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A STUDY OF THE IMPLEMENTATION OF ISO 14001
ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)
STANDARD IN HONG KONG AND THE ASIA PACIFIC
REGION

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ABSTRACT

This study aims at investigating the current implementation trends and difficulties of the ISO 14001 Environmental Management System (EMS) encountered by local business firms. This study reviews the development history, current implementation trend and difficulties of the ISO 14001 EMS in certified companies and small and medium enterprises (SMEs) in Hong Kong. In addition, the current implementation progress in other Asian countries are also discussed and compared with the situation in Hong Kong.

The surveys show that the level of environmental awareness in Hong Kong is generally low, especially in SMEs. Over half of the SMEs surveyed were not aware of ISO 14001 EMS, and most of them do not intend to implement the EMS standard in the near future. SMEs in this study typically encountered three major barriers to ISO 14001 implementation: (1) low environmental awareness within the organisation, including top management; (2) lack of resources, qualified and experienced environmental management personnel and (3) high implementation costs.

The majority of certified companies are large corporations with a quality management system (e.g. ISO 9000) already in place. The major industrial sector for ISO 14000 EMS certification in Hong Kong is manufacturing, with the construction industry becoming more active in doing so. The main certification driving forces are to increase market share, show goodwill and act as a promotional tool. Hong Kong has found to be lagging behind in the ISO 14000 race (in terms of certifications) when compared with other Asian countries, like Japan and Korea. EMS training, employees / public communication and compliance with regulatory requirements are perceived as the main areas for further improvement. Recommendations are made to enhance the adoption of ISO 14001 EMS standard in local organisations, particularly SMEs.

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ABSTRACT

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Chapter 1 Introduction

1.1 Background Information

Rapid resource-intensive industrial development has become the major threat to global environment, human health and welfare. In the last quarter of the 20th century, a number of large-scale industrial disasters, such as the chemical disaster in Bhopal, India, the radiation release in Chernobyl, USSR, the oil spill by the Exxon Valdez off the coast of Alaska and warehouse fire of a chemical manufacturer at Basel, Switzerland (WCED, 1987; Shrivastava, 1997; Ritchie and Hayes, 1998) have raised global concerns about environmental problems of industrial operations. Numerous laws have subsequently been set up in many countries to control and prevent the degradation of the environment. For instance, key legislation established in the United States included the Clean Air Act (1970), the Clean Water Act (1972), the Resource Conservation and Recovery Act (1976), the Toxic Substance Control Act (1978), the Comprehensive Environmental Response, Compensation and Liability Act (1980), and the Emergency Planning and Community Right to Know Act (1986) (Tibor and Feldman, 1996). In addition, motivated international communities began to consider new ways to minimise environmental impacts and prevent pollution.

Traditionally, environmental regulations tended to push environmental protection towards end-of-pipe solutions rather than cleaner production. However, this approach did not solve the fundamentals of many environmental problems and such approach was often expensive to implement. As pollution is an inevitable part of production,

companies should find ways to minimise the amount of waste generated rather than just to follow the regulations on the treatment and disposal. A shift in focus from end-of-pipe solutions to pollution abatement has been seen in the last 15 years. In response to environmental regulation, public pressure, and increasing demand of stakeholders, many companies have started to take a more proactive approach to improve their environmental performance, such as the application of cleaner technologies and the alteration of production processes and practices.

With an increasing level of globalisation and international trade, environmental issues can pass from one country to another through supplier network. Cost pressures, customer awareness, supply chain relations and the activities of environmentalists also force industry to consider their environmental problems. Many companies have begun to view environmental performance as an area of potential competitive advantage (Fischer and Schot, 1993; KPMG, 1997; KPMG Denmark, 1997; Porter, 1991). However, environmental standards can vary from country to country and therefore a universal environmental management system is needed – one that can cope with increasingly stringent environmental regulations without compromising economic performance of organisations.

The Stockholm Conference on the Human Environment (Clements, 1996) which was held in 1972, signalled the world's recognition of environmental protection, that - all countries had to face environmental problems caused by uncontrolled industrial development. In 1992, the Rio Conference introduced the concept of sustainable development, a notion coined by the 1987 Brundtland Commission report, *Our Common Future* (Tibor and Feldman, 1997). Sustainable development has been

identified as an approach to utilise the earth and its resources in a manner that does not compromise the ability of future generations to meet their needs. The Agenda 21 was developed during the conference as the framework for action plans for the 1990s and 21st to halt and reverse the effects of environmental degradation, as well as to promote environmentally sound and sustainable development in all countries (United Nation, 1992). The main themes of the Agenda 21 included (1) the need to integrate EMS (both planning and operational, across traditional sectional boundaries); (2) the need to involve communities in environmental decision-making and (3) the need to develop appropriate EMS for different sectors and purposes within a strategic framework.

In 1992, the British Standards Institute (BSI) published BS 7750, the first national standard of environmental management systems. The BS 7750 serves as an organisation model on management system to address all environmental problems. Regional EMS legislations were then developed in Europe. For instance, the Eco Management and Audit Scheme (EMAS) was adopted by the European Union (EU) in 1993. EMAS is a regulation that enabled industries to voluntarily implement formal environmental management system to improve their environmental performance. Since the publication of BS 7750, there was a proliferation of national EMS standards in various countries. However, these EMS standards neither share common requirements nor address all the environmental issues.

In order to facilitate international trade, a single international EMS standard that would be widely accepted around the world became necessary. Consequently, the International Organisation for Standardisation (ISO) established a Technical

Committee, TC 207, to develop ISO 14000 series standards in the area of environmental management system. The ISO 14000 series comprised environmental management system, environmental auditing, environmental labelling, environmental performance evaluation and life cycle assessment. In September 1996, ISO 14001, ISO 14004 (an EMS guidance document) and three environmental auditing guidelines (ISO 14010, ISO 14011 and ISO 14012) were finalised and published (Ritchie, 1998). Later, in September 1997, ISO 14040 (principles and framework of Life Cycle Assessment guidelines) was published. The ISO 14020 (Environmental Labelling guidelines) and ISO 14041 (Life Cycle Assessment guidelines) were published in 1998 as the formal ISO standard (Hong Kong Productivity Council, 1999).

The ISO 14001 Standard (Environmental management systems - specification with guidance for use) is the only normative standard in the ISO 14000 EMS series. It is an environmental management system (EMS) that can assist senior management to define the organisation's environmental mission and determine ways to accomplish those goals. This standard describes the basic requirements of an environmental management system. The other ISO 14000 standards in the series are informative and intended to support the implementation of the EMS. A well-executed EMS enables an organisation to formulate policies and objectives with considerations on increasingly stringent environmental legislations through continuous improvement. Furthermore, it encourages the organisation to take responsibilities of its environmental impacts. The standard itself does not include any specific environmental performance criteria.

According to the Scope section of ISO 14001, the standard is applicable to any organisation that wishes to,

- a. implement, maintain and improve an environmental management system;
- b. assure itself of its conformance with its stated environmental policy;
- c. demonstrate such conformance to others;
- d. seek certification/registration of its environmental management system by an external organisation; or
- e. make a self-determination and self-declaration of conformance with this international standard.

1.2 The Need of ISO 14001 for Hong Kong

Hong Kong is an international city that has trading relationships with many countries around the world. It has sustained a steady economic growth with Gross Domestic Product (GDP) per capita ranking the second highest in Asia (Census and Statistics Department, 2000) (Figure 1.1). The manufacturing industry accounts for 6.2% of Hong Kong's GDP in 1998 (Table 1.1). Other growing economic activities, such as wholesale, import and export trade generated about 24% of Hong Kong's GDP in 1998 (Industry Department, 2000).

In Hong Kong, manufacturing enterprises with fewer than 100 employees and non-manufacturing enterprises with fewer than 50 employees are regarded as small and medium enterprises (SMEs) (Industry Department, 2000). There were more than 290,000 SMEs in Hong Kong, which accounted for over 98% of the total

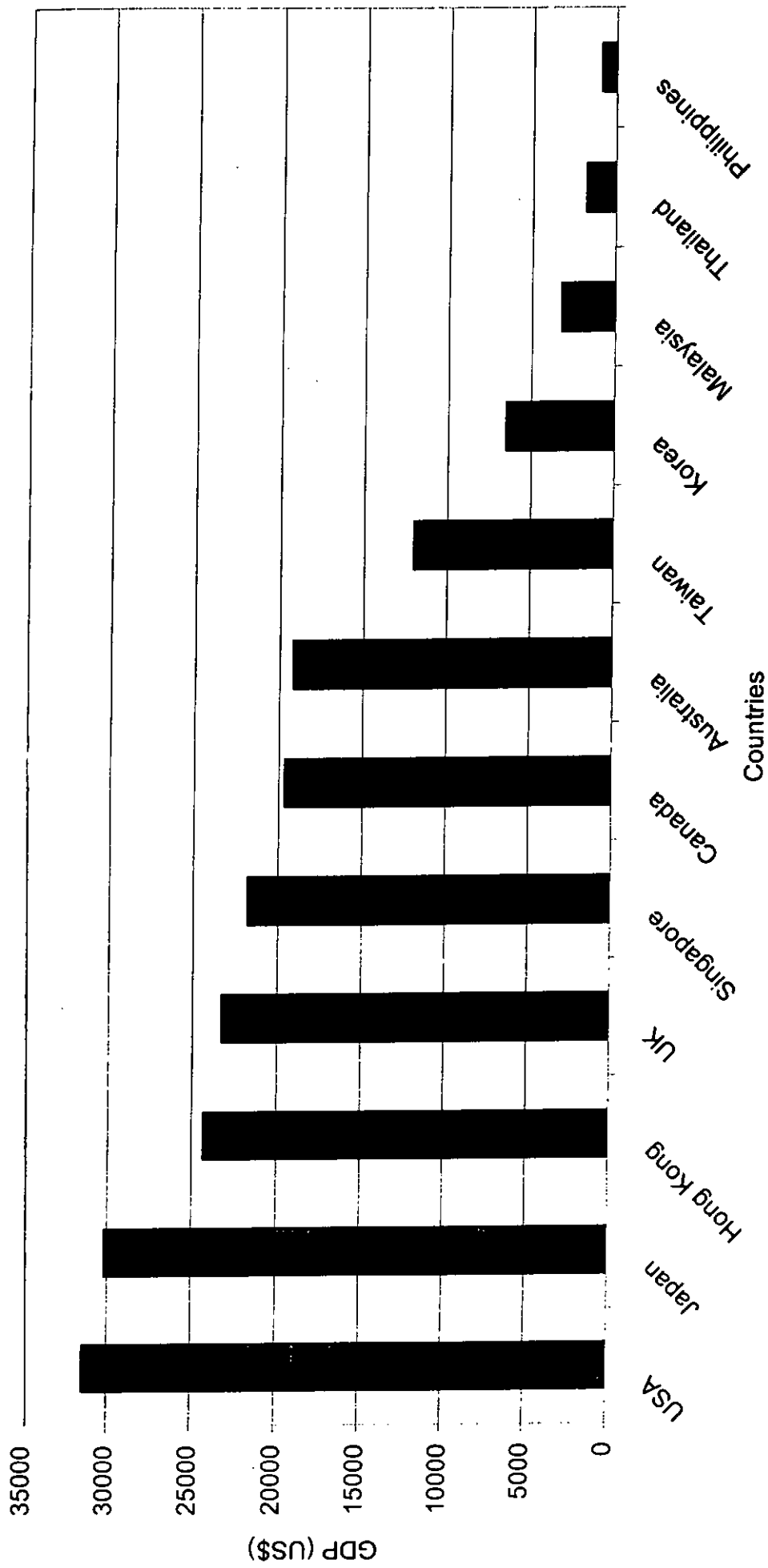


Figure 1.1 A Comparison of Per Capita GDP of Selected Economies in 1998

* According to the World Competitiveness Yearbook (Industry Department), these are provisional data or

Table 1.1 Production-based GDP by economic activity

Economic activity	1997	1998
	% of GDP	
Agriculture and fishing	0.1	0.1
Mining and quarrying	0.0	0.0
Manufacturing	6.5	6.2
Electricity, gas and water	2.4	2.8
Construction	5.8	6.1
Wholesale, retail and import/export trades, restaurants and hotel	25.4	24.0
Transport, storage and communications	9.2	9.3
Financing, insurance, real estate and business services	26.2	25.6
Community, social and personal services	17.9	19.9
Ownership of premises	13.9	14.5
Total GDP	100.0	100.0
Production-based GDP (HK\$ Bn) (at current factor cost)	1,233.0	1,182.4

*0.0' denotes less than 0.05%

establishments and provided job opportunities to over 1,367,000 people, about 60% of the workforce as in December 1999. The majorities of SMEs are engaged in the import and export sector, followed by the wholesale, retail, restaurants and hotels sectors. These two sectors constitute over 60% of SMEs in Hong Kong, employing more than half of all SMEs workforce (Figure 1.2). These SMEs therefore play an important role in the economic development of Hong Kong.

