Against suppliers company S4 starts to encourage suppliers to effort to get ISO 14000. If the supplier does not have ISO 14000, company S4 suggests them to do it again. However, because company S4 itself also just started to concern environmental issues in business activities, the company does not stop buying parts from such suppliers.

Internal Environmental Strategies and Practices of Company

Company S4 has not had an environmental department but made environmental committee within the company. The committee takes a role to manage environmental activities in business. Company S4 plans to set a business principle on environment and to publish an annual report. Company S4 performs environmental education for workers regularly. The workers understood environmental concerns within daily production activities more than before.

There is no environmental technology transfer from Japan. Head quarter in Japan already has the ISO 14000 certification, however, the interviewee said that there is no differences on the quality of products even after the certification of ISO 14000.

ISO 14000

Company S4 plans to get ISO 14000 until the end of this year. In addition, the company schedules to implement life cycle assessment. If the company get the certification of ISO 14000, the company expects many kinds of effects from ISO, such as reduction of production cost, enhancing workers consciousness on environment, improvement of the external reliance of company and so forth.

The main trading company starts to force suppliers have ISO 14000 recently. Now the company are preparing for taking the certification of ISO 14000. The company use the cost for the certification more than one million baht. The interviewee expects that they need to use cost more than two million baht after starting the environmental management following the ISO 14000 for the first investment cost and operation cost.

4. Competitiveness, Benefit

Cost Reduction

Company S4 thinks cost reduction may be realized in energy cost through good environmental management practices, such as turning off the electric light during lunch time and so on.

Differentiation

Company S4 expects upgrading of company image through implementation of environmental management and increasing the products price.

Other Benefits

The improvement of company image through environmental activities is very important. Because the group companies of company S4 are located all over the world. If he group companies improve their environmental management practices, the image of company will enhance remarkably and company S4 also contributes to global environment.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	3
2: Environmental Policy within the Company	2
3: Environmental Standards	1
4: Environmental Technology	1
Total	7: Even

1. When company S4 was established in Thailand, Thai Law environmental law and regulations were one of the incentives to invest in Thailand. To date, the considerations of company S4 on environment has changed. Because customers requires the suppliers to get concern on environment and to get the ISO 14000 more than before, the company are preparing for it.

2. There was no policy on environment now. However, they company plans to set it because they need to do it for getting the certification of ISO 14000.

3. Company S4 uses Japanese standards in production process to keep the same quality of products, which including on environmental management.

4. Head quarter in Japan also force the company to get ISO 14000.

6. Business Environmental Strategy

The company S4 takes pure strategy of Beyond Compliance Organizational Practices

This company generates little waste relatively. Its environmental impacts are small. In terms of waste water, there are only waste water from restaurant and toilet. Although company S4 is first supplier of big Japanese automobile company, company S4 has not had ISO 9000. The company plans to get ISO 9000 after being certificated by ISO 14000. The company has confidence on their production and the quality of products.

Company S4 has grown the sales every year. By getting ISO 14000, the certification of ISO will prove the company's technology officially. The company expects to construct control system through ISO 14000. The company focuses on the improvement of their production process. On the other hand, the company S4 has already implemented environmental management which beyond Thai regulations on environment. Therefore, as a competitive focus of company S4, it can be said that the company covers both of two focuses. What the company indicates most important benefit through environmental management practices are the improvements the company image shows company S4 focus on differentiate more than cost as competitive advantage.

This company supplies most of products to Japanese big automobile company. The incentive for the company S4 to start considering to get ISO 14000 is requirements from the trading company. The route to supply their products is very stable. Therefore, the company needs to revise their production process and confirm their ability to control environmental impacts to the set-maker. Consequently, in terms of future activities of company S4, it is expected to be categorized in beyond compliance practices.

7. Financial Performance

Present environmental cost is about 700,000 baht. Because the company plans to increase the workers, the company thinks that they need to increase the additional waste water treatment system for waste water from the restaurant and toilets. The ratio of environmental cost against total cost is 0.04 percent, which is the third lowest ratio among the eight companies.

5.2 Assembly Companies

5.2.1 Company A1

1. Company Profile

Overview of the Company

Company A1 is the electric production company producing car stereo, DVD deck, home audio and tuner units. This company was established in Thailand as a car stereo and home audio production facility in 1997. Company A1 has been committed to develop creative products and systems that meet the new demands of consumers. The head quarter in Japan established the foundation for Plasma Display Panel and Organic EL business and to expand from a stand-alone category to a network domain, which got award on environmental management.

The slogan of company A1 is 'Sound.Vision.Soul', which reflects their commitment to be a company that creates additional value in joy, comfort and convenience in our products, in the same way as we appreciate high qualities in picture and sound. In April 1998, company A1 attained QS 9000 certification. It

started the drive for the requirement of QS9000 standards fulfilment by America's large automobile manufacturers on the part of their suppliers in April 1997. The company also was awarded on their products' quality by Japanese automobile maker in 1999.

The company A1 is an assembly company. The company buys parts and products from suppliers and assembly in the company and sells the final product in the consumer market.

Table 5.9: Background of the Company A1

Year of Establish in Thailand	1997
Registered Capital	600 million baht
Annual Sale	16,000 million baht (2004)
Number of Worker	2800 (Japanese 20, Local 2760)
Ownership Ratio	Singapore 100%
Quality Control	ISO 9000, TS16949
Research and Development	No
Materials Supply	Import: 55% from Japan and Singapore Local: 45%

Table 5.10: Major Products of the Company A1

Product Name	Percent of Total Sale	Percent of Export
Car audio	95 %	90 % (all over the world)
Home audio	5 %	0 % (for local)

Production Process of the Company A1

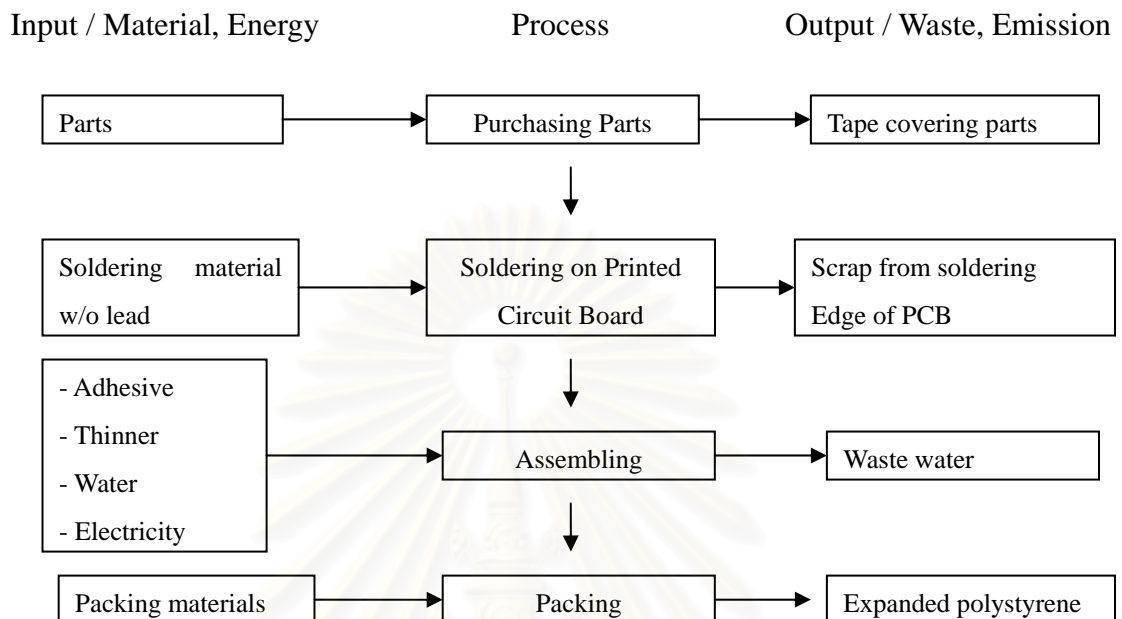


Figure 5.5 Production Process of the Company A1

This company has already used the soldering material without lead in the soldering PCB stage. The scrap of the soldering and edge of PCB discharged are sold to the other company. Especially the edge of PCB is sold to the cement company, because they knew the scrap of PCB can be reused as a cement material.

In assembly stage, the company uses adhesive and thinner to assemble the parts. The company put air filters in the factory to manage the air emission. In addition, they use own waste water treatment system to clean the waste water before flushing down to the public drain. In packing stage, there is expanded polystyrene as a waste. The company A1 is trying to use plastic case for packing which is able to reuse more than expanded polystyrene.

In addition, the company has trying to increase using of fluorescent lights to reduce the usage of electricity within the company. The company also uses the small air conditioning system for each room, not one big system for the whole departments in the company collectively. The company has collected the environmental data as a database, in order to report to the mother company in Japan.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

As incentives for company A1 to start environmental management, five items are raised such as ensuring legislative compliance, holding company's instruction, anticipating future legislation, reduce environmental risk and meeting trading companies' requirement. The company pays attention on whole stakeholders. And they effort to perform corporate social responsibility in many fields, such as scholarship, environmental education for neighbor elementary school students and cleaning up the temples in Ayuttaya etc.

They consider environment as one of the company's social contributions and important factor for business in future. The manager said company which does not implement environmental management can not survive in the market hereafter. However, implementation of environmental management does not bring business chance, because a lot of companies already started performing environmental management. It already became one of the usual business managements in the market.

Law, Standard

Company A1 thinks environmental law and environmental standards in Thailand are very important. The company sets own strict standards which cover standards of Thai governments and the industrial park where the company A1 locates.

3. Environmental Management Practice

Objectives to Implement Environmental Management

As objectives to implement environmental management, improvement of product quality, reduction of risk and prevention of future compliance are main objectives. Especially, the company thinks that companies which have never considered environmental impact of own production or products have a potential to go bankrupt because of the environmental issues. Risk avoidance is most important aspect for company A1 to implement environmental management.

External Environmental Strategies and Practices of Company

In terms of trading partners, the company A1 provides duties to select suppliers. They make the suppliers report what chemical substances and materials are included in their products, and how did they use the chemical substances and materials. Also, the company A1 check the products from suppliers by themselves with new equipment. Company A1 also put suppliers under obligation to have ISO 14000.

Company A1 ranks the suppliers regarding to environment. If the supplier produced product with some chemical substances over standards, the company makes the supplier set schedule to reduce the substance. And if they could not do it, the company A1 will stop making business with the supplier.

Internal Environmental Strategies and Practices of Company

Company A1 sets corporation policy on environment as the second most important policy within the company. There are many indications from head quarter in Japan. The company creates management report which include revise the activities of company including environmental management and method to improve for next year to send to head quarter in Japan every year.

There is no environmental department yet. However, there are people who are in charge of environmental issues within the company. Company A1 understands whole data on environment impact brought from their production process. They do environmental education regularly within the company.

ISO 14000

They were certified ISO 14000 in 1999. The manager thinks it may be the line of life of company. By getting ISO 14000, they are able to set specific target on environment which show in number, improve the workers' awareness on environment. And also, the company A1 was able to achieve customers' confidences.

4. Competitiveness, Benefit

Cost Reduction

Company A1 thinks environmental management does not relate to cost reduction. The company feels the cost for environment is not money but time. Because this company have not had a department on environment, the workers do the own jobs and works on environmental management at the same time. It is difficult to concentrate on the own job because the environmental works take a time, such as setting the standard, auditing the parts, enforcing suppliers to submit the environmental reports.

Also, the company A1 does not take cost data on environment. Because they think environmental management is ordinary activities in their production process. Therefore, environmental cost is included in production costs. They could not recognize the specific price for environmental management.

Differentiation

Head quarter in Japan got award of production of Prazuma Television on environmental management. Therefore, consumer may be willing to buy the products of this company. However, it does not relate to Thai factory.

Other Benefits

Main benefit from environmental management is risk avoidance. Environmental management is difficult to create benefits in money. In terms of Thai factory, company image is not improved through implementation of environmental management. However, from the view of the company totally including Japan and other countries, environmental management may improve company image.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	1
2: Environmental Policy within the Company	1
3: Environmental Standards	1
4: Environmental Technology	1
Total	4: Not Pollution Haven

1 and 4. The incentive to invest in Thailand for this company is cheaper labor and request from customer. The head quarter gives instructions on environment they faithfully follow the instructions and check regularly.

2. They regard the environmental policy as second important policy in the company.

3. They use own standard which beyond Thai environmental law and regulations and the standard of industrial part.

6. Orssatto's Hypothesis

The company A1 takes mix strategy of both Beyond Compliance Organizational Practices and Eco-Oriented Products and Services.

The company's attention on environment is high enough. They urge supplier to get ISO 14000 and perform environmental management in their production process. They do environmental management as not business chance but social contribution. The objectives of investment in Thailand are also requests from trading companies, car companies.

Company A1 supplies car audio to Japanese big car maker located in Thailand. The company also supplies the finished products to the local consumer market, which is small only 5 percent. They are first supplier, in other words sub-assembly maker. Company A1 purchases a lot of parts from second suppliers and assembles the parts. They have a role to force suppliers to prevent environmental

impacts. The company forces suppliers to submit a report of chemical substances and its effect within the products of the parts to ensure the parts is produced without banned substances. Therefore, the company pays attention on quality of product and service through environmental management more than production process.

Because the company A1 also export their products to Europe, RoHS standard is important for them. They are not aware of competitiveness on cost reduction through environmental management. The company focuses on the improvement of differentiation of products through environmental management. Therefore, this company is categorized in beyond compliance practices and eco-oriented product & services in Orssatto's framework.

7. Financial Performance

The environmental cost of the company A1 is approximately 600,000 baht per year, which is only 0.004 percent of total cost. The company A1 paid several million baht to set the environmental conservation systems such as for water and air as the first investment. However, the operation cost is not so high after the first investment.

5.2.2 Company A2

1. Company Profile

Overview of the Company

Company A2 began its production of Control by Numeral Console (CNC) Wire Electric Discharge Machine (EDM) compact model A280L in April 1990. the A280L was marketed and sold worldwide and proved a great success. The company's production policy has been "Total Quality Control" which means that all areas of production and assembly are controlled by quality demands whether it involves the manufacture of printed circuit boards. Machine assembly or packing the machines are ready for delivery to clients worldwide. This enables company A2 to ensure unprecedented reliability and minimal maintenance after installation. All of company A2's branch companies are seeking to promote the production of its products to meet the market demand and keep at the forefront of technology.

Company A2 employs the same production standards in Thailand as those used in its production facilities in Japan. This is how company A2 has earned its highly respected worldwide reputation by keeping abreast of customer demands, committing them to the principle be creative and by setting and achieving high goals. This company is an assembly company. However, the company A2 usually not only buys the parts from suppliers but also buy the materials and produce parts to assembly the final product by itself. The materials buying from supplier are over 40,000 items. The parts are mainly imported from Japan, 80 percent, and some in local, 20 percent.

The price of the final product of this company is about 5 to 11 million baht. The company's customers are industrial factories, such as moldering or press companies. This company has a leading role in the market of electric discharge machine because of the high technology, nano-technology which can operate the works of one by one billion meter, so-called nano meter.

The company A2 was established in Thailand in 1988 as a production base to respond quickly and efficiently to customers' requests over the world. The main incentives for this company to invest in Thailand were culture, character of Thai people, peaceful religion, good living condition and promotion of BOI. Because of the production of the high technology machine, the company needs many Japanese engineers or technicians in oversea branch. At most of the Japanese companies in Thailand, there is one Japanese worker for one hundred Thai local workers. However, there is the largest number of Japanese workers in the company A2 among the researched eight companies. The number of Thai local worker for one Japanese worker is 34.7 people.

Table 5.11: Background of the Company A2

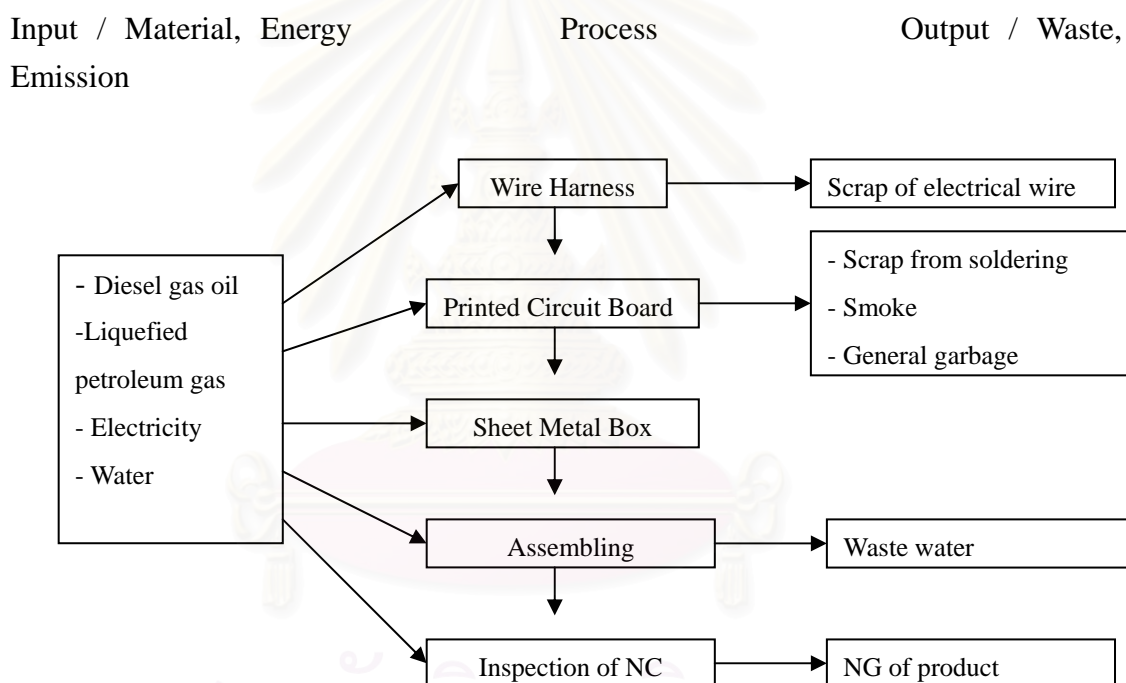
Year of Establish in Thailand	Nov, 1988
Registered Capital	420 million baht
Annual Sale	2,063 million baht
Number of Worker	1,180 (Japanese 34, Local 1146)
Ownership Ratio	Japanese 50%, JAIC 50%
Quality Control	ISO 9001 version 2000
Research and Development	No
Materials Supply	Import: 80% from Japan, Local: 20%

Table 5.12: Major Products of the Company A2

Product Name	Percent of Total Sale	Percent of Export
Electric Discharge Machine	100 %	95 % (to Japan)

Production Process of the Company A2

Electric Process



Machinery Process

Input / Material, Energy
Emission

Process

Output / Waste,

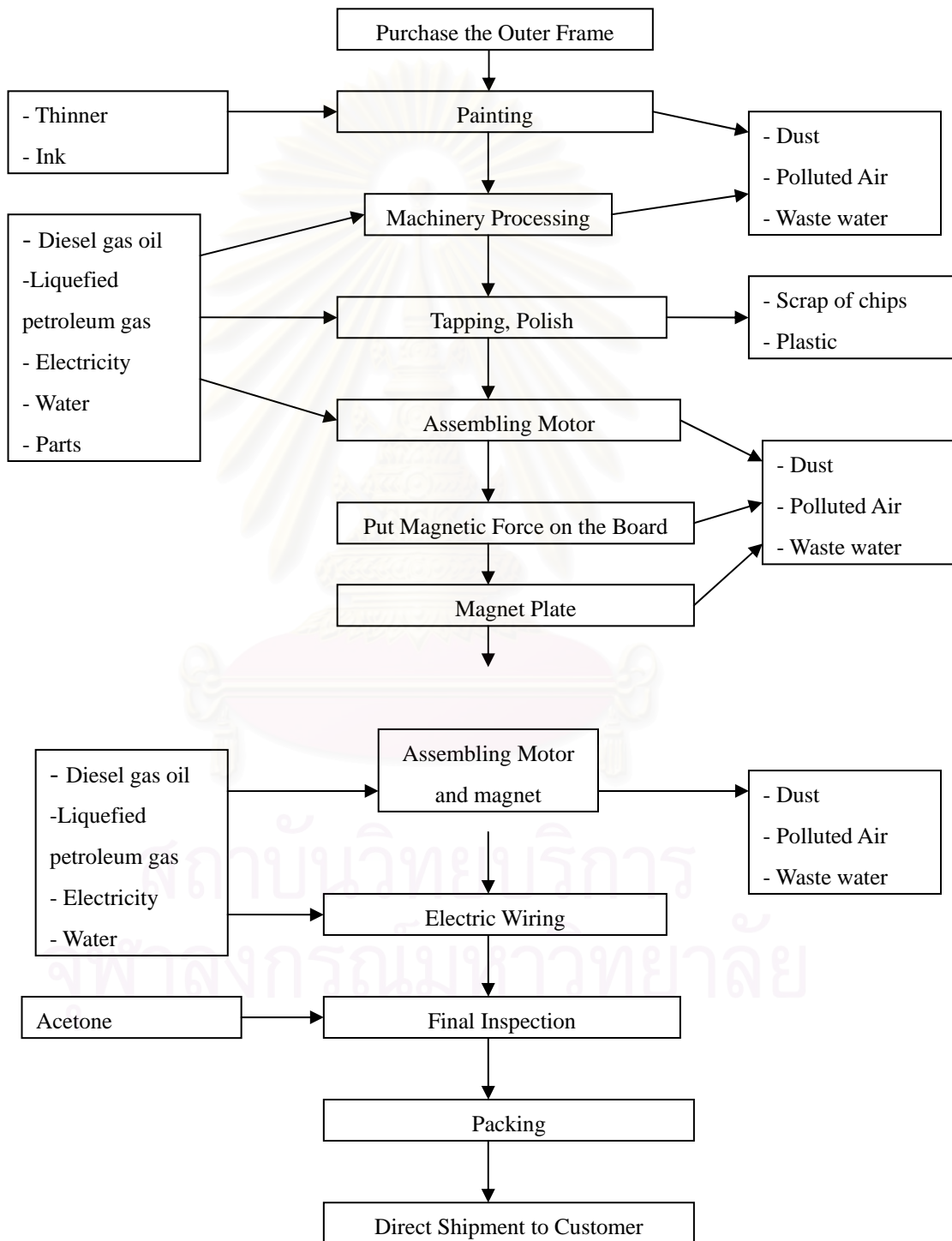


Figure 5.6 Production Process of the Company A2

There are two processes, electric process and machinery process. This company has less pollution by operating own environmental management system which is not certificated by ISO 14000 or any other environmental certifications. They develop the clean production by themselves. The company creates it from learning own experiences in Japan. Every oversea branch follows the production system which includes the environmental conservation system to keep the high quality of products.

Waste water discharged in both processes are managed to be clean through the own waste water treatment system. Industrial wastes are separated into each kind of material and sold to other company. Air emission is managed by using air filter. General garbage is disposal as public garbage collection.

Company A2 uses air filter, water shower process for powder printing in order to not discharge unclean air polluted in painting process. And they set tanks having four layers to clean waste water until they can pour to public drain. The specific environmental cost is for tank track to vacuum the precipitate of powder painting, which is five thousands baht for two times.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

There is no direct indication from head quarter in Japan on environmental management. Head quarter has been preparing environmental management in terms of setting objective with specific number. If head quarter starts doing that, the company A2 is sure to be forced to follow them. The company is just waiting now.

Environmental management does not relate to company's achievement in the company, therefore the company thinks that following the laws and standards in Thailand is enough to do. Regarding with stakeholder, the company A2 pays attention on worker and neighborhood.

Incentive to start environmental management is affected by Thai Environmental Law, prevention of future compliance, indication of head quarter, improvement of company image and improvement of relationship with neighbor.

Law, Standard

The manager knows Thai Environmental Law roughly. However, the manager said that so long as we know the law, we have to follow it correctly. Therefore, the environmental law is very important for company A2. The manager of company A2 does not know BOI's privilege promotion policy on environment. The company set environmental standard covering the law and the standards in Thailand. Company A2 made the standard and environmental management system from their experiences in Japan.

3. Environmental Management Practice

Objectives to Implement Environmental Management

Most important objectives to do environmental management for company A2 are improvement of community relation and media coverage. Second important objectives are reduction of risk and worker's commitment and prevention of future compliance.

External Environmental Strategies and Practices of Company

Company A2 pays attention on buying materials which follow RoHS standard. Moreover, in terms of trading partner, suppliers, the company set environmental standard and choose companies which also follows RoHS standard.

Internal Environmental Strategies and Practices of Company

Company A2 already have implemented own environmental management, not ISO 14000, in ordinary production activities. The company does not have an environmental department, however, they are preparing to set a department to study ISO 14000 in this year. Company A2 plans to finish setting the department which deal with whole environmental management within factory by the end of April.

Because the company A2 makes a report on environmental data every year to send to head quarter in Japan. The company understands whole important data of environmental impact. However, the company has not release the environmental data to the public.

ISO 14000

Company A2 has not have ISO 14000 yet. The company plans to get ISO 14000 next year.

4. Competitiveness, Benefit

Cost Reduction

Company A2 does not think environmental management realize cost reduction as a competitive advantage of company.

Differentiation

Head quarter in Japan appeals their high concern on environment and environmental management on newspaper. However, it does not relate to foreign branch including the company A2. It is the story only in Japan.

Other Benefits

By effects of implementation of environmental management on workers, reputation of own company was enhanced within workers. They are willing to keep working in the company for longer periods. It is usually said that Thai worker quit the job easily and early if there is someone giving little bit higher salary to them. It is very often worker come in and go out in Thailand as usual. However, in company A2, it not same as that.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	1
2: Environmental Policy within the Company	2
3: Environmental Standards	2
4: Environmental Technology	1
Total	6: Not Pollution Haven

1. Incentive is cheap and skilled labor, promotion of BOI and culture. This company needs to educate local worker well because of its high technology. For doing the education, labor and culture are important for the company.

2 and 3. This company does not have policy and standards on environment within the company. However, they already have managed environment well. They understand the environmental impact from their production. They think environmental management is not special. It is one of activities in the ordinary production process.

4. In terms of environmental technology, the head quarter give instructions on environment to each branch. They act environment management based on their own experiences in Japan. They are trying to not repeat same things of Japan.

6. Orssatto's Hypothesis

The company A2 takes pure strategy of Eco-Oriented Products and Services.

Company A2 has confidence with own technology since establishment of the company. And it has been their competitiveness in the market. Actually company A2 could get high competitive advantage in world market with their technology. Company A2 has a motto that using same production technique in every branch.

Although the company A2 has been trying to get the certification of ISO 14000, they already have implemented environmental management in own way which learned from their experiences of production activities in Japan. Company A2 produces less waste and manages the waste before throwing away to public waste treatment institution. The company also has enough equipment to control environmental impacts happen on the production process. Therefore, it cannot to say that this company thinks Thailand as pollution haven.

Company A2 divides production process into two parts, electrical part and machinery part. And the company manages the production process including environmental treatments well. This company already has own environmental management system and implement it, however, they do not have the certification which guarantee their environmental management to outside. Therefore, they are studying ISO 14000 now to get certification in next year.

The company thinks that implementation of environmental management is not something special and it does not relate to business advantages or competitiveness. The company have not considered the effect of environmental management against outside of company, but they said it affected within company, such as enhancing workers concerns on environment. This means the company does not focus on products or services to business partner or customers but differentiate the company with other companies as competitive focus in terms of improvement of worker's longer period of employment and awareness. If the company gets the certification of ISO 14000 next year, the company will be able to appeal their good management in the market to outside and enhance their competitiveness. The certification of ISO 14000 proves their good environmental management to external and internal stakeholders. Therefore, the company A2 has potential to be eco-oriented products and services.

7. Financial Performance

The company does not count the cost for environmental management. The costs to operate environmental conservation processes are calculated as the production cost. The company recognizes the cost to use vacuuming cars for the precipitate of powder color painting is the only environmental cost. Therefore, the environmental cost of the company A2 is very small. The amount is only 10,000 baht per year, which is 0.0005 percent against total cost.

5.2.3 Company A3

1. Company Profile

Overview of the Company

Company A3 has a very long history both in Japan and in Thailand. The company was established in 1939 in Japan by combining two companies, the engineering company which is Japanese first manufacture of telegraphic and the electric company which is Japanese first plant for electric incandescent lamps. The two companies merged to form an integrated electric equipment manufacture. In Thailand, joint venture agreement signed between the mother company and Thai electric company to set up the company A3 as a manufacturing company in Thailand in 1969. Company A3 was one of the first Japanese companies which invested in

Thailand.

Firstly company A3 started to produce table electric fans and one-door refrigerators. Then the company had increased the manufacturing products, such as black and white televisions, inductive motors, fluorescent lamps, rice cookers and color television in 1970s. In 1980s, company A3 started to be appreciated its production activities in Thailand and got some awards, such as the best calendar of the year for promotion of national art and culture in 1983, 1988 and 1989, the outstanding factory form the Industry Ministry outstanding exporter of the year in 1987, and the outstanding manufacture of electric appliances award form the Niyom Thai Association in 1988 and so on. During such period, the company A3 had continued to increase the production.

The company A3 produces many kinds of products. They have a business strategy to buy parts from supplier as little as possible. The company has tried to reduce purchasing parts from suppliers and to produce the final products within company. This strategy may realize the cost performance in the market thorough cost reduction to buy the materials and parts from many suppliers. However, on the other hand, it has some risks of control material stocks and meeting the market need which has changed for short term.

The mother company set the basic policy for environmental protection as follows:

- (1) We considers environmental protection to be one of management's primary responsibilities;
- (2) We specify objectives and targets for its business activities, products and services with respect to the reduction of environmental impacts and prevention of pollution;
- (3) We strive to continuously improve the environment through vigorous implementation of environmental measures;
- (4) We contribute to society through its environmental protection activities
- (5) We comply with all laws and regulations, industry guidelines and own standards for environmental protection;
- (6) We recognize that natural resources are finite and promotes their efficient utilization;
- (7) We strive to enhance the awareness of all its employees with respect to the environment; and

- (8) We operate globally, and accordingly, promote environmental activities throughout the group companies.

This company considers ISO 14000 certification to be a passport to inclusion in the ranks of the world's most environmentally responsible enterprises. In addition, in order to maintain and enhance the level of environmental protection, all employees receive environmental education according to their positions and the tasks which they are engaged.