Recently, the level of public environmental awareness has increased and various environmental measures have been carried out in countries such as Germany, Switzerland, United Kingdom and the United States. Local companies in Hong Kong that have trading relationships with developed countries (e.g. North America, European Community) are required to meeting stringent environmental standards. The implementation of ISO 14001 EMS is expected to enable companies to gain a competitive edge in the market. As ISO 14001 EMS standard is relatively new to local organisations, companies may face difficulties when implementing the standard. In order to assess the benefits and difficulties experienced by local companies, and to evaluate the effectiveness of EMS in Hong Kong, a study of the implementation of ISO 14001 EMS standard in Hong Kong and the Asia Pacific region has been proposed. In particular, the ISO 14001 awareness and its acceptance in the local SMEs are evaluated. The implication of ISO 14001 EMS adoption in SMEs and its impacts to the local business market are also explored.

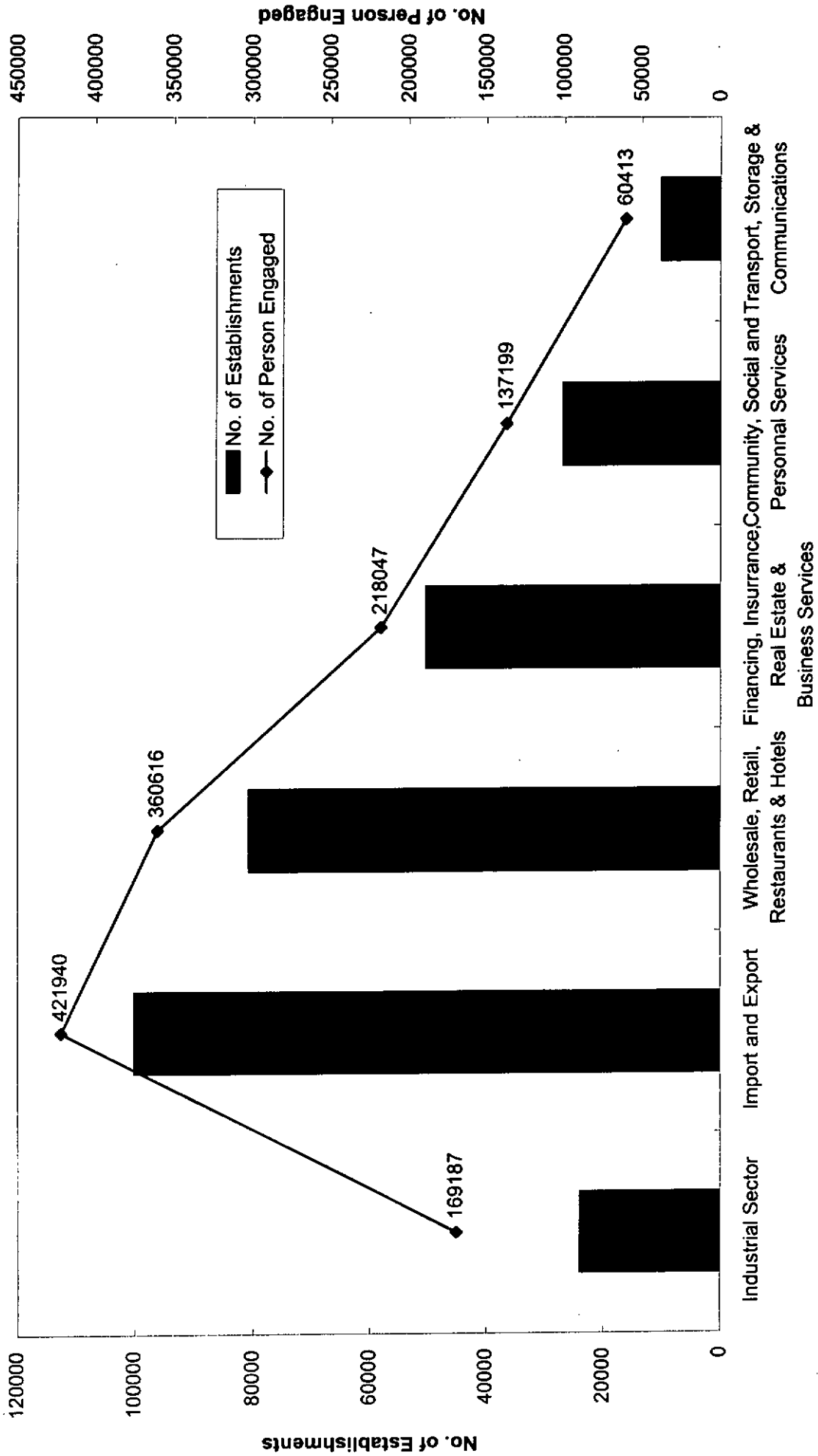


Figure 1.2 Distribution of SMEs among Business Sector (as at Dec.1999)

1.3 Objectives of the Study

The overall objective of this study is to evaluate the progress of ISO 14001 implementation and its acceptance in local companies in Hong Kong and more specifically as follows:

- To study the core elements of ISO 14001 EMS standard and its requirements;
- To examine the potential benefits and difficulties encountered by local companies during ISO 14001 EMS implementation;
- To evaluate the implications of the ISO 14001 standard in local SMEs;
- To carry out gap analysis and identify the deficiencies of existing companies' EMS in meeting ISO 14001 requirements;
- To compare differences in management practices between certified companies and the SMEs;
- To compare the situation in implementing ISO 14001 in Hong Kong with that in other countries in the Asia Pacific region; and
- To suggest special ISO 14001 EMS implementation strategies for industries in Hong Kong.

1.4 Outline of the Thesis

	Major Contents
Chapter 1	<ul style="list-style-type: none">● Background and objectives of this study● Structural outline of this report.
Chapter 2	<ul style="list-style-type: none">● Literature review on the development of ISO 14000 series, the recent development of companies in Hong Kong and Asia Pacific Region.● General trend in the implementation of ISO 14001 EMS and the common difficulties encountered by local industries.
Chapter 3	<ul style="list-style-type: none">● Methodology of the present study including literature review, questionnaire surveys, case study, evaluation the existing environmental management system and analysis of findings.
Chapter 4	<ul style="list-style-type: none">● Results of questionnaire surveys, acceptance of the ISO 14001 standard and implementation experience of the local certified companies.
Chapter 5	<ul style="list-style-type: none">● Adoption of ISO 14001 EMS in the SMEs.● Results of case studies on the local SMEs● Gap analysis of companies surveyed
Chapter 6	<ul style="list-style-type: none">● Outlines the differences in ISO 14001 EMS implementation and environmental measures among Hong Kong and other Asian countries.
Chapter 7	<ul style="list-style-type: none">● Concludes the study and provides recommendations regarding the on-going ISO 14001 implementation strategies in Hong Kong.

Chapter 2 Literature Review

2.1 Background Information of Environmental Management

2.1.1 Origins of Environmental Management

Environmental pollution and problems on the local, national and global level have led to an increasing awareness of environmental protection in the world. Much of the environmental damage and habitat destruction was caused by the unsustainable patterns of exploitation, production and consumption. Legislation related to the environment was consequently set up among countries in the 1970s & 1980s (Tibor and Feldman, 1996) to combat the situation. Environmental degradation, for instance, the global warming depletion of the Earth's ozone layer and degradation of agricultural land, is a side effect of industrial wealth, and a threat to human's survival.

Liability for environmental damage has become an important issue for many companies (Cairncross, 1991; Welford and Gouldson, 1993). Any loss of materials, energy or resources simply represents the inefficiency in manufacturing. Pollution are generated from process inefficiency represents the target for improvement on an organisation's performance (Mannion, 1996). Companies initially focused on cleaning up the environmental damage caused by production by using "end-of-pipe" solutions. Later on, as companies found that pollution was an inevitable part of production, therefore they started to find ways to minimise the amount of waste generated during manufacturing processes (Clements, 1996).

As the complex environmental issues lie across functions and organisational departments (Greeno & Robinson, 1992), there is a need for a co-ordinated approach to deal with these environmental issues.

2.1.2 Sustainable Development

The United Nations (UN) has pursued environmental issues throughout the world. The Stockholm Conference on the Human Environment (Clements, 1996) in 1972 signalled the world's awareness of the need for environmental protection. All countries had to face the environmental problems caused by uncontrolled industrial development. An independent commission, the World Commission on Environment and Development (WED), was established in 1983 to follow up the task of re-assessing the progress of environmental development agreed in the Stockholm Conference. A progress report called "*Our Common Future*" was published in 1987. In the 1992 United Nations Conference on Environment and Development (UNCED) held in Brazil (Cascio, 1996), major world leaders signed a series of declarations on environmental development. The concept of "sustainable development" recognised by "*Our Common Future*" was proposed and endorsed by every participating countries. This has become the foundation of the various environmental policies of governments and corporations subsequently.

Sustainability has emerged as a new core concept in business. Miller (1996) defined that sustainability as when a "society manages its economy and population size without exceeding all or part of the planet's ability to absorb environmental insults"

replenish its resources, and sustain life over a specified period". Multinational companies such as Monsanto have recently adopted environmental sustainability as a core value driver for long-term corporate performance (Magretta, 1997). More and more pressure has been put on companies to achieve a better environmental performance. Traditionally, business success and environmental protection have been viewed as contradictory. However, the paradigm has changed in such a way that free trade and environmental protection can coexist in pursuit of sustainable development (Tibor and Feldman, 1996).

2.2 Early Environmental Management System – BS 7750 & EMAS

In 1992, the BS 7750 EMS was launched as the first EMS standard in the world (Rothery, 1993). Interest in the development of such standard was evident from the range of organisations represented on the Technical Committee EPC/50, and the feedback incorporated in the various draft stages (Street and Barker, 1995). The BS 7750 has come to effect in less than a year after the Technical Committee first met (Grayson, 1992). The BS 7750 was described as a standard which can provide a model management system for all types of organisations taking a systematic and integrated approach on environmental management, with the final aim of improving their environmental performance (Rothery, 1993).

At that time, demands for a demonstration of environmental consideration from manufacturers increased significantly. Other industries such as transportation, power and mass retail outlets were also under pressure. The UK government has encouraged

all organisations to adopt positive environmental management and increase their environmental reporting (Street and Barker, 1995).

In 1993, another environmental management system standard was published by the European Union (EU), called “Eco-Management and Audit Scheme” (EMAS). The EMAS was a voluntary EU regulation, which enables interested parties to implement formal environmental management system and evaluate their programmes, and work toward continuous improvement in environmental performance.

Afterwards, there was a proliferation of national EMS standards in various countries. Without a common international standard, companies are forced to deal with dozens of potentially incompatible systems from each country they conduct business in, which in turn, increases the cost and trade barriers (Tibor and Feldman, 1996).

2.3 Background and Development of ISO 14000

In 1991, the International Organisation for Standardisation (ISO) created the Strategic Advisory Group on the Environment (SAGE) - to assess the need for standardisation in environmental management (Tibor and Feldman, 1997). The standard should ensure a common approach to management that enhance both business and environmental performance, as well as facilitate trade. In 1993, the ISO established a new Technical Committee, TC 207, to develop ISO 14000 series standards in environmental management. TC 207 was comprised of six subcommittees and numerous working groups, resulting in over 20 active projects.

ISO members can join any TCs that they are interested in. Forty-three countries have played an active role in the development of ISO 14000. The US is represented by the American National Standards Institute and created U.S. Technical Advisory Group (U.S. TAG) to TC 207. The U.S. TAG comprised of approximately 500 members representing industry, government, environmental groups and other interested stakeholders. The U.S. TAG is actively involved in all phases of the ISO 14001 development. The final standard reflected most of the U.S. TAG positions (Cascio, 1996). Other countries like UK, Canada, Germany and Netherlands are also involved in the development.

2.3.1 ISO 14001 EMS Standard

According to the ISO 14001 standard, an environmental management system is defined as a management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving and reviewing, and maintaining the environmental policy.

The ISO 14001 also specifies the requirements for an environmental management system (EMS) against which an organisation may be certified by a third party. The system is a new approach to manage the environmental aspect of a company's operations that depend less on regulations from a governmental entity and more on voluntary, proactive efforts within the organisation.