Table 5.13: Background of the Company A3

Year of Establish in Thailand	1969
Registered Capital	30 million baht
Annual Sale	5,000 million baht (2004)
Number of Worker	Approximately 3,000 including 8 Japanese
Ownership Ratio	Japanese 45%, Thai 47%, Other 8%
Quality Control	ISO 9002
Research and Development	Modification of design from head quarter in Japan
Materials Supply	Import: 30% from Japan, China, Taiwan, Singapore, Malaysia and Australia, Local: 70%

Table 5.14: Major Products of the Company A3

Product Name	Percent of Total Sale	Percent of Export
Micro wave	40%	75%
One-door refrigerator	20%	75%
Rice cooker	15%	75%
Electric pot	10%	75%
Hot plate	5%	75%

Production Process of the Company A3

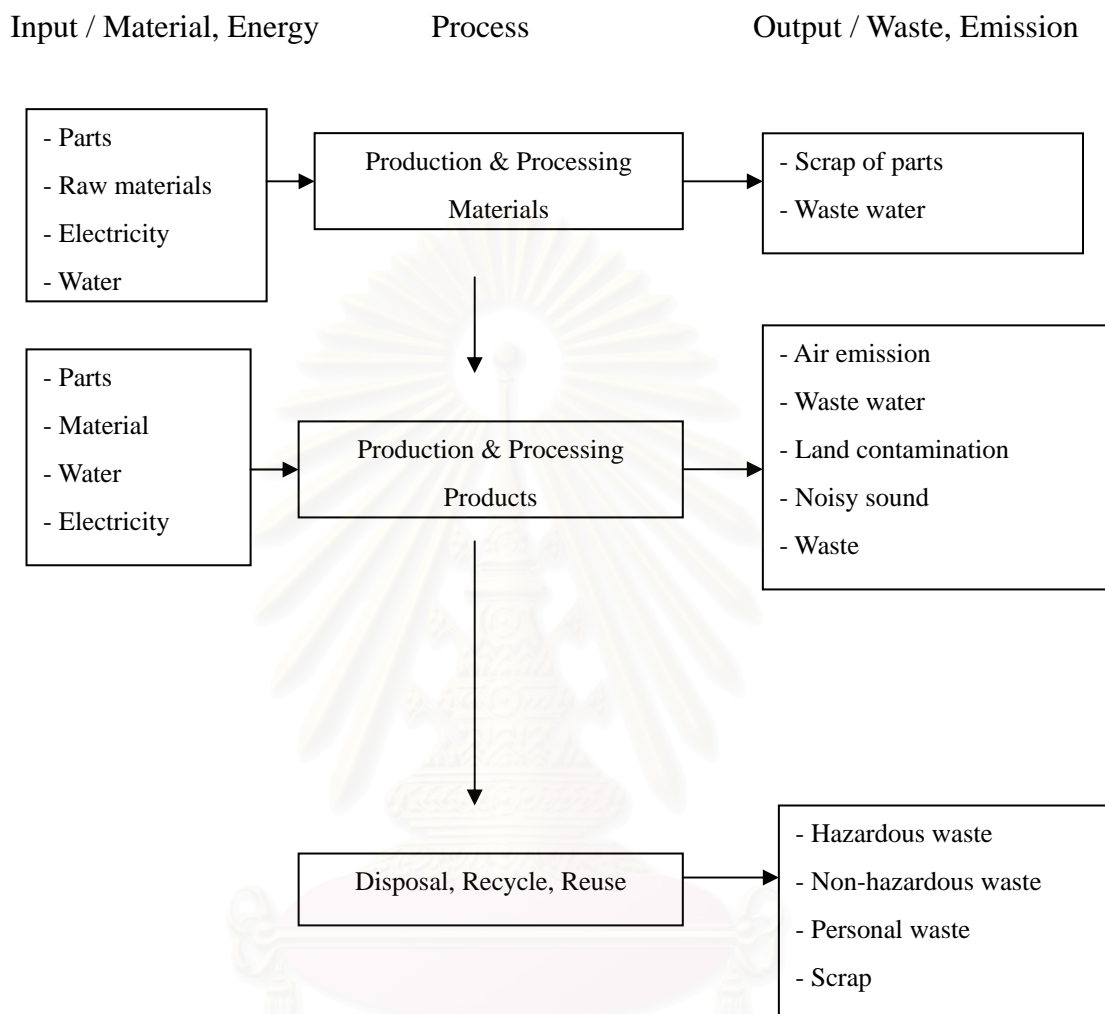


Figure 5.7 Production Process of the Company A3

The company A3 deals with the wastes in many ways. For the industrial wastes, the company separates in each kind of materials and storage. Then the company sells it to scrap companies or disposal. In terms of non-hazardous wastes, the company pays for companies to take it away. However, in terms of hazardous waste, government agency comes to take it for free. For personal wastes, the company disposal with the public wastes altogether.

The company pays attention on global warming as well. They have attention on ozone layer protection, and CFC in urethane foam as well.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

Reduction of environmental risk, expanding market opportunities and increasing employees' enthusiasm are most important incentives for company A3 to implement environmental management practices. The second important objectives are follows; legislative compliance including Thai Environmental Law and improvement of community relationship.

Law, Standard

The senior manager said although he studied a lot of books on environmental issues and standards in 1996 when company A3 started environmental management activities, he has never known Thai Environmental Law of 1992. However, he knows all other standards and regulations on environment of Ministry of Law, Industry, Health, even Ministry of Army. Company A3 has submitted reports on environment to Ministry of Industry.

The manager wondered whether Thai Environmental Law is only for new investors including Environmental Impact Assessment as same as BOI promotion or not. Company A3 sets own stricter environmental standards more than governmental standards. The standards are set for each emission. For example, for gas the company uses a standard of America.

3. Environmental Management Practice

Objectives to Implement Environmental Management

Main objective for company A3 to implement environmental management are increasing staff commitments, improvement of community relation, reduction of risk and prevention of present and future compliances. Company A3 thinks environmental management is one of the important corporate strategies and the factor which decides the future business in the market. Moreover, the company considers the environmental management practices make new business chance.

External Environmental Strategies and Practices of Company

When company A3 purchases raw material or parts, the company pays attention on the environmental impacts of the materials or parts. In addition, company A3 does not buy any parts from companies which do not have certification of ISO 14000.

Internal Environmental Strategies and Practices of Company

Company A3 does not have an environmental department, however, there are full-time workers being in charge of environmental issues of the company. The workers make annual report on environmental issues. And the workers also plan and organize the environmental education for other workers.

ISO 14000

Company A3 got the certification of ISO 14000 in 1998. The company considers that not only top management but also the improvement of the awareness of workers are very important in order to keep ISO certification and practices.

Owing to improvement of environmental conservation activities within company, environmental effect from production process and production cost reduced. Moreover, it brought the enhancement of external reliance of company. Company A3 has operated life cycle assessment partially not whole process.

4. Competitiveness, Benefit

Cost Reduction

Company A3 could realize the reduction of production cost through recycle based on improvement of environmental management in whole corporate activities.

Differentiation

Company A3 was able to differentiate their products and company from other competitors by increasing concerning on environment and acting environmental management practices. This is very important for the company A3 in terms of company image, because the company's products directly contact to consumer in household.

Other Benefit

Except for the above two benefits, the manager said, there are other three benefits from environmental management practices for company A3, which are enhancement of awareness not only workers but also stakeholders, improvement of better production, and lastly sustainable living life of people in the world.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	2
2: Environmental Policy within the Company	1
3: Environmental Standards	2
4: Environmental Technology	1
Total	6: Not Pollution Haven

1. The company has long history of manufacturing in Thailand. Moreover, it is thought that at the time that the company invested in Thailand in 1960s the company thought that Thailand has a law environmental laws and standards furthermore the government lack of enforcement power on these regulations. These points work as the reason to invest in Thailand which brings low establishment cost of factory. However, to date, the company has improved the environmental management practices.

2. and 4. There is no department on environment in company A3. However, by setting full-time workers to deal with environmental issues, the company controls environmental management of such big company. Company A3 set policy based on the instruction of head quarter in Japan. The company manages environmental cost data. And the company releases the environmental data to public.

3. The company use several standards not only Thai standard but also foreign or international standard. They manage to set the standard depending on the material element.

6. Business Environmental Strategy

The company A3 takes mix strategy of both Process-Oriented Resource Productivity and Environmental-Cost Leadership.

However, the company has changed in responsibility to manage environmental problems from their production for community or Thai society. To date, the company implements good environmental management.

Head quarter of the company A3 takes a leadership on environmental management. The head quarter in Japan publishes environmental policy and controls environmental issues through forcing of getting certification of ISO 14000 and audits of daily producing activities as a whole of the group of the company A3.

Because the company has produced home appliance electric products, the company A3 focuses mainly on products and services as a competitive focus. The company promotes eco-oriented products by no-use chlorofluorocarbon for production. In the market of household appliances, the competitiveness has been harsh, because almost all companies have ISO 14000 and enhance environmental management within company, it is difficult to enhance competitive advantage of company in terms of differentiation from other companies' products. Therefore, this company is categorized in environmental cost leadership. In addition, because this company realizes the cost reduction by recycling, the company also fits with the strategy of process-oriented resource productivity.

7. Financial Performance

The company A3 paid six million baht as the first investment for storage and handling control to protect leakage and spill from the factory. In addition, the company use five million baht for the first investment of air emission treatment, waste water treatment, land contaminate protection, noisy sound protection, and waste management in the production stage.

In the disposal stage, they use 1.5 million baht which includes security landfill for hazardous waste and sanitary landfill for non-hazardous waste.

The operation cost for environmental prevention activities have been stable around 4.5 million baht in this six years, which is 0.1 percent against total cost.

5.2.4 Company A4

1. Company Profile

Overview of the Company

In 1935, the mother company was established to take over the wiring devices division of the company's group as one of its divisional companies in Japan. Then the company became an independent company in 1946. Since then, the company has expanded its business to cover electrical construction products, home appliances, building products, automation controls, electronics materials and many other products. Its market has diversified from houses to buildings, commercial facilities and factories and so on. The mother company has broadened the scope of its operations from that of a hardware-oriented focus on housing to include a software-oriented focus on living as a provider of total business solutions integrating all relevant aspects of products for living.

To date, the company has six core businesses such as lighting products, information equipment and wiring products, home appliances, building products, electronic and plastic materials and automation controls. However, the company expanded the four new businesses to adapt to the new social trend, IT revolution, global environment and demographic change. The new businesses are IT-related businesses, green and clean, elderly support and care and stock renovation solutions.

Exploiting the core competences refines in the company's five-polar global system which is focused on Japan, China, Asia, North America and Europe. The company expands local production and sales operations through locally based planning and development. By crating products adapted to local conditions to expand and strengthen overseas business, the company aims to become the most adaptable player in every regional market. As of the end of fiscal year 2002, the oversea

operations covered 34 countries where 74 affiliated companies employed 15,131 oversea staff at 123 business bases. Company A4 was established in Thailand as an electric appliance manufacturing company in 1988. In Thailand, the company A4 has three production bases.

Table 5.15: Background of the Company A4

Year of Establish in Thailand	Sep, 1994
Registered Capital	2,800 million baht
Annual Sale	million baht (2004)
Number of Worker	1,480 (Japanese 30, Local 1,450)
Ownership Ratio	Japanese 100%
Quality Control	ISO 9000, TS16949, TQM
Research and Development	No
Materials Supply	Import: 30% from Japan, Singapore, China Local: 70%

Table 5.16: Major Products of the Company A4

Product Name	Percent of Total Sale	Percent of Export
Encapsulation material, Amino formaldehyde compound	n/a	53%
Copper Clad Laminate	n/a	63%
Lighting	n/a	74%
Wiring device, Breaker	n/a	46%
Connector, Switch	n/a	92%
Mold Die parts	n/a	11%

Production Process of the Company A4

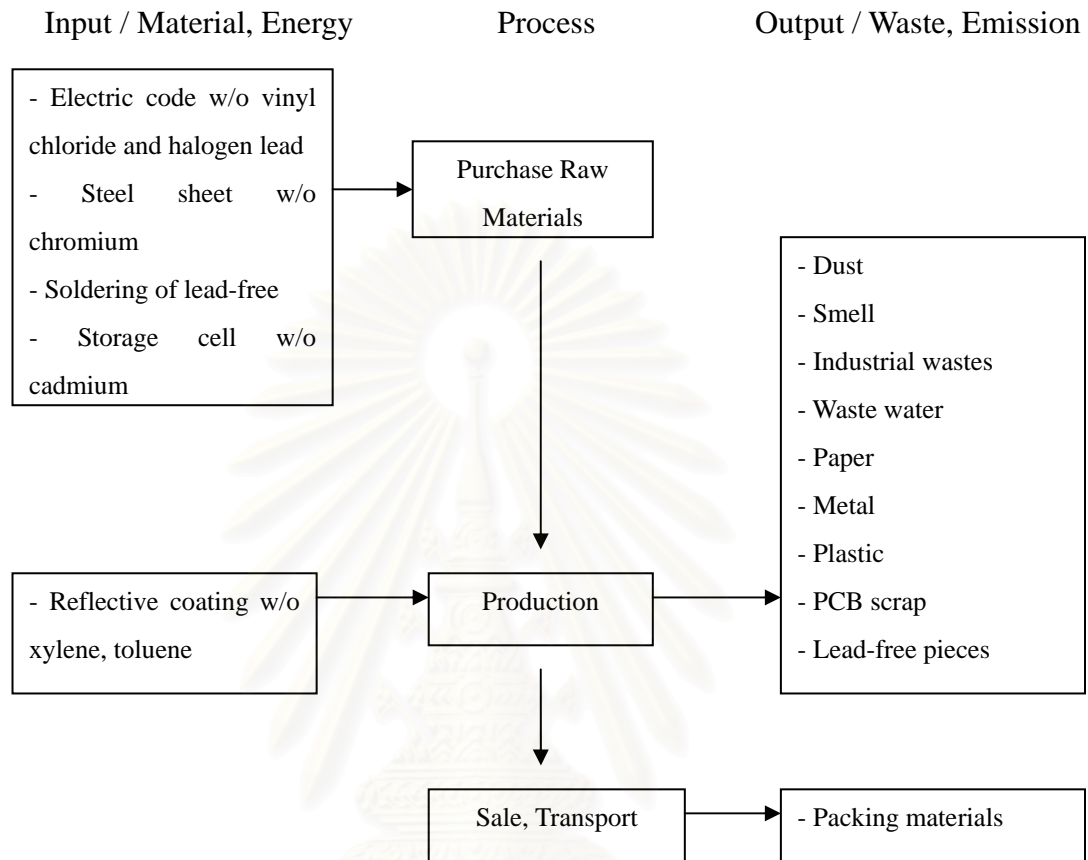


Figure 5.8 Production Process of the Company A4

Company A4 manufactures many kinds of products, such as lighting products as consumer products, electric devices as construction products and electronic and plastic materials as industrial products. Because of the limitation of data, only production process of lighting products is shown in this section.

Because the company A4 adopts the RoHS regulation, this company purchases only the materials or parts which have not used the banned chemical substances in the production process. This company produces the final products by assembling parts. In the production stage, many wastes, dust and smell are discharged. For dust, this company has dust collector to prevent from stirring up in the factory. And for smell, the company uses deodorizer to clean the air in the factory.

The company A4 deals with industrial wastes by using own incinerator or recycling. In terms of waste water, the company cleans the waste water with the own waste water treatment system and flashes down to the public sewer after treatment. Regarding the waste of paper, metal, plastic, PCB scrap and lead-free pieces, the company sells to other recycle companies.

In the sale and transport stage, when the company packs the final products to send to the market, some packing materials are left as a waste. The company also sells the leftover of packing materials to other company and reuses some of them by itself as well.