2.3.2 The Significance of ISO 14001

ISO 14001 is of great importance to senior management to provide leadership in defining the organisation's environmental policy. An environmental policy is important for an EMS because ISO 14001 standard does not establish specific environmental performance objectives and targets for the organisation. Instead, the requirements of ISO 14001 are flexible enough to require the organisation to:

- ❖ “consider” environmental impact when setting objectives and targets
- ❖ commit to “continuous improvement” of environmental performance and pollution prevention
- ❖ comply with applicable legislative and regulatory requirements in the jurisdiction where the facility is located

This flexibility allows organisations and countries to set environmental performance objectives and targets suitable to their needs. Also, it avoids the trade implications of dictating specific environmental performance requirements across national boundaries in an extraterritorial fashion. As ISO 14001 is to be implemented worldwide, registration to the standard will satisfy requirements for environmental protection in trade discussions and agreements (Cascio, 1996). The ISO 14000 standards therefore become an important business tool that cannot be overlooked (Cochran, 1999; Fielding, 1999; Figura, 1996; Sissell, 1996; Zimoch, 1999).

2.3.3 Why are Businesses Interested?

ISO 14001 is an internationally recognised standard for environmental management systems. Conformance to the standard can help companies remain competitive in the marketplace. For many companies, both their competitors are seeking registration while their customers are beginning to demand conformance to ISO14001 guidelines (as with the ISO9001 standard, the continuous improvement requirements of the standards lead to registered companies eventually needing to require that their suppliers also comply with the ISO14001 standards). By establishing and maintaining an environmental management system that meets ISO 14001 standard, companies will develop effective environmental management program. This system helps the organisations address legal, commercial, and other challenges related to the environment (International Institute for Sustainable Development, 1996). The consensus appears that dominant multinational corporations will tend to adopt or move toward adopting ISO 14001 EMS standard (Miles et al, 1997; Miles and Russell, 1997), while relatively small enterprises will wait for customer demand (Litsikas, 1997).

ISO 14001 EMS standard provides an excellent framework for establishing environmental management system. Companies can certainly gain benefits both internally and externally by implementing the standard.

2.3.4 Internal Benefits

These include:

- 1 *Reduce incident and liability:* A systematic approach to managing environmental issues can help to ensure that environmental incident and liability is reduced.

- 2 *Efficiency*: A systematic approach can help to identify opportunities to conserve material and energy inputs, to reduce wastes and to improve process efficiency.

- 3 *Performance*: A systematic approach to management leads indirectly to improve environmental performance and improve cost control.

- 4 *Improved corporate culture*: Top management commitment to improve environmental management, clearly defined goals, responsibilities and accountabilities, will create a greater awareness and understanding of the environmental issues and enhance the corporate culture.

2.3.5 External Benefits

These include:

1. *Third party assurance and recognition*: Companies reduce the need to inspect each supplier's products and services with its own auditors. The ISO 14001 EMS provides the widest possible recognition of this assurance.

2. *Market access*: ISO 14001 EMS become a pre-requisite for businesses. Companies have turned to international standards as a way of meeting certain expectations

3. *Regulatory relief:* Regulators may begin to recognise ISO 14000 and offer some regulatory relief, such as fewer inspections and streamlined reporting requirements, to those who implement EMS
4. *Public image and community relations:* The EMS will help an organisation to communicate with its stakeholders
5. *Financial markets:* The internationally recognised ISO 14001 EMS will probably improve investor confidence and access to capital, and potentially provide access to preferential insurance rates.

2.4 Trend of Environmental Management System

The overall response around the world to the ISO 14000 series of standards appears to be generally positive. Many countries have actually drafted plans to implement this standard. The following sections summarise some countries' reaction to the standard.

2.4.1 Europe

In Europe, more than four thousands companies have been certified to ISO 14001 standard, with the majority of these companies in Germany, Sweden, UK and the Netherlands (Peglau, 2000). For examples, about 1400 companies in UK have been certified as of November 2000 (Peglau, 2000). The key driving force for the certification in the UK is the pressure from supply chains. Large companies like BP

Chemicals and A.H. Marks have been certified for ISO 14001 (Hart, 1998; Scott, 1997; Powers, 1995). These companies are starting to require their suppliers and subcontractors to do the same. Some local authorities are asking their supply chains to certify to either ISO 14001 or EMAS.

The public awareness and pressure is another driving force in UK. The majority of the public believes that businesses should be environmentally responsible. In a recent study, 92% of people surveyed expressed that the companies with a greater potential to pollute should be more environmentally responsible (Petts et al, 1998). The results reflect their personal attitudes and belief in a social responsibility.

Since many companies in Europe had adopted the regulation and were certified under EMAS prior to ISO 14001, Europe's standardisation body, Comite' Europe'e de Normalisation (CEN) therefore considered whether ISO 14000 standards could be accepted as a part of EMAS (Cascio, 1996). The CEN developed a bridge document that recognises ISO 14001 plus some additional requirements to ensure that all elements of EMAS were addressed (Cascio, 1996; Tibor and Feldman, 1997; Chemical Week, 1999).

2.4.2 United States

In the US, there are 1130 companies were certified to ISO 14001 as of November 2000 (Peglau, 2000). The type of certified bodies include electronics (54%), chemical (15%), utilities power (8%), automotives (5%), consumer/home products (3%),

environmental (3%) industries and others (12%) (Capaccio Environmental Engineering Inc., 2000).

In the past few years, the US government continually tested the applicability and usefulness of ISO 14000 standard series (Tibor and Feldman, 1997; Greenwire, 1998). The United States Environmental Protection Agency (EPA) announced its plan to assist up to nine local government entities to design and implement environmental management systems (Federal Register, 1999). Training and other technical assistance would be provided through a consulting organisation funded by EPA instead of direct financial assistance to the participated local governments. The EPA believes EMS can help all types of organisations improve their overall environmental performance, prevent pollution, and improve regulatory compliance (Environment Business, 1999).

Recently, with the increasing public pressure on business firms to improve environmental performance, large companies, like IBM, Ford and General Motor have been certified to ISO 14001, and are starting to require their suppliers to implement and certify to the standard (Doug, 1999; Wilson, 1999). This move is generally viewed as a significant push for the growth and acceptance of ISO 14001 throughout the United States.

2.4.3 Japan

Japan is one of the leaders in ISO 14001 EMS adoption, with 4636 certifications up to November 2000 (Peglau, 2000). Local authorities in Japan seemed to have more

direct power, greater financial and technical resources, and more extensive environmental monitoring and information systems than other countries (Barrett, 1995). This can allow them to develop and implement policies in a relatively effective manner. The Japanese Ministry of Trade and Industry (MITI) is very proactive in incorporating ISO 14000 as part of the national industrial standards and established a scheme of assessment and registration (Kurasaka, 1997; Tibor and Feldman, 1997; Voien, 1998). Recently, local governments throughout Japan have been very active in the certification to ISO14001. Besides government departments, organisations in various fields such as retailers, hospitals, services have been working towards becoming certified to ISO 14001 in order to improve their overall management systems and environmental performance (Global Environment and Technology Foundation, 1998; Mohammed, 2000).

2.4.4 Taiwan and Korea

Taiwan is also keen in implementing EMS standard, with more than 700 organisations certified to ISO 14001 as of November 2000 (Peglau, 2000). Both government and business leaders in Taiwan view the ISO standard as a useful tool to improve the environmental performance of manufacturing and service sectors and simultaneously maintain competitiveness in international markets (Industrial Development Bureau, 1999). The interest in adopting ISO 14001 EMS standard is very high because of the export-driven nature of the Taiwan industry (Mapes, 1996; Industrial Development Bureau, 1999).

In Korea, in order to promote protection and energy conservation, Korea Energy Management Corporation (KEMCO) has trained specialists for ISO 14000 certification and life cycle assessment since 1996 (Utility Environmental Report, 1996). The leading Korean companies were required to achieve ISO 14001 EMS implementation by the Korea government (Davy, 1996). Several EMS programmes like environmental assessment and improvement plan, and demonstration of actual improvement have provided to the interested companies by the South Korea's Ministry of Environment (Naomi, 1997). More than 460 companies have certified to ISO 14001 EMS as of November 2000 (Peglau, 2000).

2.4.5 Singapore

In Singapore, about 212 organisations have achieved ISO 14001 certification as of November 2000 (Ministry of the Environment, 2000). In order to assist companies in implementing ISO 14001 EMS, Singapore has launched a number of schemes to local companies, especially the SMEs (Strategic Planning & Research Department, 1999). Through the Local Enterprise Technical Assistance Scheme (LETAS), a financial grant of 70% of cost up to a maximum of \$40000 for an ISO 14000 consultancy to set up an EMS is provided by the government. In addition, 3 to 4 SMEs from similar industries would be guided together in the implementation programme to save cost (Quazi, 1999).

2.4.6 China

As of November 2000, about 464 enterprises received ISO 14001 certification in China (Peglau, 2000). The certified companies were mainly joint-venture companies and Japanese electronics organisations, most of which are ISO 9001-certified with high awareness of quality assurance and environmental protection. About 70% of certified companies were electronics, home appliances, mechanical and office equipment firms. Only two percent of the certified organisations are classified as small or medium sized (Hale, 1999).

In 1997, the Chinese National Environmental Protection Agency (NEPA) and the State Standards Board established the China Center for Environmental Management Systems (CCEMS) to implement ISO 14000 in China. CCEMS is responsible for both registration and a variety of training services associated with ISO 14000, such as lead-auditor training. NEPA also has launched a pilot certification project in 14 cities, including Beijing, Tianjin, and Suzhou (Lam, 1998). In mid 1998, the Chinese government announced its intention to publish a regular column on EMS and ISO 14000 in the country's leading environmental publication. Hale (1999) mentioned that more and more enterprises are realising the importance of EMS and integrating the system into their short term and long-term strategy plans.

2.5 Development of ISO 14001 EMS in Hong Kong

2.5.1 Environmental Concern in Public

The Hong Kong public is generally aware of the importance of environmental protection. However, there is still a gap between environmental awareness and the actual behaviour in supporting environmental strategies. Recent survey carried out by the Hong Kong Democratic Party among 531 citizens, revealed that 90% of them thought that the government should support the development of environmental industry. At the same time, 37.1% of respondents were unwilling to buy environmental friendly product if it cost more (Hong Kong Daily News, 2000). Other surveys also indicated that 60% of Hong Kong students claimed that they have low environmental awareness and seldom participate in environmental measures (Sing Tao, 2000).

These environmental responses from the public are consistent with the previous survey results carried out in 39 countries, which listed Hong Kong as bottom, in terms of the degree of support for environmental protection, with 56% of people unwilling to pay more taxes to help prevent pollution (Lee, 1996). At the same time, the majorities of people regarded the environmental problems in Hong Kong as urgent or very urgent and that the quality of life had been seriously affected. It indicated that even though people were concerned about environmental problems, they were still generally unwilling to change behaviour or pay more money to solve the problems.

2.5.2 Government Response

The Hong Kong Government encourages all sectors of the community to implement environmental management measures. In 1995, the Government launched the Green Manager Scheme, which required every government department to appoint a Green

Manager to take the lead in managing the environmental performance of its own organisations (Environmental Protection Department, 1997). The scheme was further extended to cover the implementation of environmental audit and environmental management systems. In order to follow this direction, a project was begun in early 1997 to provide a series of environmental audit training courses for government officers (Environmental Protection Department, 1997). This was to assist government departments in preparing for the adoption of ISO 14000 and in exerting a positive influence over the local business and industry sectors.

In addition, starting from year 2000, each government department will have to produce a public environmental report, to be signed off by the department head or policy secretary. In this report, they have to explain how their programmes and policies affect the environment and what they will do about it. One reason for the publication of these environmental reports within the government departments is to inspire the private sector follow suit. At the moment, the publication of environmental reports in private companies is not common in Hong Kong. Only a few companies, such as Cathay Pacific, China Light and Power, and electronics manufacturers Elek and Eltek have their own environmental reports. Circular and guidance for the government bureaux and departments on the framework of their environmental reports have been issued and are also available on the website of the Environmental & Food Bureau and Environmental Protection Department.

Environmental reporting becomes an international trend. The report can act as a useful marketing tool in competing for both local and international businesses and it is also a good mechanism for the companies to inform and raise awareness of the

stakeholders (e.g. bankers, publics, environmental groups and customers). The companies can explain to the publics how they are managing associated environmental impacts and how is their performance. Within the company, the staff will be therefore motivated to take further environmental actions. The publication of environmental report helps companies to familiarise with the environmental management practices and therefore enhance the future adoption of ISO 14001 EMS standard. The Environmental Protection Department started to require operators for new waste facilities to be ISO 14000-certified from 1998 (Lee, 1999).

2.5.3 ISO 14000 EMS Pilot Programme

In response to the urgent demand on the implementation of ISO 14000, the Hong Kong Productivity Council (HKPC) launched Asia's first ISO 14000 Environmental Management System (EMS) Pilot Programme in November 1995 (Coppell, 1997). Eleven companies participated in the programme, representing a wide range of business and industry sectors. They included the Shell Greater China, Mobil Oil HK Ltd, the Island Shangri-La Hotel, Philips HK Ltd, China Light and Power, Elec and Eltek Co Ltd, Green Valley Landfill Ltd, Yau Lee Construction, Shui Wing Steel, Sylva Industries Ltd and the Electrical and Mechanical Services of the Hong Kong Government.

This acted as a demonstration to many other companies. The programme was implemented in three phases: an introductory phase, an implementation phase and a wrap up phase. It provided the participants with an overview of the ISO 14001

requirements, the concepts of environmental management and the benefits associated with a formalised and structured system of environmental management.

2.5.4 Other Supporting Groups

Apart from HKPC, Friends of the Earth in Hong Kong (FoE) had already helped many corporations, such as Cathay Pacific, Swire Resources, Honeywell, and Elec and Eltek as well as several hotels to provide environmental awareness training for their employees (Friends of the Earth, 1996). The professional team in FoE helped companies to develop a series of environmental workshops for employee training. The registered associate environmental auditors in FoE also helped some companies to conduct environmental audit for their own office and to document all relevant information required for ISO 14001 certification.

2.5.5 ISO 14001 Trends in SMEs

As many large global corporations have already begun to implement EMS, trend has been established to require their suppliers to have ISO 14001 certification or other EMS standard. As global business transforms itself into dense networks of large and small suppliers and contractors, the leverage exercised by large multinational businesses over other firms in their supply chains is potentially powerful (Gunningham, 1995). It is believed that ISO 14000 certification will become a “condition of doing business” in the future (Begley, 1996) or otherwise it will likely

become a barrier to entry in the global market (Blau, 1995; Miles et al., 1997; Tibor and Feldman, 1996).

A majority of business firms around the world are small and medium enterprises that may have significant environmental impacts (Hillary, 1997; Johansson, 1997). Therefore, ISO 14001 adoption by the SMEs tends to enhance the relationships between SMEs and their stakeholders, including creditors, customers, employees and regulators. Crick and Chaudhry (1998) states that SMEs, i.e. firms with less than 500 employees, will likely be dramatically affected by the movement toward a formal global environmental management system, because they have been impacted by other manifestations of globalisation.

However, Kirkpatrick (1999) mentioned that less than 20% of companies that have certified to ISO 14001 in the world are SMEs. Nowadays, the number of certification in SMEs is still very low, and limited to the relatively high profile companies or sectors heavily dependent on exports. The issues whether SMEs have enough resources and time to handle the additional administration burden and the value of ISO 14001 certification in SMEs are under debated (Drobny, 1997; Kirkpatrick, 1999). Miles *et al* (1999) pointed out that the development, maintenance, and training cost for most SMEs would be substantially higher since few of organisations would have the in-house technical skills and capabilities to achieve ISO 14001 certification without substantial outside assistance.

In Hong Kong, there are ninety-one companies or departments having been certified with ISO 14001 as of December 2000 (Environmental Protection Department, 2000). A list of the certified companies is attached in Appendix I.

2.6 Requirements of the ISO 14001 EMS

Companies contemplating the implementation of ISO 14001 are well advised to assess their existing environmental management system in order to identify activities that fulfil ISO 14001 requirements and gaps that must be filled. In the following section, the principle of the standard and its requirements are reviewed.

The ISO 14001 EMS consists of 5 core principles: (1) Environmental Policy, (2) Planning, (3) Implementation and Operation, (4) Checking and Corrective Action and (5) Management Review.

The requirements contain the elements that must be established, implemented and maintained in order to conform to ISO 14001 EMS standard. Companies seeking certification will be audited against section 4 of ISO 14001 EMS Standard (Block, 1997). The summary of the requirements which is based on various literature (Tibor and Feldman, 1996; Marilyn, 1997; Puri, 1996; and ISO, 1996 is shown below.

2.6.1 Environmental Policy

According to the ISO 14001 EMS standard, top management shall define the organisation's environmental policy and ensure that it

- (a) is appropriate to the nature, scale and environmental impacts of its activities, products or services;
- (b) includes a commitment to continual improvement and prevention of pollution;
- (c) includes a commitment to comply with relevant environmental legislation and regulations and with other requirements to which the organisation subscribes;
- (d) provides the framework for setting and reviewing environmental objectives and targets;
- (e) is documented, implemented and maintained and communicated to all employee;
- (f) is available to the public

2.6.2 Planning

According to the ISO 14001 EMS standard, the organisation shall provide a process to identify significant environmental aspects that should be addressed as a priority by the organisation's environmental management system.

Environmental Aspects: The organisation shall establish and maintain procedure(s) to identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, in order to determine those who have or can have significant impacts on the environment. The organisation shall ensure that aspects related to these significant impacts are considered in setting its environmental objectives. The organisation shall keep this information up to date.

Legal and Other Requirements: The ISO 14001 Standard requires an organisation to have some way to keep track of legal and other requirements that apply to the environmental aspects of its activities, products, and services. This includes requirements specific to the activity, such as an operating permit or license, and those related to the organisation's products or services, such as specific regulations or general environmental laws.

Objectives and Targets: The companies are required to establish and maintain documented environmental objectives and targets at each relevant function and level within the organisation. When establishing and reviewing its objectives, the companies are expected to consider relevant legal and other requirements, significant environmental aspects and technological options. Also, the companies are expected to consider the financial, operational, and business requirements as well as the views of interested parties.

Objectives and targets must be consistent with your environmental policy, including your commitment to pollution prevention.

Environmental management programs: The companies shall establish and maintain programs for achieving environmental objectives and targets, including: designation of responsibility for achieving objectives and targets at each relevant function and level of the organisation and the means and time frame by which they are to be achieved.

If appropriate, amend the programs to ensure that environmental management will also apply to new developments and new or modified activities, products, and services.

2.6.3 Implementation and Operation

The successful implementation of an EMS relies on the commitment of all employees of the organisation. Environmental responsibilities therefore should not be seen as confined to the environmental function, but may also include other areas of an organisation such as operational management or staff functions other than environmental function.

Structure and responsibility: Top management need to appoint a specific management representative(s) with defined roles, responsibilities and authority irrespective of other responsibilities. The representative(s) is accountable for ensuring environmental management system requirements are established, implemented and maintained in accordance with ISO 14001.

The management representative(s) will report on the performance of the system to top management for review and as a basis for improvement of the system.

Training, awareness and competence: ISO 14001 requires the organisation to identify training needs for all personnel whose work may create a significant impact upon the environment. The organisation shall establish and maintain procedures to make employees or members at all levels be aware of:

- the importance of conformance with the environmental policy and procedures and with the requirements of the environmental management system;
- the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;
- their roles and responsibilities in achieving conformance with the environmental policy and procedures and with their requirements of the environmental management system, including emergency preparedness and response requirements;
- the potential consequences of departure from specified operating procedures

Communication: The organisation shall establish and maintain procedures for

- internal communication between the various levels and functions of the organisation;
- receiving, documenting and responding to relevant communication on its significant environmental aspects and record its decision

Environmental management system documentation: The organisation is required to establish and maintain information, in paper or electronic form, to

- describe the core elements of the management system and their interaction;
- provide direction to related documentation

Document control: The organisation shall establish and maintain procedures for controlling all documents required by ISO 14001 standard to ensure:

- they can be located;

- they are periodically reviewed, revised as necessary, and approved for adequacy by authorised personnel;
- the current versions of relevant documents are available at all locations where operations essential to the effective functioning of the system are performed;
- obsolete documents are promptly removed from all points of issue and points of use or otherwise assured against unintended use; and
- any obsolete documents retained for legal and/or archival purposes are suitably identified

Operational control: The ISO 14001 requires the organisation to identify those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives and targets. The organisation shall plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by

- establishing and maintaining documented procedures to cover situations where their absence could lead to deviations from the environmental policy and the objectives and targets;
- stipulating operating criteria in the procedures;
- establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organisation and communicating relevant procedures and requirements to suppliers and contractors

Emergency preparedness and response: The organisation shall establish and maintain procedures to identify potential for respond to accidents and emergency situations,

and for preventing and mitigating the environmental impacts that may be associated with them.

2.6.4 Checking and Corrective Action

Monitoring and measurement: The ISO 14001 requires the organisation to establish and maintain procedures and define responsibilities and authority for handling and investigating nonconforming conditions. The documented procedures required in ISO 14001 include:

- Recording information to track performance, operational controls, and conformance with objectives and targets.
- Calibrating and maintaining monitoring equipment such as instruments, test equipment, software, and hardware sampling to ensure reliability.
- Maintaining calibration and maintenance records.
- Periodically evaluating compliance with relevant environmental legislation and regulations.

Nonconformance and corrective and preventive action: The ISO 14001 requires organisation to establish and maintain procedures for

- Defining responsibility and authority for handling and investigating nonconformance
- Acting to mitigate the resulting impacts on the environment
- Initiating and completing corrective and preventive action

- Implementing and recording changes to documented procedures that result from corrective and preventive action

Records: The organisation shall maintain appropriate records to demonstrate conformance to the requirements of the ISO 1401 standard. This means to develop procedures for identifying, maintaining, and disposing of environmental records.

Environmental records must be legible, identifiable and traceable to the activity, product or service involved. Also the records are to be stored and maintained in such a way that they are readily retrievable and protected against damage, deterioration or loss. Their retention times are to be established and recorded.

Environmental management system audit: The audit program and schedule should be based on the environmental importance of the activity concerned and the results of previous audits.

In order to be comprehensive, audit procedures need to cover the audit scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.

2.6.5 Management Review

Top management expect to review the environmental management system at pre-determined intervals. The purpose of the management review is to ensure the system's continuing stability, adequacy and effectiveness. The management review

process can ensure that necessary information is collected to allow management to carry out the evaluation.

Reviews shall be documented. They are to address the need for changes to policy, objectives and elements of the EMS in the light of audit results, changing circumstances and the commitment to continual improvement.

Chapter 3 Methodology

This study aims at investigating the implementation process of environmental management system, in particular, ISO 14001 EMS standard, in local organisations. Results are based on the data collected from literature review, questionnaire surveys, and case studies on selected certified companies and SMEs. The current research will also identify environmental behaviour among the local business corporations, particularly those of the SMEs, and the general acceptance of the ISO 14001 Environmental Management System in business sector. In this study, ISO 14001 EMS standard is presented as a framework for the assessment of the environmental management system in the local organisations.

3.1 Literature Review

With the increasing pressure on the industry to achieve and demonstrate sound environmental performance, the environmental management systems have become a concern in many companies. Similar environmental trends are found in Hong Kong. As of December 2000, ninety-one local organisations had certified in ISO 14001 EMS (Environmental Protection Department, 2000). The majority of the certified companies are large corporations, while small and medium enterprises (SMEs) accounted 13 certifications only. Since Hong Kong's economic development is highly dependent on overseas markets and international investment, local industries become sensitive to global changes in environmental trends and attempt to conform to the international environmental standard, ISO 14000 EMS series.

The development of environmental management system (EMS), history of ISO 14000 EMS, potential benefits of ISO 14001 adoption, general response from the world, and its recent implementation progress in Hong Kong have been carefully reviewed in a series of publications including journal papers, reports and books. The key literature is listed in the reference section of this thesis.

3.2 Identification of Study Groups

The first job is to identify study groups. In this project, the information of certified companies was obtained from the Environmental Protection Department (EPD) while a list of small and medium enterprises (SMEs) was selected from the Industry Department's website. Four companies that have a high portion of export business, were selected for the case studies. Four business sectors included paper, polystyrene, jewellery manufacturing and electroplating were chosen because of their potential impact on the environment and capacity to benefit from ISO 14001 EMS standard.

3.3 Questionnaire Surveys

Three questionnaire surveys had been carried out in this study, namely Survey A, Survey B and Survey C. Survey A was conducted in December 1998, and during which only 23 companies in Hong Kong were ISO 14001 certified according to the Environmental Protection Department. In addition to these 23 companies, 200 SMEs were selected from the Industry Department website and included in Survey A. The

SMEs sample size may not be large enough comparable to the total number of SMEs in Hong Kong. However, we could see the SMEs' general attitudes towards ISO 14001 EMS standard via this survey, and the obtained information was useful for in setting up the in-depth SMEs survey (Survey B) that took place at a later stage. Two sets of questionnaires were sent to the certified companies and the SMEs to inquire about their progress in the implementation of ISO 14001 EMS. Multiple options were given in the survey forms. If these options were inappropriate, interviewees could choose "Others" to indicate their own ideas.

The differences in management practices between the certified companies and the SMEs were studied in Survey A. The actual ISO 14001 implementation, experience and difficulties encountered by the certified companies were investigated. ISO 14001 EMS knowledge and its acceptance by the SMEs were also assessed during this survey.