The mother company has created and improved the environmental regulation and standard since 1970s. The company set regulation of pollution prevention control in 1970s and set the committee on saving material and energy in 1980s. Followings are the main activities of the mother company on environment, setting the global environmental conservation center in 1991, releasing the global environmental charter in 1992 and starting to implement the environmental principle in 1996. The mother company has controlled the every branch to keep the quality and brand name with the same policy as Japan. Therefore, there are a lot of instructions from the mother company in Japan, in particular on green procurement and energy conservation. The data and information on environmental management of the mother company are opened on the website. However, the data and information of each group company in foreign countries are not released on the website. The information of the group companies in foreign countries are summarized in one data. The company A4 has done the monitoring and auditing the environmental effects. But this is for reporting to the mother company, not released to the public.

2. Important Factors Affecting Environmental Concern of Company

Incentives, Stakeholders

Company A4 considers whole stakeholders. The company regards following things as incentive to start environmental management, ensuring legislative compliance including Thai Environmental Law, reduction of environmental risk and BOI promotion.

Law, Standard

The workers being in charge of environmental issues understand Thai Environmental Law well. Company A4 regards the environmental law as important influence to business. Similarly, the promotion policy of BOI is very important for law requirements.

In terms of standard within the company, company A4 sets own standards according to the company's environmental regulations which covers the Thai Environmental Law.

3. Environmental Management Practice

Objectives to Implement Environmental Management

Increasing staff commitment, reduction of risk, assuring the present and future compliances are most important objectives for company A4. improvement of community relation is also important. Company A4 has increased the objectives during practices of environmental management.

External Environmental Strategies and Practices of Company

When the company A4 buys materials or parts, the company pays attention on the environmental impacts of these materials. In addition, the company A4 enforces every suppliers to submit a report concerning on chemical substances within the parts and its environmental impacts. Company A4 purchases around four thousand kinds of parts from 160 suppliers. The whole submitted reports are kept by company A4.

Internal Environmental Strategies and Practices of Company

Company A4 enacts an environmental principle in business activities. The company implements environmental management practices following ISO 14000 and understands whole environmental impacts from the production processes as numeral data. There is no any department on environmental issues. However, there are full-time workers who are in charge of environmental management within company.

Company A4 operates environmental education regularly. As the effects of environmental education, employees started to have basic idea of environmental management system and to activate the awareness.

ISO 14000

Company A4 got the certification of ISO 14000 in 1996. Practices which follows ISO 14000 benefits in many aspects, such as reduction of production cost, improvement of communication both in external and internal and rising reliance of company and so force. The company is planning to operate life cycle assessment.

4. Competitiveness, Benefit

Cost Reduction

Cost reduction was not only incentive to start environmental management but also one of the main objectives. The company thinks the reduction of cost can be realized as a whole. If we look only on the environmental cost, it increases to be more cost.

Differentiation

Company A4 was able to create good competitive advantage by conserving environment in the market which is severe competition.

5. Pollution Haven

	Score
1: Incentive to Invest in Thailand	3
2: Environmental Policy within the Company	1
3: Environmental Standards	1
4: Environmental Technology	1
Total	6: Not Pollution Haven

1. When the company A4 invested in Thailand, reduction of environmental cost of the company was one of the incentives. However, today is not as same as before. Because the company A4 has been manufactured products which directly

relate to consumer, practices of environmental management is essential activities for companies in the market.

2. This company enacts the environmental policy to control the group of the company.

3. The company sets the standard by own. It is basically based on Thai Environmental Law. However, this company sells the product to the international market. Therefore, the company A4 adopts the standard beyond Thai environmental standards.

4. Head quarter in Japan controls the environmental management of the group companies. In particular, head quarter emphasizes the instructions on green procurement and energy conservation. Every branch companies have to follow the instructions from the head quarter.

6. Business Environmental Strategy

The company A4 takes mix strategy of both Process-Oriented Resource Productivity and Environmental-Cost Leadership.

By enforcing suppliers to submit environmental report and to get and implement ISO 14000, the quality of the products of the company A4 has been improving. Company A4 purchases parts and assembly. And company A4 is set-maker which directly sells their products to consumer. Therefore, as a competitive focus, company A4 focuses on the improvements of products and services to win the competition.

Because the company A4 is in the market of severe competitive, the company does concentrate on cost advantage. With regards of differentiation, because of the characteristics of the market and the low awareness of Thai people, it is difficult to maximize competitiveness thorough environmental management practices. Therefore, the company A4 fits with environmental cost leadership.

The company also focuses on improvement of their energy consumption in the production process, which may help the improvement of product and services. Therefore, the company A4 fits with process-oriented resource productivity as well.

7. Financial Performance

The company A4 uses about 14 million baht per year for environmental conservation activities within the company. The amount of cost is 0.35 percent against total cost.



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CHAPTER VI

RESEARCH FINDINGS AND ANALYSIS

This chapter has five sections. The analysis of survey response is discussed in 6.1. Comparison of Companies' Profile is discussed in 6.2. Other three sections test each hypothesis, pollution haven hypothesis in 6.3, competitiveness hypothesis in 6.4 and cost hypothesis in 6.5.

6.1 Analysis of Survey Response

The seven interesting question from the result of questionnaire are raised to show in figure and discuss in this section.

6.1.1 Incentive to Invest in Thailand

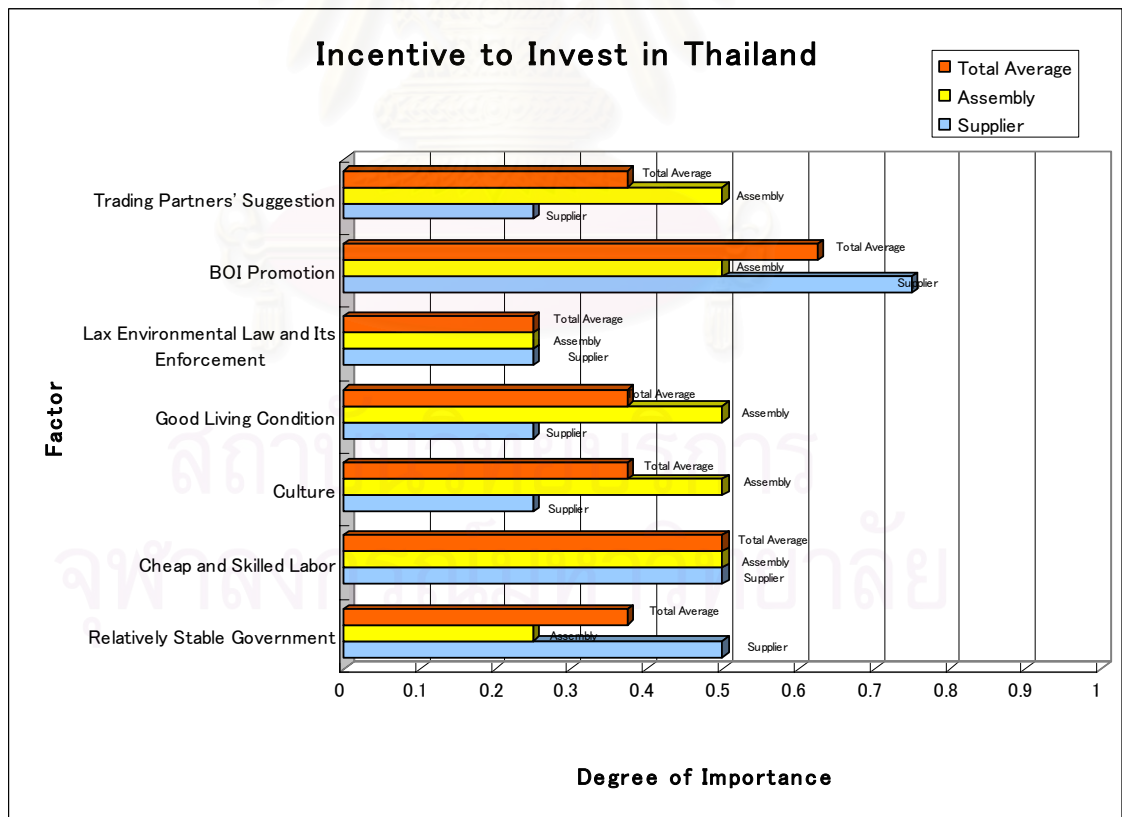


Figure 6.1: Incentive for Japanese companies to Invest in Thailand

This question was asked for each company as a multiple-answered question. The score on the horizontal line shows the degree of importance that the each company thinks. Also, the factors on the vertical line present the incentives for the Japanese companies to invest in Thailand which are made as example by the author. Actually a few companies have other incentives to invest in Thailand, which do not appear in this question.

The method of calculation is that if the company marks the factor, it is counted by one. If the company does not mark, it means zero. And then the scores are added up and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.1.

The result of interview shows that BOI promotion is the most effective incentive for Japanese companies to invest in Thailand. In the above figure, the BOI promotion incentive is distinguished from others, which is the only incentive beyond 0.6 in average.

Moreover, cheap and skilled labor is also important incentive for Japanese companies including assembly and supplier. The quality of the Thai worker is highly received the recognition by Japanese companies. Also, many companies claimed that the gentle personality of Thai people was one of the principle factors to decide to invest in Thailand. The cheap and skilled labor could be one of the competitiveness of Thailand for foreign direct investment, at least for Japanese companies.

Finally, the incentive of lax environmental law and its weak enforcement is the least incentive for Japanese companies. The lax environmental law and weak enforcement power is no longer the incentive for investing in Thailand. It means Thailand is not pollution haven.

As other incentive except for the seven incentives shown in questionnaire, one assembly company said that the main incentive to invest in Thailand was the low establishment cost which includes the cost for real estate, construction, administrative procedures and so on. This company established the company in Thailand in 1969. The environmental law and enforcement power were much lax and weak at that period as a matter of course. The company naturally might

have caught the benefit of less environmental cost more than Japan.

In addition, another assembly company said the history between Thai and Japan and less people who have a grudge against Japanese are also incentive to invest in Thailand. They said that there is less anti-Japanese feeling in Thailand. This may be related to the broad-minded personality of Thai people as stated above. The good living condition and the resemblance of culture based on Buddhism were one of the major incentives for Japanese companies to invest in Thailand as well.

6.1.2 Concern on Environmental Activities of Companies

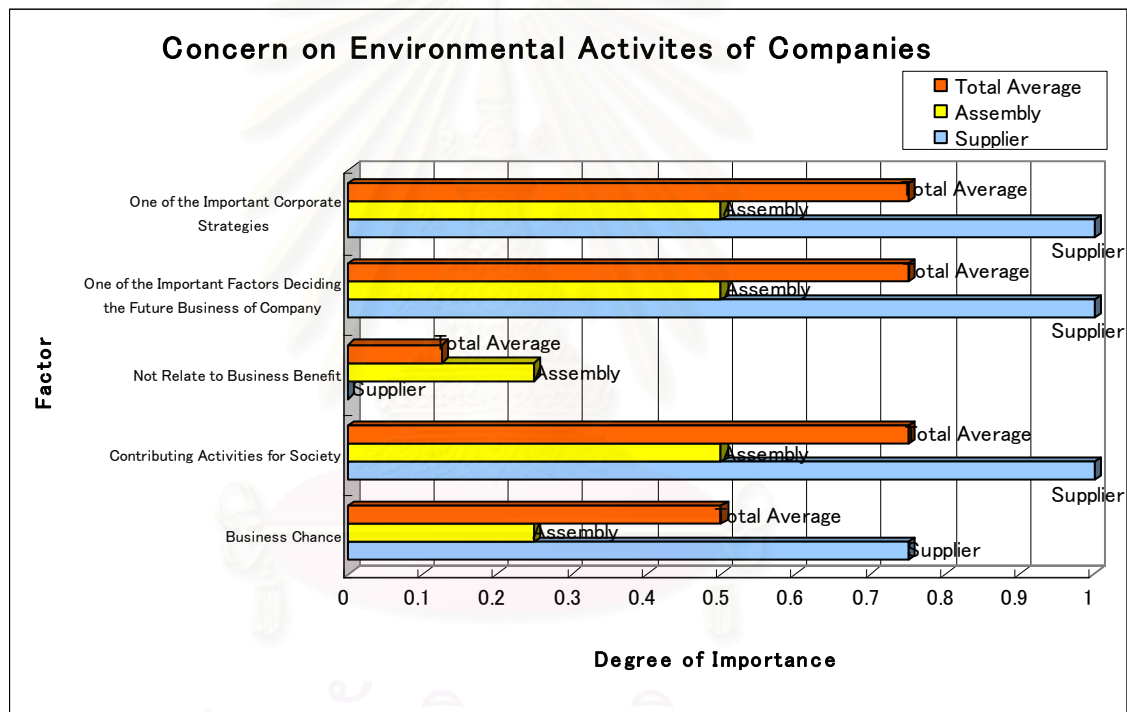


Figure 6.2: Concern on Environmental Activities of Companies

This question was asked for each company as a multiple-answered question. The score on the horizontal line shows the degree of importance that the each company thinks. Also, the factors on the vertical line present the incentives for the Japanese companies to invest in Thailand which are made as example by the author. Actually a few companies have other incentives to invest in Thailand, which do not appear in this question.

The method of calculation is that if the company marks the factor, it is counted by one. If the company does not mark, it means zero. And then the scores are added up and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.2.

With regard to the economic effects brought by environmental management practices of companies, it is shown that supplier has higher interests more than assembly from the result. Suppliers relatively think environmental management relates to business chance, and regard environmental management as one of the important corporate strategies and one of the important factors deciding the future business. There was no supplier company who answered environmental management does not relate to the business benefit.

On the other hand, assembly companies justly take environmental management in one of the corporate strategies, however, they do not expect the business benefit more than supplier. Because assembly companies who produce the final products connect directly with global consumer markets and sell their product with their brand name, the concern on environment must not be low. However, those who use hazardous chemical substances in the production process are mainly not assembly companies itself but supplier companies. Hence, company who is affected by the strict environmental laws and regulations of the international market is supplier. For supplier, if they do not follow the standards, they will lose the business. Environmental management activities are an issue of vital importance for supplier. Therefore, supplier companies relatively have higher interests on environmental management, because that is the work which must operate to survive in the market.

6.1.3 Incentive to Start Environmental Management

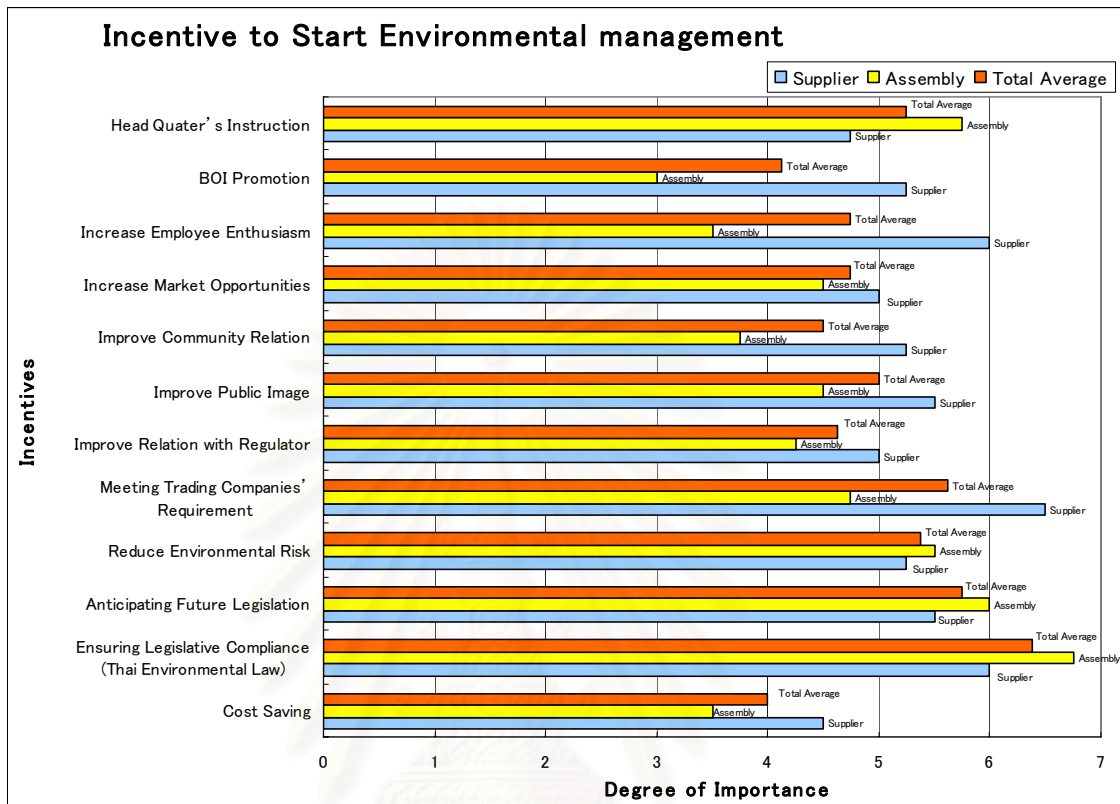


Figure 6.3: Incentive to Start Environmental Management

This question was asked for each company to score the degree of importance of each incentive for the company to start the environmental management. The score has a range from one to seven, which one means not important and seven is very important. The score on the horizontal line shows the degree of importance that the each company thinks. Also, the factors on the vertical line present the incentives for the Japanese companies to start the environmental management.

The method of calculation is to add the scores of each degree of importance and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.3.

Incentive of instructions of the head quarter in Japan has large effect for assembly. On the other hand, the requirements from trading companies, customers, are main incentive for supplier to start environmental management. Assembly companies of household appliances started being interested in the environmental

conservation activities by companies relatively early. Because they have set various environmental principles or standards respectively and performed for long periods, they have required for oversea branches to concern on environment as well.

On the other hand, supplier companies have received the pressure to concern on environmental impacts of the company from assembly companies, customer for supplier, which have received the pressure from the international markets rather than mother company in Japan. To follow the customers' requests is quite important for supplier to keep business.

BOI promotion is one of the important factors for supplier to start environmental management as same as the incentive to invest in Thailand, because the promotion provide special advantages such as the tax exemption for companies to save costs.

Supplier companies need to reform the awareness of workers to implement the environmental management, because many of suppliers have been trying to operate the new production measures taking into account environmental impacts, which has never operated before. The awareness of worker will decide the success of the environmental management system of the company, because if the workers do not understand, the management system will be failed.

Hence, the incentive of increase employees' enthusiasm is much important for supplier rather than assembly who already have adopted the environmental concern into the production process and operated since before.

Cost reduction is the lowest among the incentives. Despite the operation costs are not so expensive, the first investment costs are extremely high. The companies have to take a time to look the effect of environmental management on the cost and to realize cost reduction. It is thought that companies expect the cost reduction, but because the effect does not appear immediately, the incentive has not strong enough to start environmental management practices.

6.1.4 Objective to Implement Environmental Management

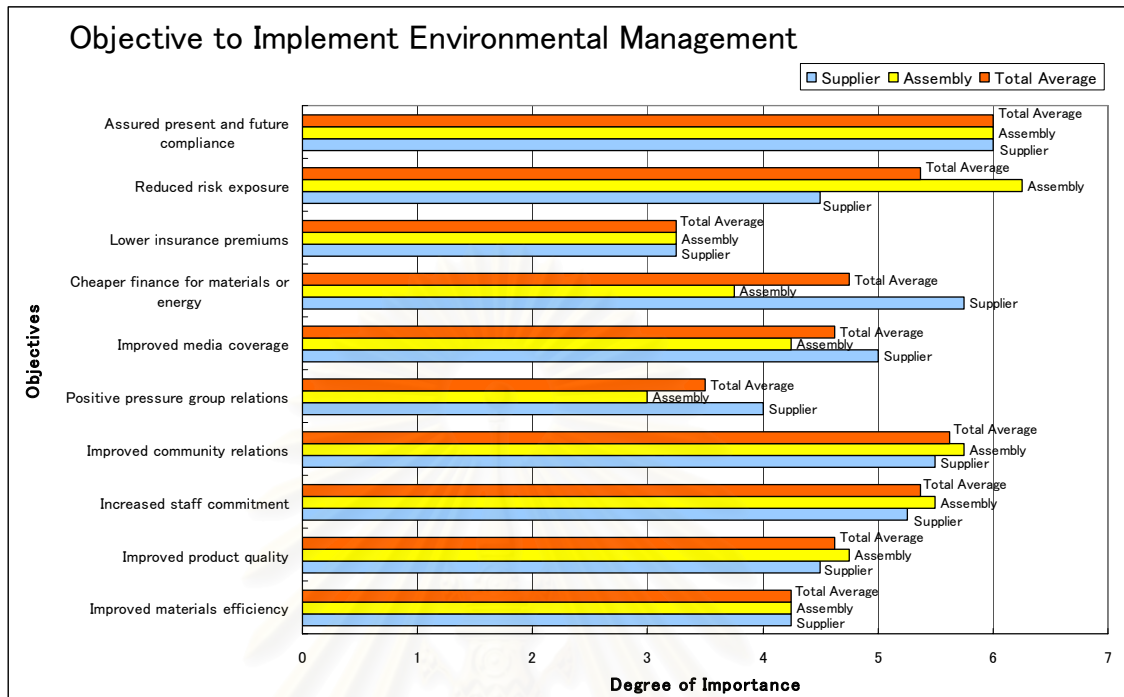


Figure 6.4: Objective to Implement Environmental Management

This question was asked for each company to score the degree of importance of each objective for the company to implement the environmental management as same as the incentive to start the environmental management. The score has a range from one to seven, which one means not important and seven is very important. The score on the horizontal line shows the degree of importance that the each company thinks. Also, the factors on the vertical line present the objectives for the Japanese companies to start the environmental management.

The method of calculation is to add the scores of each degree of importance and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.4.

Both assembly and supplier recognize the importance of the environmental management practices as a countermeasure for the environmental regulations which have continued to be stricter hereafter. However, the result shows that there are two different strategies against the present and future regulations between assembly and supplier.

Firstly the characteristic of assembly’s strategy can be seen in the high degree of importance of the reduce risk in business activities. Assembly companies tend to take the strategy which preempts the countermeasure for the future risk to hedge the worst situation. The mismanagement of environmental issues is capable of damage deadly the company in the recent market. Therefore, even if the strategy is not related to present profit, the prevention measure is significant for the companies who have a brand name which is mainly based on the quality.

On the other hand, supplier companies tend to not operate the preempting management but to manage to implement environmental management as the customers’ request. What the importance of improving community relations and increasing staff commitment are high relates to corporate social responsibility. There are many companies, including assembly and supplier, which pay attention to not only the environment within won company but also stakeholders and the periphery.

6.1.5 Environmental Standard

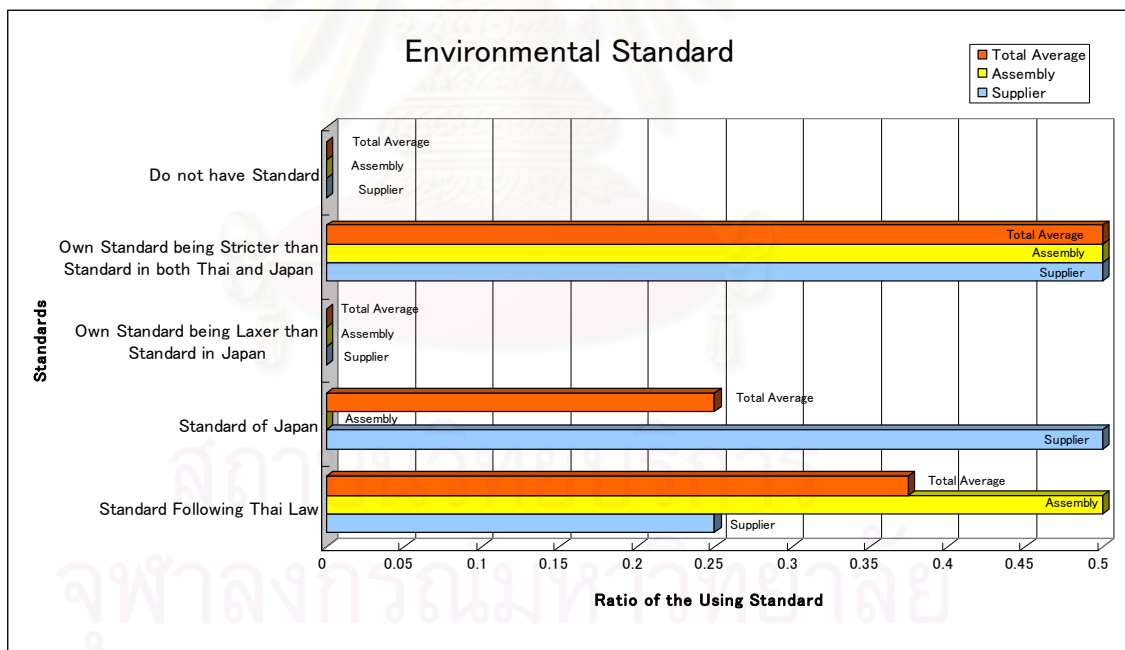


Figure 6.5: Environmental Standard

This question was asked for each company as a multiple-answered question. The score on the horizontal line shows the ratio that the companies use the each kind of standard. Also, the factors on the vertical line present the standards which are made as example by the author. Actually a few companies have other incentives to invest in Thailand, which do not appear in this question.

The method of calculation is that if the company marks the factor, it is counted by one. If the company does not mark, it means zero. And then the scores are added up and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.5.

Companies were allowed to answer more than one for this question, because there are some companies which use different standard for different customers, not only Japanese standard but also Thai standard.

Many of the companies use the own standard which stricter than regulations of both Japanese and Thailand. Among these companies, two assembly companies have common features, which are both companies do not recognize the environmental management as the business chance and one of the important companies' strategies. On the other hand, the two supplier companies using the stricter standard recognize the environmental management as the both topics.

The number of assembly companies using Thai standard was much larger than supplier. Moreover, the number of supplier which has used the Japanese standard was large. Oh the other hand, there was no assembly using the Japanese standard at all. Among the companies to be researched, there were some supplier using the own standard, which is identical with Japan, in Thailand. However, there was no assembly company using the standards as exactly same as Japan.

Company's ability of flexibility may be one of the reasons for the result. From the result of interviews, there was a lot of assembly which invested in Thailand to expand its production. Assembly usually target to sell their product in various markets which include Thai local market. Also, assembly companies can relatively afford human resources, capital and time more than supplier to adapt their standard to each customer's request or the needs of the market.

On the other hand, there was a lot of supplier which invested in Thailand to meet the requests from customers. However, they use the Japanese standard not because they lack of capital and human resources, but because they are requested to keep the quality by customers in Thailand. It is thought that because customers of supplier companies are usually Japanese companies and the supplier, especially first supplier, usually has run business connection with the customer since

they were in Japan, suppliers are required to keep the same or higher quality, which is not only for products but also over production process.

If an assembly company buy a parts from supplier using the standard based on Thai regulation because it is more or less laxer than Japanese standard, the assembly lose the competitiveness in the market and disgrace the own brand name. Hence, assembly does not buy parts from such supplier. That is thought as one of the reasons which supplier must use the Japanese standards in Thailand.

The two assembly companies using Thai standard have a common feature. It is that both companies treat the environmental management as one of the important corporate strategies. However, the both companies answered that the environmental management does not relate to business benefit. Both companies are household appliance maker with large factory in Thailand.

6.1.6 Environmental Activities

This question was asked for each company as a multiple-answered question. The score on the horizontal line shows the ratio that the companies implement the activities. Also, the factors on the vertical line present the activities of environmental management which are made as example by the author.

The method of calculation is that if the company marks the factor, it is counted by one. If the company does not mark, it means zero. And then the scores are added up and divided by four to get the average in each group, supplier and assembly. Finally, the two averages are added and divided by two to get the total average. The table of results on this question can be seen in appendix 2.6.

The result shows that both assembly and supplier pay attention to the improvement of internal environmental management within the company, such as enhancement of workers' awareness through environmental education, reduction and recycle of waste in office including print, copy and stationary, and energy saving. These factors, except for energy saving, show same ratio between assembly and supplier.

As a whole, assembly companies tend to consider that the environmental impact of production activities is important. And they practice recycle actively more than supplier. Moreover, assembly companies pay attention to the recycling the materials and wastes more than improvement of the whole production process. They also act the improvement of transportation and reduction of noise and so on more than supplier.

On the other hand, supplier companies devote themselves to practice the structural reform within the whole production process. They have been trying to develop the production by increasing investment. However, they still cannot afford to improve the recycle and transportation. In addition, in the electric and electronics industry, companies pay more attention to regulations on the banned chemical substances represented by RoHS regulation of EU rather than reduction of carbon dioxide.



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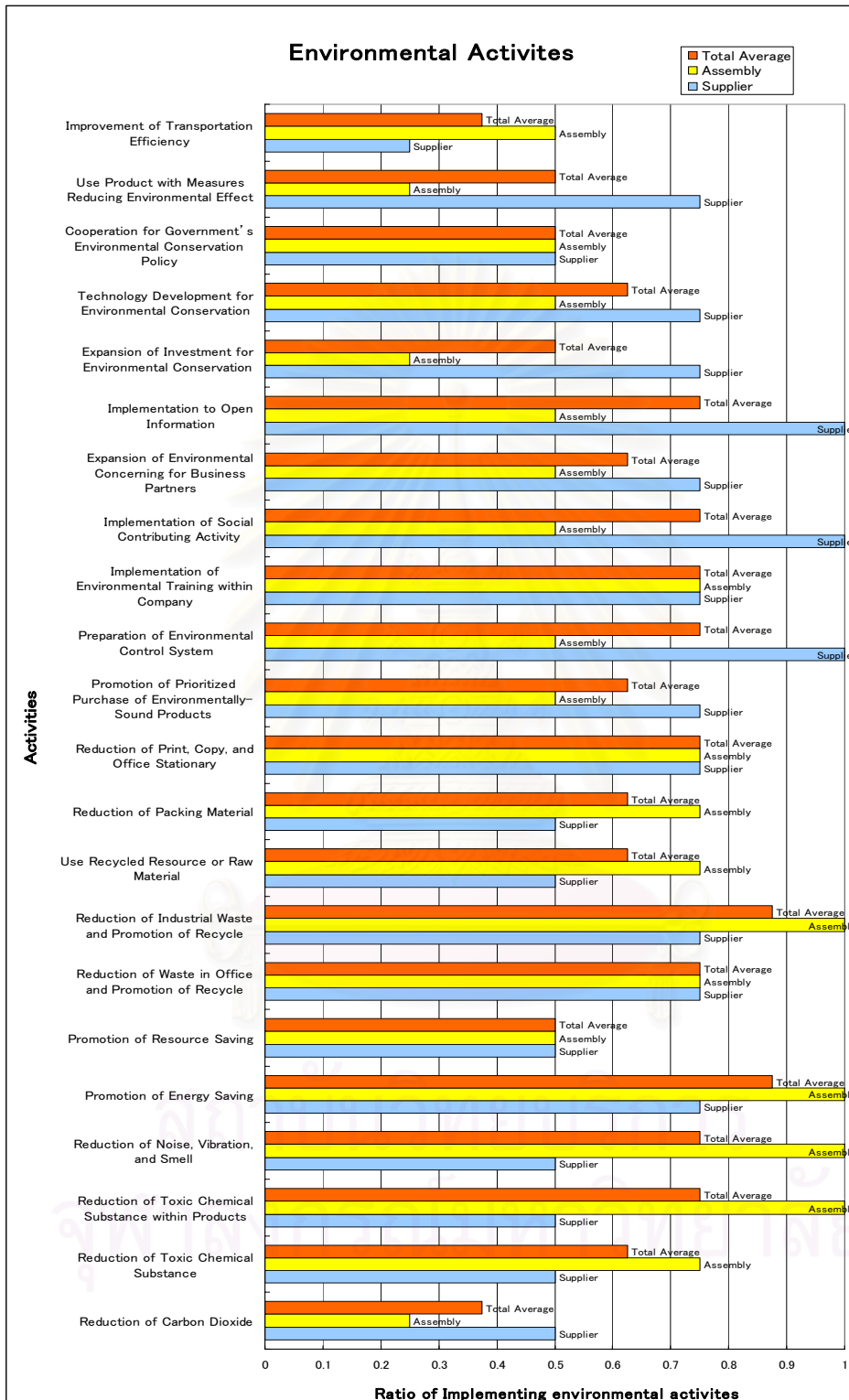


Figure 6.6: Environmental Activities

6.1.7 Cost Analysis

The table 6.2 and 6.3 show the account of each company to be researched. The tables are the summary table of eight researched companies. There is the average of each group, supplier and assembly, on the bottom of the table. However, there are two exceptions in these companies, which are S3 and A2.