In order to further investigate the business situation of the local SMEs and their acceptance of ISO 14001 EMS standard, a second survey (namely Survey B) was carried out in March 1999 in collaboration with the Hong Kong International Association of Small and Medium Enterprises (iSME). Over a thousand questionnaires were sent to the iSME's members, which was believed to be statically sound and representative of business nature typically found in Hong Kong.

The second round survey covered two main board areas: the responses to 14001 EMS and the current business situations of SMEs. The views of environmental management in the SMEs, such as the environmental awareness among the employees,

existing environmental practices, acceptance of ISO 14001 by top management and general environmental performance were investigated. In addition, the business situations of the SMEs, such as the import and export, and the possible budgets for ISO 14001 implementation, were also studied.

The number of ISO 14001 certifications in Hong Kong gradually increased during the two-year study period, from 23 companies in December 1998 to 58 in February 2000. In order to keep track of the latest information of ISO 14001 EMS implementation in Hong Kong, a survey (namely Survey C) was conducted with the newly certified companies in February 2000. Additional questions such as the implementation costs, payback period and saving costs on the ISO 14001 EMS implementation were included. Samples of the questionnaires are attached to Appendix II.

3.4 Case Studies

Four companies were selected for detailed case studies. The companies were of different sizes, business nature and environmental performance. The manufacturing divisions of these companies were located in China with their administrative offices in Hong Kong. Workers were generally employed from China, and staff at the management level was often recruited from Hong Kong.

A detailed EMS audit was conducted at the four sites. The EMS audit protocols were used including the policies, daily operation procedures, factors influencing the ISO 14001 EMS adoption and the existing waste minimisation measures of each company. Company information such as process flow diagrams, technical manuals, reports and

product brochures were collected during the various site visit. Furthermore, management structure and the employees' levels of environmental awareness were also evaluated on site. The case studies checklist is appended in Appendix III.

3.5 Analysis of Findings

The results of the questionnaire surveys were analysed using a statistical method on the occurrence of options. Data such as the ISO implementation progress, commercial benefits, and the effectiveness of the ISO standard in the certified companies were studied. The analysis focused on the general attitudes of implementing the ISO 14001 EMS standard in local organisations, as well as the slow progress of the EMS standards adoption. In addition, experiences of the ISO 14001 EMS standard of the certified companies were discussed.

The case studies were analysed individually. Each case study report consisted of company background, management structure, existing EMS practice, operation process and present environmental pollution measures. Cross case analysis techniques were used to analyse the results after each case study. A gap analysis between the existing management system and the ISO 14001 requirements was also carried out.

The current situation of ISO 14001 implementation in Hong Kong was studied, and potential strategies were recommended to companies for ISO 14001 standard implementation. Special attention was also given to the relevancy of implementing ISO 14001 standard in SMEs in Hong Kong.

Chapter 4 Implementation of ISO 14001 in Certified Companies and SMEs

4.1 Questionnaire Survey A – December 1998

In order to understand the situation of ISO 14001 EMS implementation in Hong Kong, a questionnaire survey was conducted with 23 large companies that had been certified to ISO 14001 EMS by December 1998. In addition, 200 local small and medium size enterprises (SMEs) were also studied to compare their management structure and the potential impacts of the EMS standard. Fourteen of the certified companies and 81 of the SMEs responded to the questionnaires, representing 60.9% and 40.5% of the total sample populations respectively. The surveyed sectors of the certified companies and SMEs are listed in Table 4.1 & 4.2.

Table 4.1 Types of Certified Companies participated in Survey A

Types of Sector	No. of companies	No. of Replied	Replied %
Construction	5	3	60.0
Manufacturing	5	3	60.0
Electrical & Electronics	4	3	75.0
Transportation	3	2	66.7
Hotel	2	1	50.0
Government Department	1	1	100
Others	3	1	33.3
Total	23	14	60.9

Table 4.2 Types of SMEs participated in Survey A

Types of Sector	No. of companies	No. of Replied	Replied %
Watch	50	23	46.0
Toy & Games	20	11	55.0
Garment	20	9	45.0
Electronics	55	15	27.3
Hotel	55	23	41.8
Total	200	81	40.5

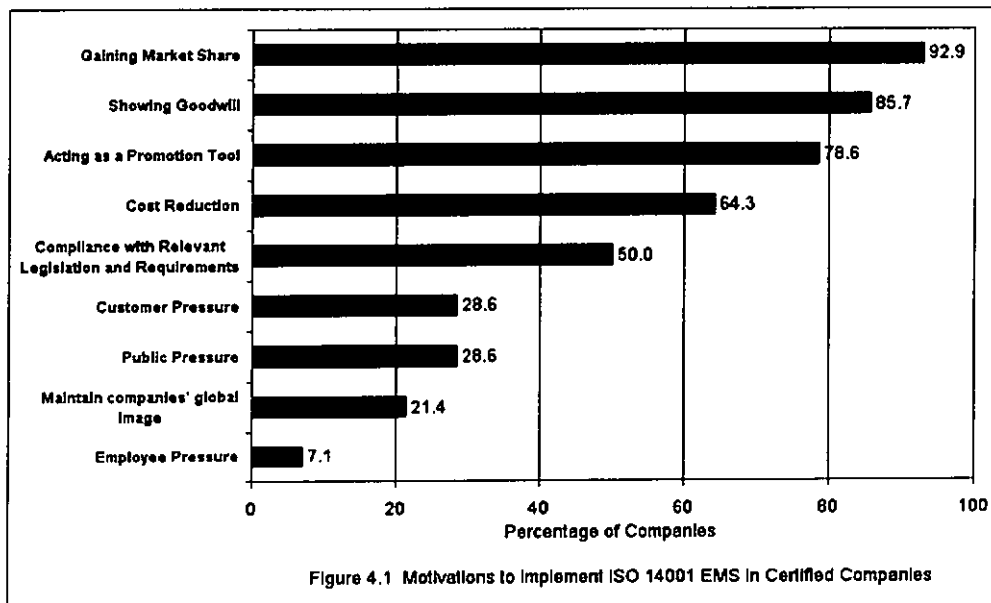
4.1.1 First Survey Results of ISO 14001 Certified Companies

ISO 9000 Certification Background

Among the fourteen ISO 14001 companies, thirteen (93%) had already adopted a quality management system such as ISO 9000 prior to ISO 14000 implementation. All of these companies mentioned that ISO 9000 provided a good basis for their companies to adopt the ISO 14001 EMS standard. Some companies also stated that the successful implementation of ISO 14001 owed much to the quality culture in the organisations (e.g., ISO 9000). With a well-defined organisational structure and responsibility, ISO 9000 appears to act as a backbone of ISO 14001 implementation (Chin and Pun, 1999). In fact, ISO 9001 and ISO 14001 standards share many similarities, such as management commitment and responsibility, management system documentation, document control, operational control, training, monitoring and measurement, non-conformance and corrective action, records and audits (Cascio *et al.*, 1996).

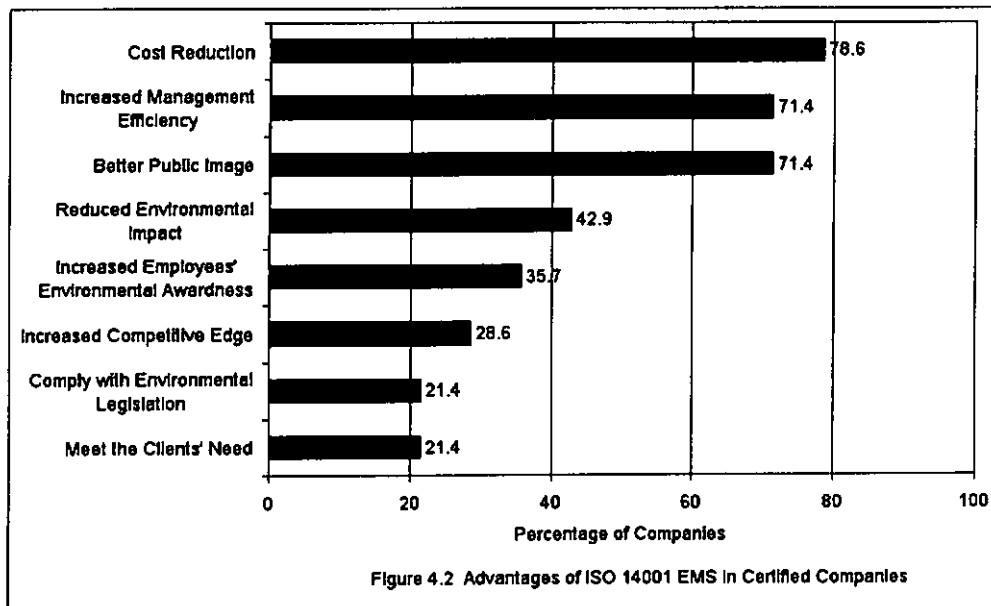
Motivations to Implement ISO 14001 EMS

Important motivating factors for ISO 14001 EMS standard certification expressed by these companies were illustrated in Figure 4.1. The top three motivations were gaining a larger market share (92.9% of total respondents), showing goodwill (85.7%) and acting as promotion tool (78.6%). Pressures from the public, customer and employee and the maintenance of a global image were other considerations (Figure 4.1). Most of the certified companies surveyed were large corporations. These companies' motivation for ISO 14001 EMS certification was market-driven and not performance-driven. In general, most of the certified companies considered ISO 14001 EMS standards as environmental protection and pollution prevention measures, as well as commercial tools.

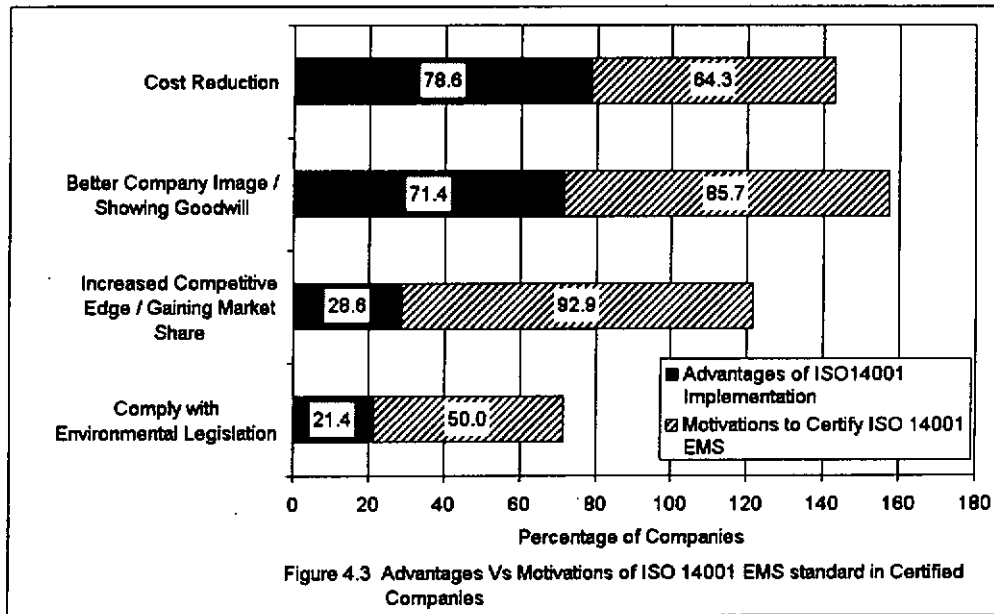


Advantages of ISO 14001 EMS

The fourteen certified companies enjoyed various advantages brought about by the implementation of ISO 14001 EMS, including improved environmental performance, enhanced management efficiency, and reduction of operational costs (Figure 4.2). These results provide good examples to local SMEs as they reveal the potential benefits that could be earned through the implementation of ISO 14000. In particular, advantages of cost reduction and management efficiency improvement can be the main driving forces for ISO 14001 adoption in the future.