In terms of company S3, this company has minus profit in the year of the data, 2003. However, this company has grown its profit in recent years. This year is the exception for this company in the profit. Moreover, this company uses the environmental cost quite a lot although the company is a supplier. Actually this company is big company. The factory in Thailand is main production base in the world. The factory is extremely huge and very clean. However, the amount of environmental cost of this company will make the ratio of the average of environmental cost of all supplier companies be unreliable, because of the unusual amount of the cost. Hence, the company S3 is treated as an exception in this cost analysis.

Moreover, in terms of company A2, this assembly company actually has implemented good environmental conservation activities within the company and discharge less pollution emissions. However, the company has not recognized the cost for the management as the environmental cost. They have never counted it as the environmental cost. It is included in production cost. The environmental management is also included in the usual production process, which is not specified. Therefore, the manage of this company could say only the very less amount of environmental cost. It is feared that this number may also drive the total average of the assembly wrong. Hence, the company A2 is also treated as a exception in this cost analysis.

From this table, the most interesting point is the difference of percent of environmental cost against total sales and total cost between supplier and assembly. The ratio of supplier is relatively higher than assembly in both. This means that supplier spend more costs for environment than assembly. In the supplier group, the company S1 spends a lot of cost for environment. This company is metal plating company. This company has huge waste water treatment system which is same technology as Japan in the factory. However, this company needs to clean not only the waste water but also tap water to use for washing the material after copper plating. The tap water in Thailand is enough clean, however, the water change to be dirty

during sending from the public water purification plant, because of the old water pipe. Because the company S1 operates the metal plating of electric and electronics parts, they need very clean pure water. It is thought that they spend some cost for clean the tap water with the water treatment system.

In terms of the assembly companies, they get profit more than suppliers in average in the table of absolute number. However, in the real, the percentage of cost against sales is higher and the percentage of profit against sales is lower. It means that they produce the profits because of the scale of the business, however, it is not so economically good, too much cost and less profit. Accordingly, the amount of the environmental cost is much less that supplier both in absolute number and in ratio.

The severe competition in the market could be one of the reasons behind this result. In addition to the severe competitive condition, recently the environmental conservation of companies has been required in the international market, especially in the European market. The assembly companies have to be adopted the trend of the market, however, the real player who has used the hazardous chemical substances is supplier. Therefore, shifting the pressure to suppliers to meet the environmental standard in the market may be enough for the assembly. The assembly companies can keep the brand name and even improve it with the good environmental management. Hence, the supplier companies are forced to implement the environmental management with much higher cost.

On the other hand, the high concerns of assembly companies on environment can also be one of the reasons for the result of table. It means that most of assembly companies received the pressure to improve the environmental management practices early because they are related to the international market including the European market. They could start performing environmental conservation practices within own company. Also, they have already operated for many years. The first investment cost for the environmental conservation activities is quite large, however, the operation cost is not so expensive and stable except for some high polluting companies.

Therefore, the number of the table may show that the environmental management of assembly companies already gets in the mature and steady stage. On the other hand, because the supplier companies just started implementing environmental management, they need the high first investment cost for environmental conservation activities. Therefore, the number of supplier is much higher than assembly companies.

This decision is difficult with only eight companies' data. It needs much more sample and more detailed cost data.



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Table 6.1: Summary Table (Absolute Number)

Company	Asset	Total Sales	Total Cost	Environmental Cost	Profit
S1	356,542,354	247,828,179	197,299,387	6,000,000	50,528,792
S2	5,778,909,423	9,599,481,126	8,918,157,083	6,226,524	681,324,043
S3	2,871,086,654	5,746,907,332	5,961,088,417	632,394,146	-214,181,085
S4	818,854,340	1,992,215,458	1,955,844,153	700,000	36,371,305
A1	3,721,409,172	16,761,646,037	16,433,608,856	600,000	328,037,181
A2	1,556,703,195	2,063,759,002	1,958,860,803	10,000	104,898,199
A3	2,084,471,427	4,514,575,480	4,441,234,258	4,500,000	73,341,222
A4	3,268,205,235	4,266,113,184	4,011,203,118	14,000,000	254,910,066
Supplier Average	2,456,348,193	4,396,608,024	4,258,097,260	161,330,168	138,510,764
Assembly Average	2,657,697,257	6,901,523,426	6,711,226,759	4,777,500	190,296,667

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Table 6.2: Summary Table (Percentage Ratio on Sales and Asset)

Company	% of Cost against Sales	% of environmental Cost against Sales	% of Environmental Cost against Cost	% of Profit against Sales	% of Profit against Asset
S1	79.6%	2.4%	3.0%	20.4%	14.2%
S2	92.9%	0.06%	0.07%	7.1%	11.8%
S4	98.2%	0.04%	0.04%	1.8%	4.4%
A1	98.0%	0.004%	0.004%	2.0%	8.8%
A3	98.4%	0.10%	0.10%	1.6%	3.5%
A4	94.0%	0.33%	0.35%	6.0%	7.8%
Supplier Average	90.2%	0.8%	1.0%	9.8%	10.1%
Assembly Average	96.8%	0.144%	0.151%	3.2%	6.7%

Table 6.3: The Percentage Ratio of Exceptions

Company	% of Cost against Sales	% of environmental Cost against Total Sales	% of Environmental Cost against Total Cost	% of Profit against Sales	% of Profit against Asset
S3	103.7%	11.00%	10.61%	-3.7%	-7.5%
A2	94.9%	0.0005%	0.0005%	5.1%	6.7%

6.2 Comparison of Companies' Profile

In this research, only Japanese companies which include Japanese joint venture are the target group for the study. Most companies are located in the industrial parks around the center of Bangkok. Most companies export their products to Japan or other countries, while some companies sell a small percentage of their products in local Thai market.

Companies interviewed are divided into two groups: assembly and supplier. Assembly companies buy parts from suppliers and assemble into the final products for the market. Supplier companies are categorized into three levels: 1) supplier selling the products or parts to assembly companies, 2) supplier assembling products from materials or parts for the first level supplier, and 3) supplier producing very small parts such as screws.

There are four assembly companies and four first supplier companies for this study. These companies are different in the scale of factory, capital, number of workers, annual sales and so on. The year of establish in Thailand of each company ranges from 1969 to 1997. The number of worker is also quite different. The smallest number is 95, and the largest number is 19,011. It is often said that the number of Thai worker against one Japanese worker is 100 among the industrial companies. Among the sample for this research, the average of the number of Thai worker against one Japanese worker is 109. The summary which total number of Thai worker is divided by the number of Japanese worker is shown in table 6.1.

The number of supplier companies is large. On the other hand, the number of assembly companies is less. There is larger number of Thai worker per one Japanese worker in assembly companies than supplier companies. It may mean that the assembly companies tend to have bigger factory or more branches than supplier companies. Furthermore, it may also means that the assembly companies have already operated the top management by Thai workers. The Japanese workers do not need to control the production in Thailand. The companies have been localized.

Seven out of eight companies have the certification of ISO 9000 and four out of these seven companies have TS 16949 as well. In addition, six out of eight companies have ISO 14000. Companies which have not had the certification of ISO 14000 also plan to get it by next year. The timing when the six companies got the ISO

14000 can be divided into two groups, before and after 2000.

Table 6.4: Summary of the Number of Thai Worker against One Japanese Worker

Company		Number of Thai Worker against one Japanese worker
Supplier	1	88
	2	69
	3	95
	4	16
Assembly	1	140
	2	34
	3	375
	4	49
Average	Supplier	67
	Assembly	150
Total Average		109

Source: Question number 1.5 in the questionnaire

Table 6.5: Year of Certified by ISO 14000

Year of Certified by ISO 14000	Company
1996	A4
1997	S3
1998	A3
1999	A1
2003	S2
2005	S1

Source: Question number 2.12 in the questionnaire

Four companies which got the ISO 14000 certification before 2000 already incorporated the environmental management into the production process. Some companies have still continued to improve own environmental management further. Other companies just keep the same environmental management practices. Company S2 got the certification of ISO 14000 in 2003. However, the company already has created some benefits through the environmental management practices. Company S1 just got the ISO in February 2005. Therefore, the company still needs time to see the impact of environmental management practices within the company.

6.3 Possibility of Pollution Haven for Japanese Companies to Invest in Thailand

This section shows the result to test the first hypothesis: Pollution haven is still an incentive for Japanese companies to invest in Thailand.

Table 6.6: Summary of Scoring of Pollution Haven

Supplier		Assembly	
Company	Score	Company	Score
S1	6	A1	4
S2	7	A2	6
S3	4	A3	6
S4	7	A4	6
Total	24	Total	22
Average	6	Average	5.5

Source: Analyses of each company in chapter 5

There is no company researched who clearly invested in Thailand with consideration of pollution haven. Most of the companies which invested in Thailand after 1995 came to Thailand to meet the requests of customers, which supplier produce the parts or products in Thailand and supply to them. In addition, every company sets the environmental standards which follow the Thai environmental standards or stricter than the standards.

It is though that some companies which invested in Thailand in 1980s or before it may have used to think that Thailand is pollution haven. However, to date, these companies have no potential to pollute the environment in Thailand from the

result of this study. It shows that these companies changed their thought on environmental concern about operating production in Thailand.

The score of each company and each group were not over 10 point. This means that Thailand is no longer pollution haven for Japanese companies.

Therefore, the first hypothesis is not proven; Pollution haven is no longer an incentive for Japanese companies to invest in Thailand.

6.4 The Impact of Implementing Environmental Management on Competitiveness of Japanese Companies in Thai Market

This section refers to the result to test the second hypothesis: Environmental management practices in Thai market can enhance company’s competitiveness; with analyses of each company based on the Orssatto’s framework.

Cost	(1) Process-Oriented Resource Productivity	(2) Environmental Cost Leadership
	2 Suppliers (S2 & S3) 2 Assemblies (A3 & A4)	2 Assemblies (A3 & A4)
Competitive Advantage	(3) Beyond Compliance Practices	(4) Eco-Oriented Products & Services
Differentiation	4 Suppliers (S1 - 4) 1 Assembly (A1)	1 Supplier (S3) 2 Assemblies (A1 & A2)
	Process	Products & Services
	Competitive Focus	

Figure 6.8: Result of Business Environmental Strategies from Research

Every company has positive effects from environmental management practices, which relates to competitiveness of the company. Companies realize the enhancement of competitiveness through cost reduction, increase of workers' awareness on environment or improvement of company image to stakeholders and so on.

Every company can be fitted with the framework of Orssatto (2001). Moreover, many companies have implemented environmental management beyond the Orssatto's framework. The companies do not fit with one strategy. These companies take mix strategy which fit with more than one strategy. These companies realize two competitive advantages with one competitive focus or two competitive focuses with one competitive advantage.

In terms of supplier companies, they focus on process improvement more than products and services. Also, supplier companies take competitive advantage of differentiation rather than cost. On the other hand, for assembly companies, in terms of both competitive focus and competitive advantage, there is not different very much. Assembly companies have a great variety of the business environmental strategies. There are little bit higher result in products and services improvement for competitive focus and in cost as competitive advantage.

As a whole, process improvement is clearly dominant strategy for competitive focus. In terms of competitive advantage, there is small difference between cost and differentiation. However,, differentiation is little bit ascendant more than cost.

Therefore, it is the beyond compliance practices strategy is the dominant strategy of this business environmental strategy on competitiveness hypothesis. The result shows that Beyond Compliance Practices Strategy strategy is most effective to enhance the company's competitiveness through environmental management practices.

In conclusion, the second hypothesis is proven; environmental management practices in Thai market can enhance company's competitiveness.

6.5 Cost Reduction through Environmental Management Practices

This section will test the third hypothesis, H3: Cost reduction is brought by implementing environmental management, by analysis with the result of the research.

Three out of eight companies have realized cost reduction through environmental management practices. There are some identical characteristics among these three companies. The companies discharge a lot of wastes from the production. However, at the same time, they perform environmental conservation practices very actively. In particular, they focus on the treatment of waste. They have tried to selling the waste to other companies, to enhance the recycle ratio within the company and to improve the resource efficiency by developing the production process or innovating machineries.

However, majority of the companies including both assembly and supplier do not agree with that environmental management practices bring cost reduction. They do not expect to get benefits of cost reduction from environmental management practices. They expect other benefits, such as keeping the business relation with customers, risk hedge of future regulations or environmental accidents, improvement of company image to stakeholders or enhancement of workers' awareness and so on.

Interestingly, one supplier company uses different standards for different customers. The company's standards are fundamentally based on the Thai regulation. However, when customer requires to produce parts with stricter environmental standards on environment more than Thai regulations, the company adjusts the environmental standard according to the demand of customers. This is one of the business strategies on environment of this company. This strategy makes the company save the cost when the company supplies their parts to the customers who do not require the stricter standard than Thai regulations.

Therefore, the third hypothesis is partially proven; cost reduction is realized by implementing environmental management in some company not whole companies, which depends on company's scale, products, production style and recycle ratio and so on.

CHAPTER VII

CONCLUSION

The summary of this research is argued in this chapter by following the objectives of this research which is set in chapter 1. The policy implications for each group, assembly companies, supplier companies and government are referred in 7.2. The limitation of this research and the future research are stated in 7.3 and 7.4 respectively.

7.1 Summary of the Findings

7.1.1 Environmental Management Practices of Japanese Companies in Thailand

The practices of environmental management by Japanese companies in Thailand have improved as shown in chapter five and six. Despite there is a waste water treatment center in the industrial park, most of Japanese companies have own waste water management system. They purify the waste water before sending to the water treatment center of the industrial park. Companies take care of waste water not only industrial waste water but also other waste waters from factory such as water from restaurant and toilet.

There are six out of eight companies certified with ISO 14000. Other two companies are preparing to get ISO certification next year by setting environmental department within the company and learning about environmental management system with outside consultants. Regarding the assembly companies, they perform beyond compliance and standards by following their own standard or ISO 14000's procedure to deal with environmental issues. But one company from supplier considers getting ISO is not for doing better to environment, just to keep business with trading companies. The manager said our company got the certification of ISO 14000 in order to just get ISO.

ISO 14000 is one of the environmental management practices for company. However, in most cases, ISO 14000 is an opportunity to consider and start environmental management, especially for supplier companies.

7.1.2 Important factors for Japanese companies to start and keep implementing environmental management in Thailand

The result of this study shows that the most important factor for Japanese companies to start and keep implementing environmental management is Thai Environmental Laws and standards. Both assembly and supplier companies consider the government policies to be very important.

However, because in real, the standards of Thai government are lower than the standards of Japan or the international market. Japanese companies have not faced difficulties to follow Thai Environmental Laws and standards. They concentrate on struggling with the international standard such as ISO 14000 and RoHS much more.

In terms of incentive to undertake environmental management, the pressure or indications from customers for supplier performance, instructions from head quarter in Japan and regulations of the international markets for assembly companies are also important factors for Japanese companies. This result is based on the recent growing concern on environment over the world. Even if they are suppliers which do not sell their product to consumer directly, they need to collect data on environmental impact and make a report to trading companies or holding companies. One manager said if a company does not do anything on environment now, the company will not survive in near future.

In terms of the objective for implementing environmental management, contributions to society and prevention of future compliance are indicated as the highest degree of importance by Japanese companies. Most companies conduct activities for their neighborhood such as planting tree, cleaning temple, environmental education for elementary school children and so forth.

In addition, the result of study in chapter 6.3 indicates that Japanese companies no longer think Thailand is pollution haven to invest as same as the past.

7.1.3 The Impact of Implementing Environmental Management on Competitiveness of Japanese Companies

Environmental impacts are usually not so visible. Pollution of water, air and soil need special technical determination to identify the level of pollution. Therefore, people tend to overlook the effects of environment. However, if a private company does not focus on the importance of environment, the company will lose business. Even if the general public ignore the effects of environment, they do not suffer any serious damage. However, if private companies including supplier and assembly companies overlook the effects, they cannot survive in the market. On the other hand, if companies treat the environment as important factor for business and implement environmental management practices, the company is able to enhance their competitive advantage in the market through improving company image and awareness of workers on environment and so on.

The strategy on environment differs according to the company. However, from result of chapter 6.4, Beyond Compliance Practice Strategy which focuses on enhancement of advantage of differentiation by improving the production process is the most effective strategy through environmental management practices. It means that the company taking the strategy can maximize the benefits brought by environmental management practices, which directly relate to the competitiveness of the company.

In terms of the competitiveness on cost reduction and differentiation which Porter (1995) stated, differentiation is shown to be dominant strategy from the result of study in chapter 6. However, there are only three out of eight companies which realize cost reduction through environmental practices.

There are many companies regarding the benefit of environmental management such as improving company image and awareness of workers. In assembly companies, when business environmental strategies of top management and commitment of workers and performance of suppliers are put together, the company can perform environmental management. Therefore, many companies claim the importance of awareness of workers. Such activities realize not only effective environmental management but also maximizing benefits brought by environmental management practices.

There are some companies who discharge less emission by implementing own environmental management method without ISO 14000. For the companies which have already implemented good environmental management practices as their usual production activities. The certification of ISO 14000 can improve their competitiveness in the market by the reputation for good environmental management. Also, they may achieve cost savings by improving the control the environmental management system over the company.

In order to determine benefits form environmental management, it need to take more data and information from various departments in the companies as most companies got ISO 14000 certification only three to four years ago. However, the environmental concern of Japanese companies and their corresponding activities have been better than before when the Japanese companies were blamed for exporting pollution to Thailand.

7.2 Policy Implications

The goal of this policy implication is to make private companies be more environmentally-friendly. Some recommendations are proposed in this section for each group, such as assembly companies, supplier companies and government.

7.2.1 Assembly

- To assist suppliers to implement environmental management practices by considering supplier companies are one of the important stakeholders of assembly companies.

For assembly companies, at present they implement corporate social responsibility such as planting trees in the neighborhood, cleaning the temple, giving the scholarship and environmental education for children. Assembly companies strive to contribute to society, neighbors as important stakeholders of the company. However, assembly companies tend to lack of the consideration that suppliers are direct and the closest stakeholder in their business activities. They should consider the suppliers are also one of the important stakeholders, which should be target of CSR activities.

Assembly companies should act own CSR activities not only for society to improve the company image and relationship but also for suppliers to assist

suppliers to be more environmentally-friendly company. In particular, the assembly companies which already matured in environmental management have a potential to cover the common characteristic of supplier such as lack of human resource, capital, knowledge and skill for suppliers to implement better environmental management.

7.2.2 Supplier

- Do not do pass the pressure to the lower suppliers.
- Do try to cooperate to improve environmental management with other companies.

Most of the supplier companies operate the environmental management by being pressured by their customers, and assembly companies. Because they have just started the environmental management practices, the effect is not obvious so much. However, when they attain the stage which can incorporate environmental management system into the process and keep the stable operation cost, if they pass the pressure to meet the environmental regulation given by assembly companies to lower supplier, second and third supplier, environmental management practices of companies cannot be improved. Supplier companies need to consider the cooperative activities of company on environment.

7.2.3 Government

- To increase and advertise the promotion for private companies to cooperate to improve the environmental management practices.

For the government, in order to improve the environmental management practices by private companies, the government support is highly important. Because private sector seeks to maximize the profit in the market, there is conflict to cooperate to perform something together. The companies are different in many aspects, such as capital, production and skill. That is why they need authority agencies to support them in undertaking the environmental conservation activities in cooperation with other companies. The government is able to take a leading role in order to realize the cooperation of private companies. Not only controlling and auditing the companies' performance, but also support and assist are keys to improve the environmental management practices of companies as a whole.

7.3 Limitations

Although it was originally the objective of the current study to reflect the environmental management status of the Japanese companies at large, the company cooperation in providing information is still a limiting factor for the overall study. The information obtained from eight companies represents cases of certain industrial groups and sizes. The fact remains that it was very difficult to obtain certain data especially monetary related information. Companies do not formally release their environmental information and data to publics, and will provide the information only to customers and head quarter in Japan. Moreover, only few companies perform life cycle assessment but not to the full scale.

Lastly, because scope of the study is only companies' executives in this study, this study is a kind of one side story. It has better to interview workers, neighbors and managers of industrial parks.

7.4 Future Research

(1) Take a time to see the effects of today's environmental management practices

Currently companies are facing the new environmental regulation of EU, RoHS, and trying to change the production performance within the company. When the RoHS is enforced in July 2006, the companies will have to meet new requirements in improving their environmental performance. That time may be a chance for private companies to enhance the competitiveness through environmental management by thinking today's action over and making the most of the experiences.

(2) Larger number of sample

Future research directions are to research more large number of samples to identify the condition of Japanese companies' activities on environment.

(3) Same industry of Japanese companies in several different countries

And it may be interesting to do comparative study the environmental management practices by Japanese companies in several countries.

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APPENDICES

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Appendix 1: Questionnaire

Thank you for your cooperation for this interview. This research is for my thesis “Environmental Management of Japanese Companies in case of Thailand”. I do not release the name of company.

Yuichiro Fukumaru

Master of Science in Environmental and Natural Resource Economics

Faculty of Economics, Chulalongkorn University

1. Background of Company

1.1 Company Name _____

1.2 Year of Establish in Thailand _____

1.3 Registered Capital _____

1.4 Annual Sale _____

1.5 Number of Worker Total _____

Japanese _____

Local _____

1.6 Ownership Ratio

() Japanese 100%

() Joint Venture

Japan _____ %

Thai _____ %

Other _____ %

1.7 Major Product of the Company

Product Name	Percent of Total Sale	Year that start producing this product	Percent of Export

1.8 What are major incentives to invest in Thailand?

- (1) Relatively Stable Government
- (2) Cheap and Skilled Labor
- (3) Culture
- (4) Good Living Condition
- (5) Lax Environmental Law and Its Enforcement
- (6) BOI Promotion
- (7) Trading Company's Suggestion
- (8) Others _____

1.9 Quality Control

- (1) ISO 9000
- (2) Other _____
- (3) None

1.10 Research & Development

- (1) Yes: Technology: Year that start R & D _____
 Environment: Year that start R & D _____
- (2) No
- (3) Planning: Year that plan to start R & D _____

1.11 In terms of production technology or equipments, does your company do technology transfer from the head company in Japan?

- (1) Yes: Contents _____
- (2) No
- (3) Planning: Year that plan to start R & D _____

1.12 Please describe the production process of your company from buying raw material to disposal

1.13 What kind of materials does your company use?

Percentage of Imported Material

Import _____ % from _____
 Local _____ %

1.14 What kind of energy does your company use and what kinds of waste are there in each stage of production process?

1.15 What kind of chemical substances does your company use? Which stage in the production process? And what is the effect of the chemical substances on environment?

2 Environmental Management

2.1 What do you think the environmental conservation activities of companies?

- (1) Business Chance
- (2) One of the Contributing Activities for Society
- (3) Not Relate to Any Business Benefit.
- (4) One of the Important Factors which Decide the Future Business of Company
- (5) One of the Important Corporate Strategies
- (6) Other _____

2.2 Are there some instructions on environmental management from holding company in Japan?

- (1) Yes: What kind of instructions is it?

- (2) No

2.3 Does your company enact business principle on environmental conservation?

- (1) Yes, enact
- (2) Planning
- (3) No, do not enact

2.4 Importance of objectives when your company plans to implement environmental management

Objective	Degree of Importance						
	Least						Most
1. Improved Materials Efficiency	1	2	3	4	5	6	7
2. Improved Product Quality	1	2	3	4	5	6	7
3. Increased Staff Commitment	1	2	3	4	5	6	7
4. Improved Community Relations	1	2	3	4	5	6	7
5. Positive Pressure Group Relations	1	2	3	4	5	6	7
6. Improved Media Coverage	1	2	3	4	5	6	7
7. Cheaper Finance for Materials or Energy	1	2	3	4	5	6	7
8. Lower Insurance Premiums	1	2	3	4	5	6	7
9. Reduced Risk Exposure	1	2	3	4	5	6	7
10. Assured Present and Future Compliance	1	2	3	4	5	6	7

Others _____

2.5 Does your company have a department on environment or person being in charge of environmental issues?

- (1) () There is a department on environment
- (2) () There is no department but there is full-time person being in charge of environmental issues
- (3) () There is part-time person being in charge of environmental issues
- (4) () Do not have
- (5) () Other _____

2.6 Does your company make and release annual environmental report?

- (1) () Make and release annual report
Release to where _____
- (2) () Make annual report but do not release
- (3) () Do not make
- (4) () Planning

2.7 What kind of activities for environmental conservation have your company performed?

- (1) () Reduction of carbon dioxide
- (2) () Reduction of toxic chemical substance
- (3) () Reduction of toxic chemical substance of products
- (4) () Reduction of noise, vibration, and smell
- (5) () Promotion of energy conservation
- (6) () Promotion of resource conservation
- (7) () Reduction of waste in office and promotion of recycle
- (8) () Reduction of industrial waste and promotion of recycle
- (9) () Use recycled resource as raw material
- (10) () Reduction of packing material
- (11) () Reduction of print, copy, and office stationary
- (12) () Promotion of prioritized purchase of environmentally-sound products
- (13) () Preparation of environmental control system
- (14) () Implementation of environmental training within company
- (15) () Implementation of social contributing activity
- (16) () Expansion of environmental concerning for trading partners
- (17) () Implementation to open information
- (18) () Expansion of investment for environmental conservation
- (19) () Technology development for environmental conservation
- (20) () Cooperation for government's environmental conservation policy
- (21) () Use product with measures which reduce environmental effect
- (22) () Improvement of transportation efficiency
- (23) () Other _____

2.8 Do you know the environmental effects of your company's activities?

- (1) () Understand whole important environmental effects
- (2) () Understand a part of important environmental effects
- (3) () Do not understand

2.9 What kind of data of environmental effects do you understand?

- (1) () Amount of invested of total energy
- (2) () Amount of invested of total material
- (3) () Amount of used of paper
- (4) () Amount of invested of water
- (5) () Amount of discharged of green house gas

- (6) () Amount of discharged of chemical substance
- (7) () Amount of manufactured of total product or total product sale
- (8) () Amount of discharged of total waste
- (9) () Amount of discharged of final disposal waste
- (10) () Amount of discharged of total waste water
- (11) () Other

2.10 What kinds of machine equipments or technologies does your company use in order to conserve environment?

2.11 Does your company do environmental education for workers?

- (1) () Do regularly
- (2) () Not regularly but do
- (3) () Do depending on workers request
- (4) () Do not do

2.12 Do you have ISO 14000

- (1) () Yes: Year of certified by ISO 14000 _____
- (2) () No
- (3) () Planning

2.13 Does your company implement Life Cycle Assessment?

- (1) () No
- (2) () Planning
- (3) () Do not know LCA
- (4) () Yes: Please describe the Life Cycle Assessment of your company.

2.14 What kind of effects do you have by getting ISO 14001?

- (1) () Reduce cost
- (2) () Improve management on environmental conservation and reduce environmental effects
- (3) () Enhance workers' concern on environment
- (4) () Improve the communication both in internal and external
- (5) () Rise external reliance of company
- (6) () Other _____

(5) () Do not have standard

(6) () Other _____

2.22 Importance of incentive for your company start environmental management

Incentive	Degree of Importance						
	Least						Most
1. Cost Saving	1	2	3	4	5	6	7
2. Ensuring Legislative Compliance (Thai Environmental Law)	1	2	3	4	5	6	7
3. Anticipating Future Legislation	1	2	3	4	5	6	7
4. Reduce Environmental Risk	1	2	3	4	5	6	7
5. Meeting Trading Companies' Requirement	1	2	3	4	5	6	7
6. Improve Relation with Regulator	1	2	3	4	5	6	7
7. Improve Public Image	1	2	3	4	5	6	7
8. Improve Community Relation	1	2	3	4	5	6	7
9. Increase Market Opportunities	1	2	3	4	5	6	7
10. Increase Employee Enthusiasm	1	2	3	4	5	6	7
11. BOI Promotion	1	2	3	4	5	6	7
12. Head Quarter's Instruction	1	2	3	4	5	6	7

Others _____

2.23 Does your company pay attentions on stakeholders in terms of environment?

(1) () Yes

a) () Employees

b) () Customer

c) () Neighbors

d) () Suppliers

e) () Other _____

(2) () No

2.24 How much have your company used for environmental management?

Amount of Environmental Cost

- A: Less than 50,000 Baht
- B: 50,000 - 100,000 Baht
- C: 100,000 - 500,000 Baht
- D: 500,000 - 1,000,000 Baht
- E: 1,000,000 - 1,500,000 Baht
- F: 1,500,000 - 2,000,000 Baht
- G: 2,000,000 - 2,500,000 Baht
- H: 2,500,000 - 3,000,000 Baht
- I: More than 3,000,000 Baht

(1) Life Cycle Cost

In case your company do business activities concerning on environment, how much has your company paid costs in each level of production process more than when your company didn't care about environment? Please show the price of the costs.

Production process of the below table is just reference. If your company has own life cycle assessment of environmental management, please show the price of the costs following your company's production process.

Production Process	Year	Kinds of Environmental Management	Amount of Environmental Management Cost (Baht)
1) Purchasing Raw Materials			
2) Production and processing of the raw materials			

3) Production and processing of products			
4) Using and consuming the products			
5) Disposal, Recycle, Reuse			

(2) Annual Environmental Management Cost

Please show how much has your company paid costs for environmental management in annual.