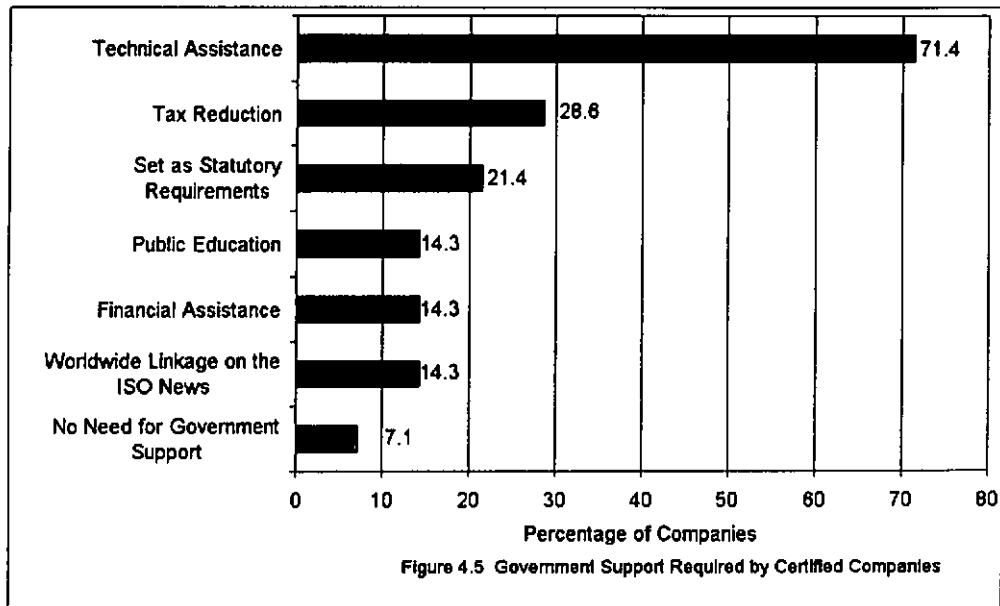
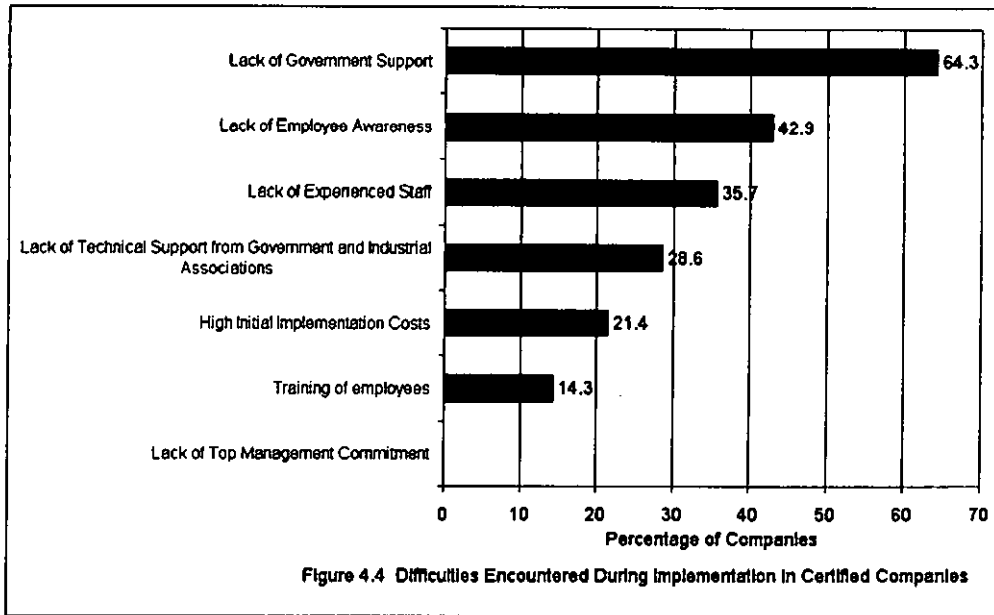


However, not all the advantages gained by these companies were as well as previously anticipated. In particular, only 28.6% of certified companies had actually gained competitive edge in the market after the implementation of ISO 14001, compared to 92.9% of them initially motivated by gaining market share (Figure 4.3). If companies wish to be certified only for commercial purposes, further considerations would therefore be necessary in order to avoid disappointment.



Difficulties Encountered by Certified Companies

Lack of government support (64.3% of the total respondents), employee awareness (42.9%) and experienced staff (35.7%) were the main difficulties experienced by the certified companies during the EMS implementation (Figure 4.4). The results indicated that the government should improve her support of ISO 14001 EMS adoption. Most certified companies believed that the government could improve its support by various means (shown in Figure 4.5). Technical assistance, such as how to conduct an initial gap analysis, provide practical environmental measures and consultation on documentation control, was strongly recommended by these certified companies.

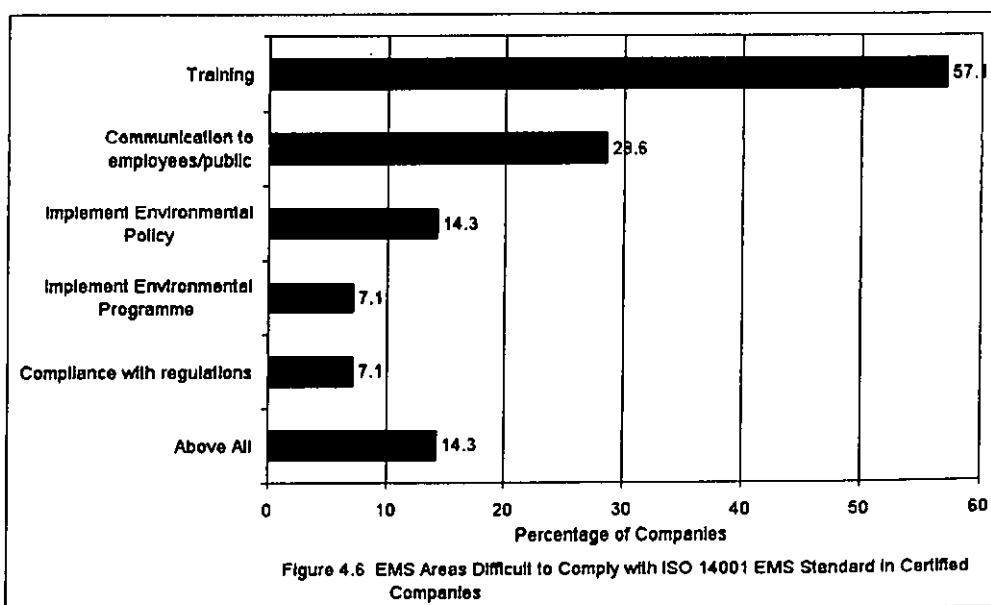


Similar to the present findings, Chin & Pun (1999) also found a strong need for technical support in organisations in Hong Kong. Many companies in the study suggested that an environmental specialist's assistance played a vital role in ISO 14001 implementation and the appointment would be even more important than the use of advanced monitoring and measurement equipment and the enhancement of production process. Government support has been proven to be an important factor in

ISO 14001 implementation in United States, United Kingdom and Japan. In these countries, technical assistance and financial support are provided to companies interested in ISO 14000 EMS adoption (Federal Register, 1999; Witt, 1999). Unfortunately, such technical and financial assistance has not yet been appeared in HK.

EMS Areas Difficult to be comply with ISO 14001 EMS Standard

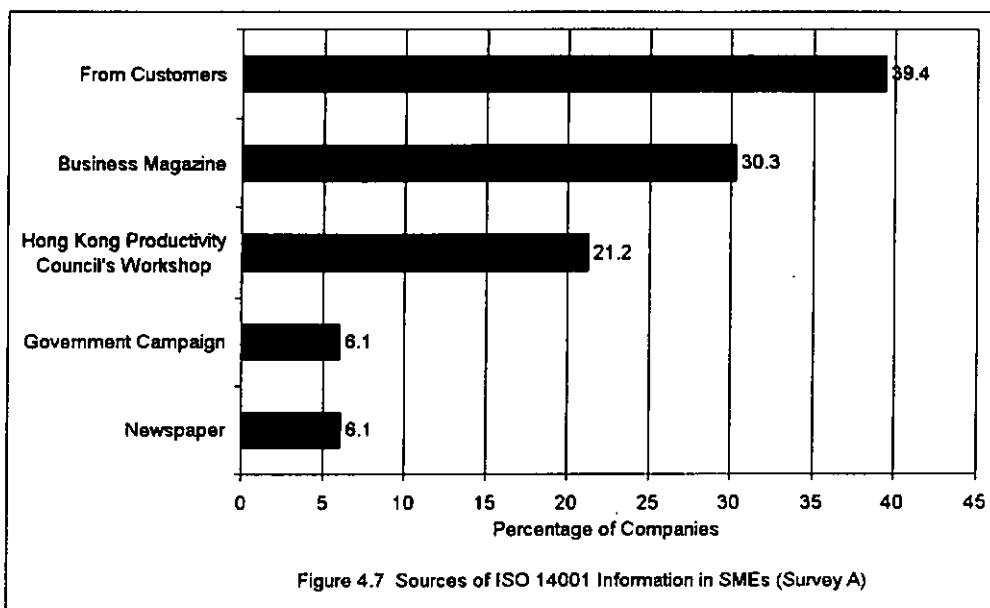
The certified companies in the survey expressed that several areas of their current EMS could be improved further. For instance, environmental and EMS training (57.3% of total respondents) and communication to employees/ public (28.6%) (Figure 4.6) are the key areas of further improvement. Due to limited resources, 57.3% of the certified companies indicated that only selected employees received EMS training at the moment. In order to continually improve the system, training in the EMS standard and skills is necessary. To achieve this, companies should have the commitment to continual improvement. 14.3% of certified companies surveyed thought that every EMS aspect in their companies could be further improved.



4.1.2 First Survey Results of SMEs

The second survey, Survey B, which consisted of a larger sample size, was performed in March 1999. Thus, the results of this survey, Survey A, are briefly discussed below. The detailed survey results are discussed in the Section 4.2.1.

Of the 81 replies from SMEs, 48 companies (59%) had not previously known about the environmental management systems. Most of them also had no knowledge of environment management or quality management systems. Others (41% of the SMEs) learned about the ISO 14001 standard through various sources (Figure 4.7), predominantly from customers (39.4%) and business magazines (30.3%).

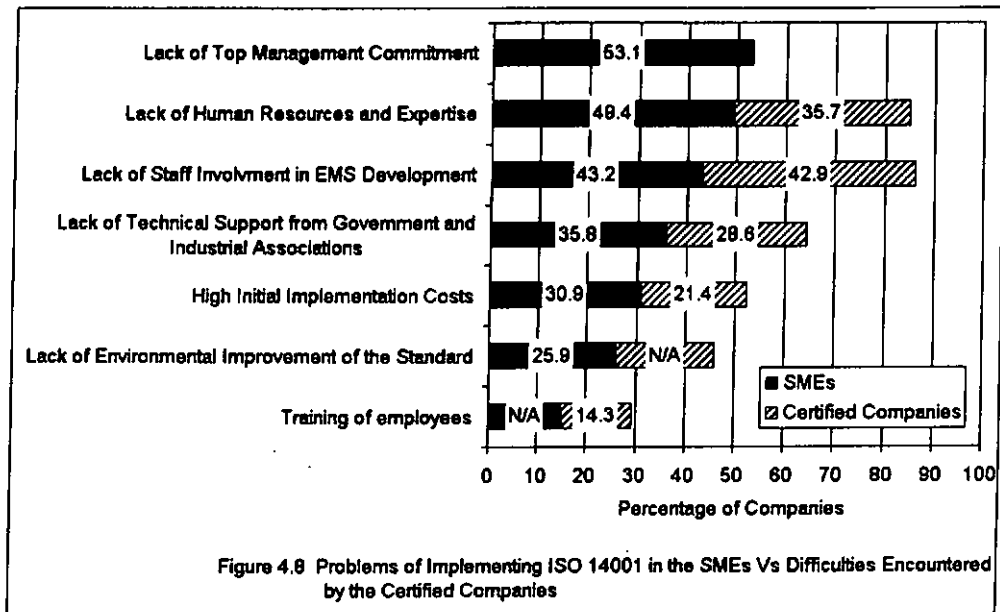


As the majority of SMEs were engaged in import and export. Customer information, especially from overseas, was an important source for ISO 14001 EMS. By comparison, only two companies (6.1%) mentioned that they learned about the standard from a government campaign. This indicated that the government's ISO

14000 promotion scheme was neither adequate nor effective for local SMEs. Further promotion programmes should be introduced in the future.

In addition, fifty-seven of the 81 respondents (70%) thought that ISO 14001 standard could not bring any advantage to their business under present operational conditions. These companies regarded the standard as non-essential for business at the moment, their clients had not demanded adoption of ISO 14001 EMS. Without such requirement, the SMEs seemed reluctant to allocate the already scarce resources to implement the EMS. Moreover, the majority of the respondents in this study expressed that ISO 14001 EMS could not replace regulatory inspections by government authorities.

This survey also revealed that the most recognized difficulty in ISO 14001 EMS implementation was the lack of commitment from the top management (53.1% of total respondents), together with a low environmental awareness of management staff. Environmental problems were generally not regarded as important business issues by the SMEs. Other major difficulties listed in the survey included a lack of human resources and expertise (49.4% of total respondents), lack of staff involvement (43.2%) and poor co-ordination of government, industry and business (35.8%). These results suggested that management awareness and commitment were more important problems in the SMEs than lack of technical supports encountered in the certified companies (Figure 4.8).



With limited resources and limited knowledge of environmental management systems, the implementation of ISO 14001 EMS was especially difficult for small organisations. Johansson (1997) pointed out that “often managers of small and medium enterprises (SMEs) feel that they are powerless next to large and multinational organisations. Either they feel that environmental problems are global in nature, and therefore outside the ability of an SME, or that they do not have the resources within their grasp to make the changes necessary”. The survey showed that about 75% of the SMEs did not have plans to implement ISO 14001 EMS in the near future.

4.2 Questionnaire Survey B – March 1999

The ISO14001 EMS standard adoption has grown steadily in Hong Kong. Forty-seven local companies had been certified to the standard by March 1999 and about 89.7% were multinational corporations (Environmental Protection Department, 1999). In order to further investigate the business situation of local SMEs and their acceptance of ISO 14001 EMS, another questionnaire survey which was targeting on a thousand of SMEs, in collaboration with the Hong Kong International Association of Small and Medium Enterprises (iSME) were conducted this time. The study aimed at investigating the attitude and response of SMEs towards environmental issues, with particular attention to the ISO 14001 EMS standard.

The business sectors covered six different categories, including financing, insurance, restaurants, community services, manufacturing, and import and export, based on the Hong Kong Standard Industrial Classification published by the Census and Statistics Department (Table 4.3). Compared with the manufacturing and import and export businesses in Survey A, the SMEs participated in this survey were more diverse in nature.

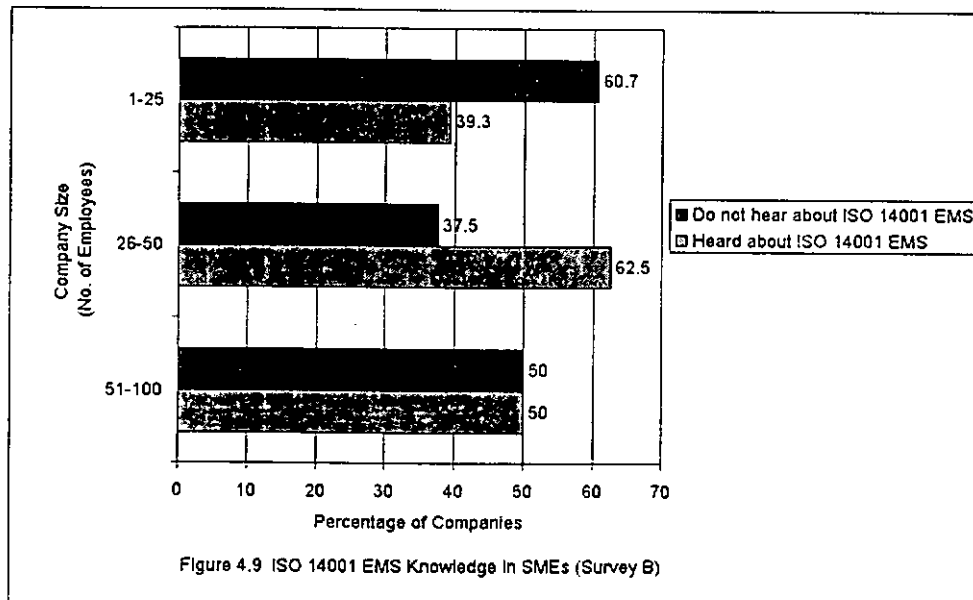
Table 4.3 Classification of the SMEs in Survey B

Business Type	No. of Companies	Company Size (No. of Employees)		
		1-25	26-50	51-100
Financing, Insurance, Real Estate & Business Services	23	18	5	--
Wholesale, Retail & Import / Export Trades, Restaurants & Hotel	17	15	2	--
Manufacturing	15	4	7	4
Community, Social & Personal Services	8	7	1	--
Construction	6	5	1	--
Transport, Storage & Communication	1	1	--	--
Unclassified	6	6	--	--
Total	76	56	16	4

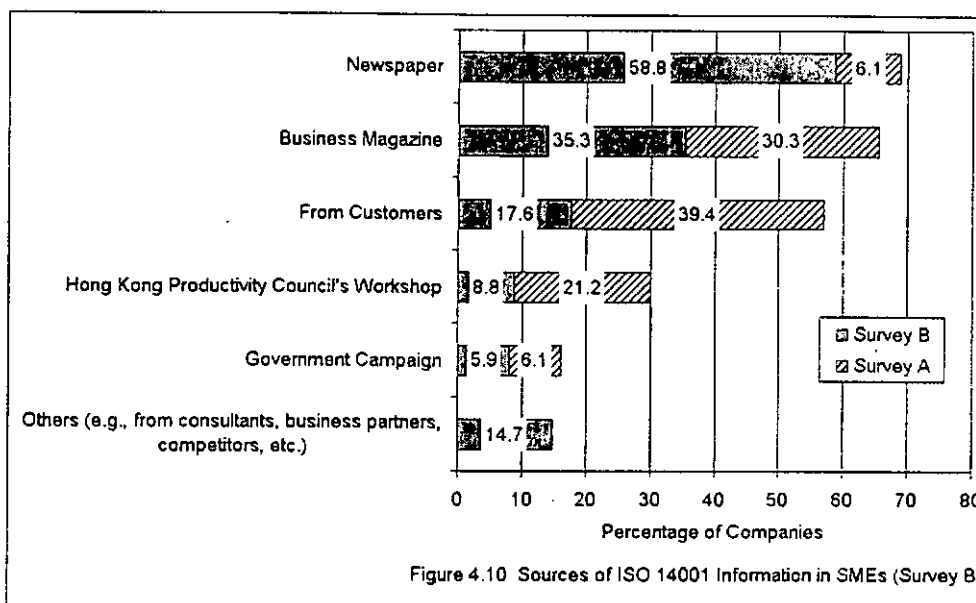
4.2.1 Second Survey Results of SMEs

Awareness of ISO 14001 EMS

Forty-two respondents (55%) did not previously know about the EMS standard in Survey B. The result preferences were more predominant in the company size between 1-25. Thirty-three of 56 SMEs in this group replied that they had no knowledge of the standard (Figure 4.9). These respondents believed that an EMS standard, such as ISO 14001 EMS could not help to minimise any of the existing environmental problems.

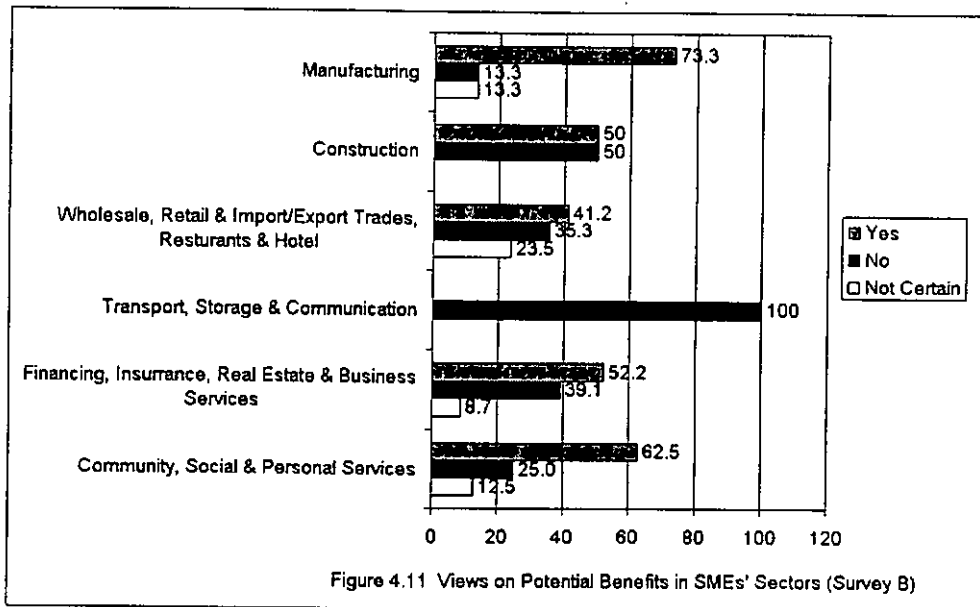


The other 45% of the respondents had heard of ISO 14001 EMS from channels such as newspapers, business magazines and customers (Figure 4.10). The results indicated that newspapers and business magazines might be the most effective media for introducing ISO 14001 EMS to local SMEs. However, it is interesting that in the first survey (Survey A), most of the SMEs knew about the standard through their customers. This difference may be due to differences in business nature of the SMEs surveyed and the increase of ISO 14001 EMS promotion in newspapers. Companies involving in import and export business always need to communicate with their customers and meet their requirements. The continual communication made “customers” a popular and direct channel for the SMEs to learn about ISO 14001 EMS standard. Similar to Survey A, only limited respondents heard about EMS through government campaigns. Further promotion of ISO 14001 EMS in local SMEs is necessary and involvement of the Hong Kong government is very important.

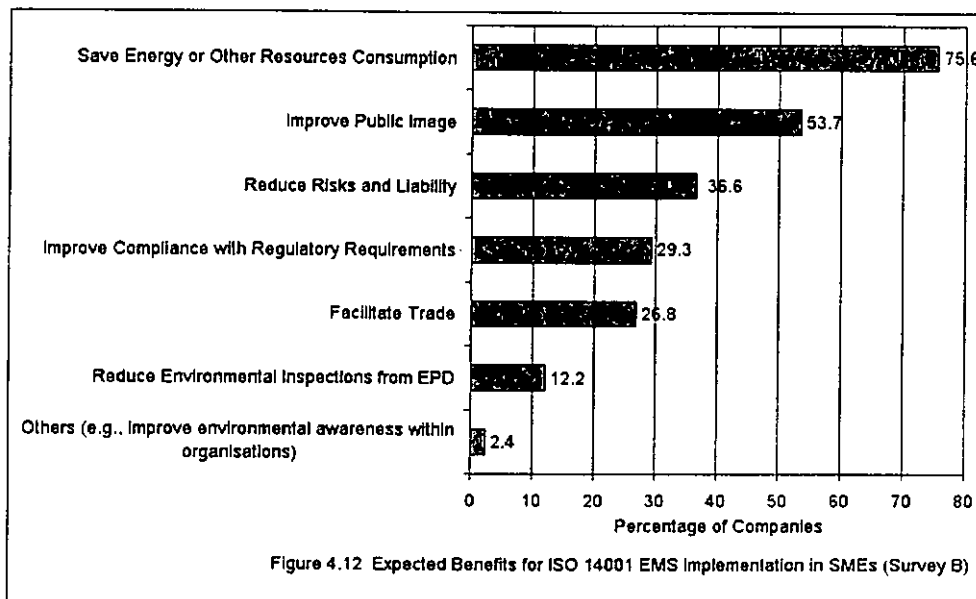


Possible Benefits of ISO 14001 EMS

Forty-one respondents (54%) stated that the ISO 14001 EMS standard could bring advantages to their business operations, and most of these companies were medium size with 26 to 100 personnel. Compared with the results of Survey A, the percentage of respondents believing that the ISO 14001 standard could bring advantages to their organisations increased from 30% to 54%. However, some of the SMEs regarded that the effectiveness of the standard would be greater in larger companies. This was also reported in some other studies (Julien et al, 1994; Johansson, 1997; Perry and Teng, 1999). Small-sized companies were usually uncertain about the adoption of ISO 14001 EMS. In the manufacturing sector, 73.3% of SMEs believed that the ISO 14001 EMS implementation would improve their environmental performance and save operation costs (Figure 4.11).

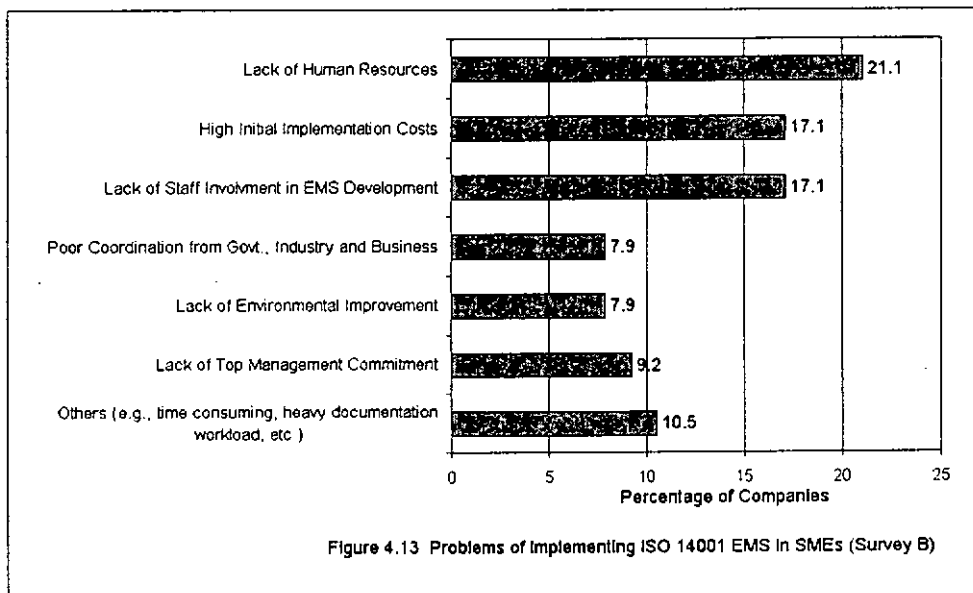


The major benefits expected by local SMEs were listed in Figure 4.12. Five SMEs (12.2%) have also mentioned the benefit on reducing the chances of non-compliance with environmental regulations.