Year	Major Products	Amount of Environmental Management Cost	Kinds of Environmental Management
1990			
1991			
1992			
1993			
1994			
1995			
1996			
1997			
1998			

Year	Major Products	Amount of Environmental Management Cost	Kinds of Environmental Management
1999			
2000			
2001			
2002			
2003			
2004			

2.25 Do you think the implementation of environmental management realize cost down to enhance the competitiveness of your company?

(1) () Yes

(2) () No

(3) () Other _____

2.26 Do you think the implementation of environmental management realize differentiation of your company's products to enhance the competitiveness of your company?

(1) () Yes

(2) () No

(3) () Other _____

2.27 Do you think what kind of benefits did the implementation of environmental management bring to your company except for above two things (cost down and differentiation of the products)?

○

○

○

Thank you very much for your cooperation.

Appendix 2: Analysis of Survey Response

Appendix 2.1: Incentive to Invest in Thailand

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Sample Average
Relatively Stable Government	0	1	0	1	0	0	0	1	0.5	0.25	0.375
Cheap and Skilled Labor	0	0	1	1	1	0	0	1	0.5	0.5	0.5
Culture	0	0	0	1	0	1	0	1	0.25	0.5	0.375
Good Living Condition	0	0	0	1	0	1	0	1	0.25	0.5	0.375
Lax Environmental Law and Its Enforcement	0	0	0	1	0	0	0	1	0.25	0.25	0.25
BOI Promotion	0	1	1	1	0	1	0	1	0.75	0.5	0.625
Customer's Suggestion	1	0	0	0	1	0	0	1	0.25	0.5	0.375

Appendix 2.2: Environmental Conservation Activities of Companies

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Sample Average
Business Chance	0	1	1	1	0	0	1	0	0.75	0.25	0.5
Contributing Activities for Society	1	1	1	1	1	0	1	0	1	0.5	0.75
Not Relate to Business Benefit	0	0	0	0	0	1	0	0	0	0.25	0.125
One of the Important Factors Deciding the Future Business of Company	1	1	1	1	1	0	0	1	1	0.5	0.75
One of the Important Corporate Strategies	1	1	1	1	0	0	1	1	1	0.5	0.75

Appendix 2.3: Importance of Incentive for Your Company Start Environmental Management

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Sample Average
Cost Saving	3	5	6	4	3	1	4	6	4.5	3.5	4
Ensuring Legislative Compliance (Thai Environmental Law)	7	6	6	5	7	7	6	7	6	6.75	6.375
Anticipating Future Legislation	7	5	6	4	7	7	6	4	5.5	6	5.75
Reduce Environmental Risk	4	5	6	6	7	1	7	7	5.25	5.5	5.375
Meeting Trading Companies' Requirement	6	6	7	7	7	1	6	5	6.5	4.75	5.625
Improve Relation with Regulator	4	6	6	4	5	1	5	6	5	4.25	4.625
Improve Public Image	6	5	6	5	5	3	5	5	5.5	4.5	5
Improve Community Relation	4	5	6	6	5	3	6	1	5.25	3.75	4.5
Increase Market Opportunities	3	6	6	5	4	1	7	6	5	4.5	4.75
Increase Employee Enthusiasm	7	6	6	5	5	1	7	1	6	3.5	4.75
BOI Promotion	4	6	6	5	1	1	3	7	5.25	3	4.125
Head Quater's Instruction	3	4	6	6	7	7	4	5	4.75	5.75	5.25

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Appendix 2.4: Importance of Objective to Do Environmental Management

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Sample Average
Improved materials efficiency	3	5	5	4	5	1	6	5	4.25	4.25	4.25
Improved product quality	3	5	6	4	7	1	6	5	4.5	4.75	4.625
Increased staff commitment	7	5	5	4	5	3	7	7	5.25	5.5	5.375
Improved community relations	4	6	6	6	5	5	7	6	5.5	5.75	5.625
Positive pressure group relations	2	1	6	7	2	1	4	5	4	3	3.5
Improved media coverage	2	6	6	6	2	5	5	5	5	4.25	4.625
Cheaper finance for materials or energy	6	5	7	5	4	2	5	4	5.75	3.75	4.75
Lower insurance premiums	3	1	5	4	4	1	4	4	3.25	3.25	3.25
Reduced risk exposure	3	3	6	6	7	4	7	7	4.5	6.25	5.375
Assured present and future compliance	5	6	7	6	7	3	7	7	6	6	6

Appendix 2.5: What kind of standard does your company follow?

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Sample Average
Standard Following Thai Law	0	1	0	0	0	0	1	1	0.25	0.5	0.375
Standard of Japan	0	1	0	1	0	0	0	0	0.5	0	0.25
Own Standard being Laxer than Standard in Japan	0	0	0	0	0	0	0	0	0	0	0
Own Standard being Stricter than Standard in both Thai and Japan	1	0	1	0	1	1	0	0	0.5	0.5	0.5
Do not have Standard	0	0	0	0	0	0	0	0	0	0	0

Appendix 2.6: Environmental Management Activities

Factors / Company	S1	S2	S3	S4	A1	A2	A3	A4	S (Average)	A (Average)	Total (Average)
Reduction of Carbon Dioxide	0	1	1	0	0	0	0	1	0.5	0.25	0.375
Reduction of Toxic Chemical Substance	0	1	1	0	1	0	1	1	0.5	0.75	0.625
Reduction of Toxic Chemical Substance within Products	0	1	1	0	1	1	1	1	0.5	1	0.75
Reduction of Noise, Vibration, and Smell	0	1	1	0	1	1	1	1	0.5	1	0.75
Promotion of Energy Saving	1	1	1	0	1	1	1	1	0.75	1	0.875
Promotion of Resource Saving	0	1	1	0	1	0	0	1	0.5	0.5	0.5
Reduction of Waste in Office and Promotion of Recycle	1	1	1	0	1	1	0	1	0.75	0.75	0.75
Reduction of Industrial Waste and Promotion of Recycle	0	1	1	1	1	1	1	1	0.75	1	0.875
Use Recycled Resource or Raw Material	0	1	1	0	1	0	1	1	0.5	0.75	0.625
Reduction of Packing Material	0	1	1	0	1	0	1	1	0.5	0.75	0.625
Reduction of Print, Copy, and Office Stationary	1	1	1	0	1	0	1	1	0.75	0.75	0.75
Promotion of Prioritized Purchase of Environmentally-Sound Products	1	1	1	0	0	1	0	1	0.75	0.5	0.625
Preparation of Environmental Control System	1	1	1	1	1	0	0	1	1	0.5	0.75
Implementation of Environmental Training within Company	1	1	1	0	1	1	0	1	0.75	0.75	0.75
Implementation of Social Contributing Activity	1	1	1	1	1	0	0	1	1	0.5	0.75
Expansion of Environmental Concerning for Business Partners	0	1	1	1	1	0	0	1	0.75	0.5	0.625
Implementation to Open Information	1	1	1	1	1	0	0	1	1	0.5	0.75
Expansion of Investment for Environmental Conservation	1	1	1	0	0	0	0	1	0.75	0.25	0.5
Technology Development for Environmental Conservation	1	1	1	0	0	1	0	1	0.75	0.5	0.625
Cooperation for Government's Environmental Conservation Policy	0	1	1	0	0	0	1	1	0.5	0.5	0.5
Use Product with Measures Reducing Environmental Effect	1	1	1	0	0	0	0	1	0.75	0.25	0.5
Improvement of Transportation Efficiency	0	0	1	0	0	0	1	1	0.25	0.5	0.375

Appendix 3: Net Flow of Foreign Direct Investment

Appendix 3.1: Net Flows of Foreign Direct Investment in Thailand Classified by Countries

	1965-1969		1970-1974		1975-1979		1980-1984		1985-1989		1990-1995	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
Japan	1,305	28.17	2,384	27.82	2,584	33.19	8,367	25.75	41,211	43.83	76,152	25.68
U.S.	2,217	47.87	3,295	38.46	2,607	33.49	8,985	27.65	13,902	14.78	41,003	13.83
NIES	243	5.24	974	11.36	464	5.97	3,378	10.39	20,682	21.99	72,480	24.44
Hong Kong	208	4.48	942	11.00	395	5.07	3,253	10.01	10,911	11.60	52,627	17.75
Taiwan	35	0.76	36	0.42	1	0.01	89	0.27	9,189	9.77	17,844	6.02
South Korea	0	0.00	-5	-0.05	69	0.88	35	0.11	582	0.62	2,009	0.68
ASEAN	29	0.62	607	7.08	469	6.03	2,990	9.20	4,269	4.54	31,029	10.46
Singapore	12	0.26	443	5.16	458	5.88	2,586	7.96	4,137	4.40	29,096	9.81
Others	17	0.36	164	1.92	11	0.15	404	1.24	132	0.14	1,934	0.65
EU	479	10.35	986	11.51	1,630	20.93	5,294	16.29	7,942	8.44	27,275	9.20
U.K.	152	3.28	465	5.43	639	8.20	1,650	5.08	1,809	1.92	11,167	3.77
Germany	68	1.47	70	0.81	348	4.47	878	2.70	2,214	2.35	4,937	1.66
Others	259	5.60	452	5.27	643	8.26	2,766	8.51	3,919	4.17	11,171	3.77
Other Countries	360	7.76	322	3.75	30	0.39	3,479	10.71	6,039	6.42	48,617	16.39
Total	4,633	100.00	8,567	100.00	7,785	100.00	32,493	100.00	94,055	100.00	296,555	100.00

Unit: Million Baht, Percent

Source: Bank of Thailand

Appendix 3.2: Net Flow of Foreign Direct Investment in Thailand Classified by Business

	1970-1974		1975-1979		1980-1984		1985-1989		1990-1995	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
Financial Institutions	1,675	19.5	666	8.5	1,173	3.6	5,135	0.5	20,353	6.9
Trade	1,543	18.0	1,977	25.4	5,520	17.0	14,402	15.3	53,356	18.0
Construction	861	10.0	1,032	13.3	4,604	14.2	9,936	10.6	27,653	9.3
Mining & Quarrying	1,465	17.1	462	5.9	7,288	22.4	1,995	2.1	12,090	4.1
Agriculture	25	0.3	-11	-0.1	349	1.1	1,484	1.6	1,369	0.5
Industry	2,506	29.2	2,889	37.1	10,504	32.3	46,252	49.2	102,732	34.6
Food	328	3.8	243	3.1	315	1.0	4,145	4.4	7,718	2.6
Textiles	1,163	13.6	884	11.4	853	2.6	2,938	3.1	5,971	2.0
Metal & Non-metallic	152	1.8	95	1.2	1,451	4.5	5,092	5.4	12,625	4.3
Electrical Appliances	241	2.8	907	11.7	3,179	9.8	17,208	18.3	36,596	12.3
Machinery & Transport	73	0.9	255	3.3	991	3.0	1,911	2.0	11,298	3.8
Chemicals & Paper	282	3.3	366	4.7	1,101	3.4	5,720	6.1	18,033	6.1
Petroleum Products	118	1.4	98	1.3	2,054	6.3	-427	-0.5	-2,895	-1.0
Construction Materials	51	0.6	-118	-1.5	48	0.1	162	0.2	1,399	0.5
Other Industry	98	1.1	160	2.1	514	1.6	9,503	10.1	11,985	4.0
Services	322	3.8	701	9.0	2,203	6.8	4,655	4.9	9,888	3.3
Investment	0	0.0	0	0.0	0	0.0	0	0.0	1,500	0.5
Real Estate	171	2.0	68	0.9	852	2.6	9,623	10.2	72,128	24.3
Others	0	0.0	0	0.0	0	0.0	573	0.6	-4,511	-1.5
Total	8,567	100.0	7,785	100.0	32,493	100.0	94,055	100.0	296,555	100.0

Unit: Million Baht, Percent

Source: Bank of Thailand

Appendix 3.3: Net Flow of Foreign Direct Investment from Japan Classified by Business

	1971-1974		1975-1979		1980-1984		1985-1989		1990-1995	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
Financial Institutions	261	12.68	266	10.30	238	2.84	1,759	4.27	722	0.95
Trade	569	27.60	440	17.04	2,020	24.14	4,208	10.21	9,771	12.83
Construction	113	5.50	339	13.12	3,053	36.49	6,556	15.91	8,870	11.65
Mining & Quarrying	13	0.62	6	0.23	9	0.10	8	0.02	200	0.26
Agriculture	20	0.97	-18	-0.69	84	1.00	717	1.74	520	0.68
Industry	1,027	49.79	1,303	50.42	2,814	33.63	23,199	56.28	52,369	68.77
Food	228	11.05	110	4.26	-314	-3.76	913	2.21	2,610	3.43
Textiles	471	22.85	750	29.04	633	7.56	437	1.06	1,934	2.54
Metal & Non-metallic	41	2.01	28	1.07	1,082	12.93	3,633	8.81	7,513	9.87
Electrical Appliances	92	4.45	77	2.96	791	9.46	11,948	28.99	22,404	29.42
Machinery & Transport	29	1.41	105	4.07	353	4.21	1,797	4.36	7,244	9.51
Chemicals & Paper	145	7.05	174	6.74	230	2.74	1,829	4.44	4,782	6.28
Petroleum Products	0.3	0.01	15	0.56	3	0.03	-10	-0.02	2,484	1.95
Construction Materials	13	0.62	0.4	0.02	8	0.10	25	0.06	42	0.06
Other Industry	7	0.33	45	1.73	29	0.35	2,627	6.37	4,356	5.72
Services	59	2.85	246	9.52	150	1.80	4,773	11.58	3,700	4.86
Total	2,062	100.00	2,584	100.00	8,367	100.00	41,221	100.00	76,152	100.00

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Appendix 3.4: Net Flow of Foreign Direct Investment into Electric Appliances in Thailand Classified by Country

	1980		1981		1982		1983		1984		1985		1986	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
U.S.	202.5	45.2	533.2	85.4	519.3	77.9	259	65.6	309.7	29.6	173.1	61.8	28.7	4.7
Japan	28.6	6.4	58.9	9.4	88.3	26.8	27.2	6.9	588.8	56.3	117.3	41.9	319.7	51.8
Hong Kong	204	45.5	27.5	4.4	0	0	47.2	12	45.7	4.4	7.2	2.6	1	0.2
Taiwan	0	0	2.7	0.4	0	0	0.1	0	0	0	0	0	2.1	0.3
Korea	3.7	0.8	0.1	0	0	0	5.7	1.4	0	0	4.7	1.7	0	0
Malaysia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singapore	0	0	0.7	0.1	0	0	0.4	0.1	3.5	0.3	17	6.1	258.4	41.9
Total	448.2	100	624.4	100	666.7	100	394.8	100	1045.3	100	280	100	617	100

	1987		1988		1989		1990		1991		1992	
	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share	Amount	Share
U.S.	114.2	10	314.5	5	1213.7	13.7	686.4	6.4	695.9	7.8	2377.2	40.2
Japan	826.7	72.7	4697.1	74.4	6000.4	67.7	6966.6	64.3	6318.1	70.7	2312.2	39.1
Hong Kong	1.7	0.1	400.5	6.3	378.4	4.3	560	5.2	719.9	8.1	177.8	3
Taiwan	64.3	5.7	151.4	2.4	649.3	7.3	599	5.5	375.4	4.2	260.6	4.4
Korea	1	0.1	86	1.4	19.5	0.2	138.2	1.3	66.4	0.7	44.4	0.8
Malaysia	0	0	0	0	0	0	393.8	3.6	0.4	0	0	0
Singapore	116.6	10.3	612.4	9.7	476	5.4	776.7	7.2	536.9	6	582.9	9.9
Total	1136.5	100	6317.5	100	8857.2	100	10827.7	100	8932.7	100	5906.9	100

Unit: Million Baht, Percent

Source: Bank of Thailand

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