Problems of Implementing ISO 14001 EMS

Problems encountered by SMEs in implementing ISO 14001 EMS mainly included lack of human resources (21.1% of total respondents), high initial implementation costs (17.1%) and lack of staff awareness (17.1%) (Figure 4.13). An Environmental Management System is similar to Quality Management System, which requires staff to implement a system effectively and continuously. In this survey, most of the SMEs lacked a formal structure and management system. Although many realised that there were environmental problems in their daily operations, they considered these problems difficult to solve with limited time and efforts. The fines for non-conformance from the Environmental Protection Department (EPD) were often incorporated into the cost of business operations. A simple prosecution system had little effect on general business operations and it contributed little to the purpose of protecting the environment against industrial pollution.

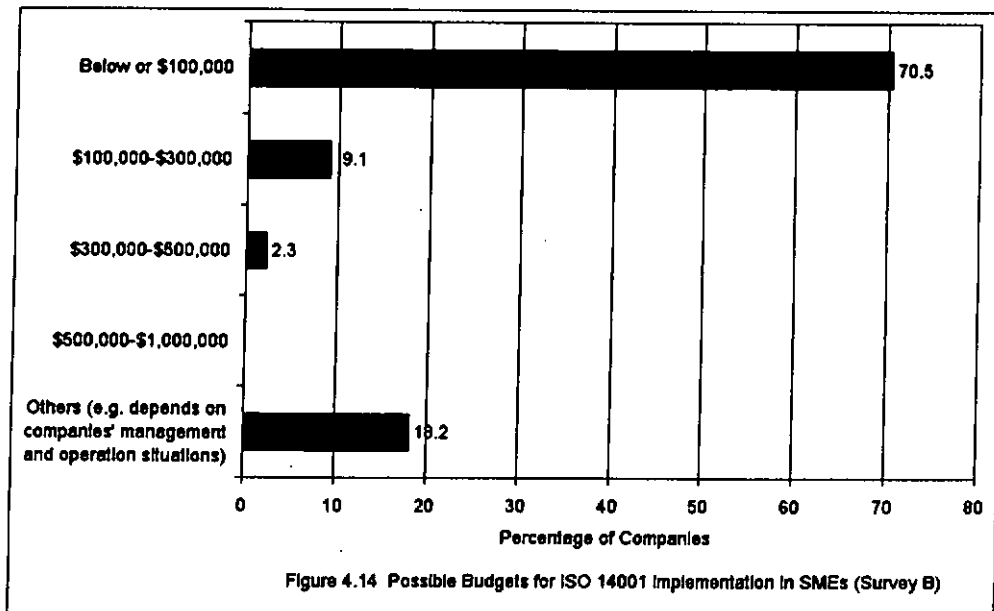


The Survey A revealed the lack of top management commitment was the main obstacle in implementing ISO 14001 EMS in SMEs. Whilst in Survey B, the top management commitment was regarded as only the fourth difficult issue faced by the SMEs. This might indicate that the top management in SMEs had a greater awareness of environmental issues compared with those in the Survey A and were more willing to support environmental management system. However, the difference in the survey samples and the type of business sectors in these two surveys may also affect the results. The SMEs surveyed in December 1998 represented mainly the import/export and manufacturing sectors, while the SMEs in this second survey included import/export, manufacturing, service, commercial and professional sectors. These services, commercial and professional sectors might think that top management commitment would not be the main problem in implementing the ISO 14001 EMS standard.

In addition, many professional sectors, such as medicine, accountancy and law had the misperception that ISO 14001 EMS standard was only suitable for industrial sectors. In fact, it can be applied in all businesses and achieve continual improvements in environmental performance and management efficiency.

Budgets for ISO 14001 EMS Implementation

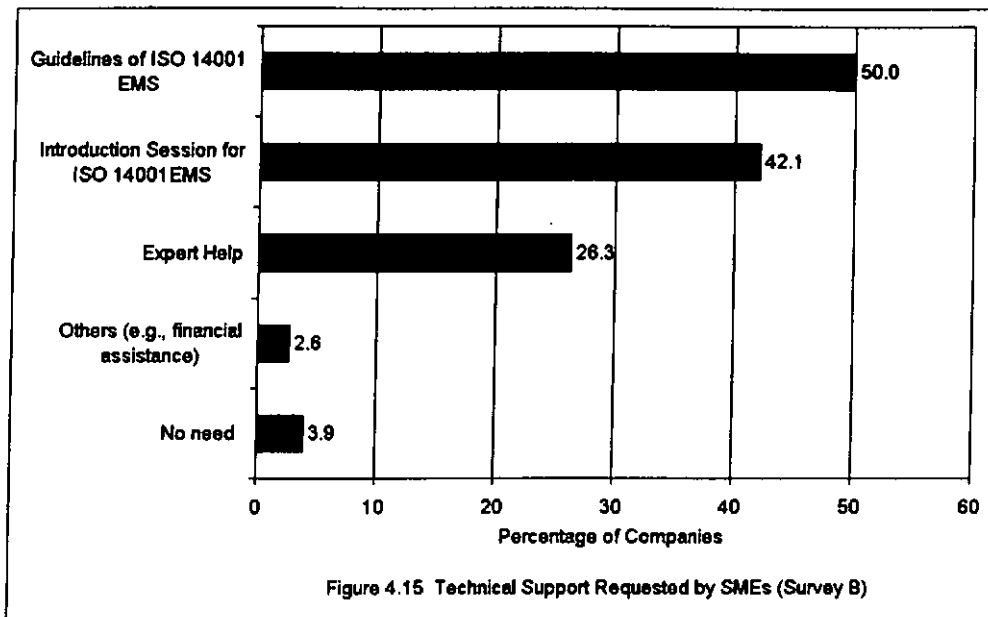
Since initial implementation cost is one of the major barriers for the SMEs in implementing the system, the second SME survey addressed several budget-related questions to the possible budget of ISO 14001 adoption. More than 70% of the replies were below HK\$100,000 (Figure 4.14).



All of the companies willing to spend HK\$100,000 belonged to 1-50 sized companies. Only four companies with company sized 51-100 said that their budgets were ranged from HK\$100,000 to HK\$300,000. The SMEs' budget would be compared with the actual implementation costs that found in the certified companies in Section 4.31 and 4.5. The budget was directly related to the company size. The smaller the company, the less they could afford financially. Some companies (18.2%) stated that the budget was dependent on other factors, such as internal management resources, effectiveness of the ISO 14001 EMS and the present economic situation. Many SMEs surveyed were unclear about the costs necessary in implementing and maintaining the ISO 14001 EMS standard.

Need for Government Support

Many companies asked for technical support from the government, such as the implementation guideline of ISO 14001 EMS (50% of total respondents), introduction session to the implementation of ISO 14001 EMS standard (42.1%) and the expert help (26.3%) (Figure 4.15).

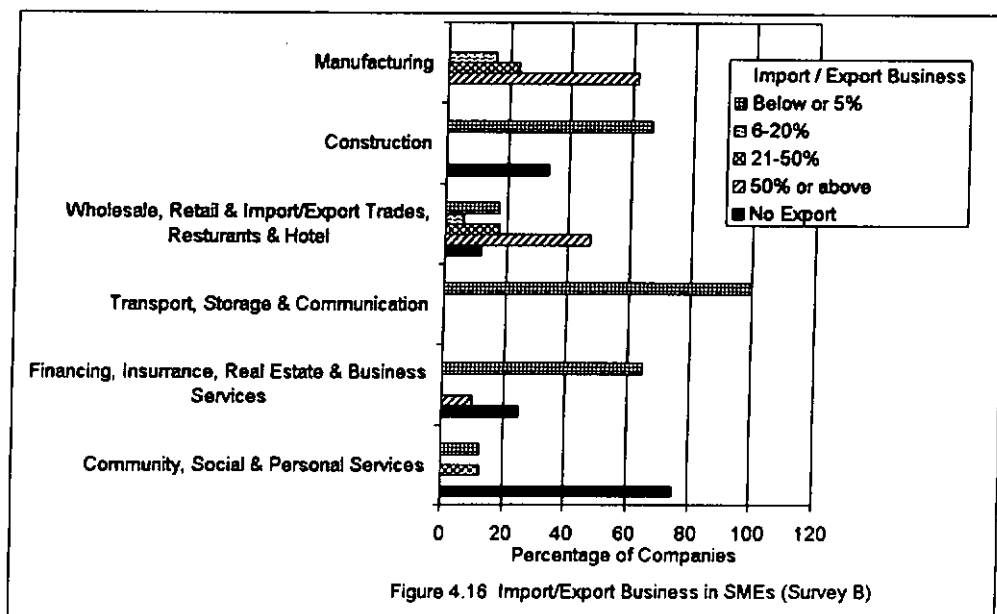


The importance of technical support was also mentioned in other studies (Chin and Pun, 1999; Warren and Ortolano, 1999). The failure of SMEs to adopt cleaner technology equipment and processes was usually due to their limited technical knowledge instead of weak financial constraints. In fact, the implementation guideline of ISO 14001 EMS has already been published and available to the public in both hard copy and electronic form. The interested parties could obtain the relevant information either in person from EPD branches or download it from the EPD's website. However, most of the SMEs are unaware of this. Consequently, it seems that government promotion of ISO 14001 EMS is insufficient.

Import and Export Business in SMEs

The survey indicated that the import/export trades are the major business of SMEs in the manufacturing and wholesale categories (Figure 4.16). These business sectors might be more urgently in need for the implementation of ISO 14001 in order to meet the increasingly stringent environmental legislation in countries such as Germany,

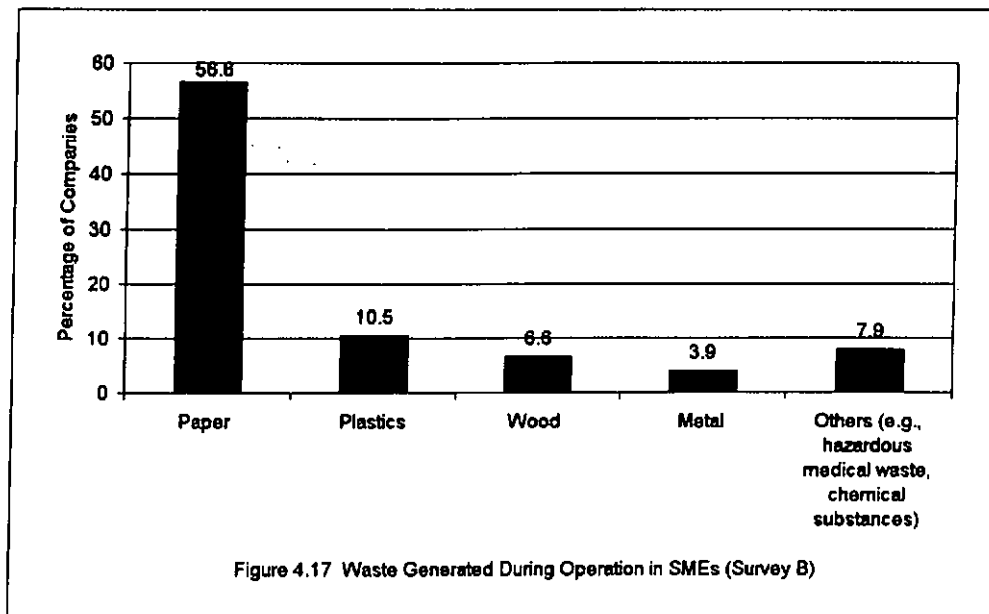
Switzerland, Netherlands and United States (Trade Development Council, 2000). Statistics from the Industry Department have shown that the majority of local SMEs are engaged in the import and export sectors, followed by the wholesale, retail, restaurants and hotel sectors. Since these two sectors constituted over 60% of the SMEs in Hong Kong, employing more than half of the workforce of all SMEs (Industry Department, 1999), they should have a priority in receiving the government support, such as providing technical and financial assistance.



In-house EMS Programmes in SMEs

In order to achieve the environmental objectives and targets, EMS programmes need to be established under the requirements of ISO 14001 standard. In this survey, waste types generated in SMEs operation and the existence of in-house EMS/waste minimisation programmes was investigated. Paper was found to be the most common types of waste (Figure 4.17). About 32.9% of SMEs surveyed said that they were not aware of the types and amount of waste generated during their daily business. In fact,

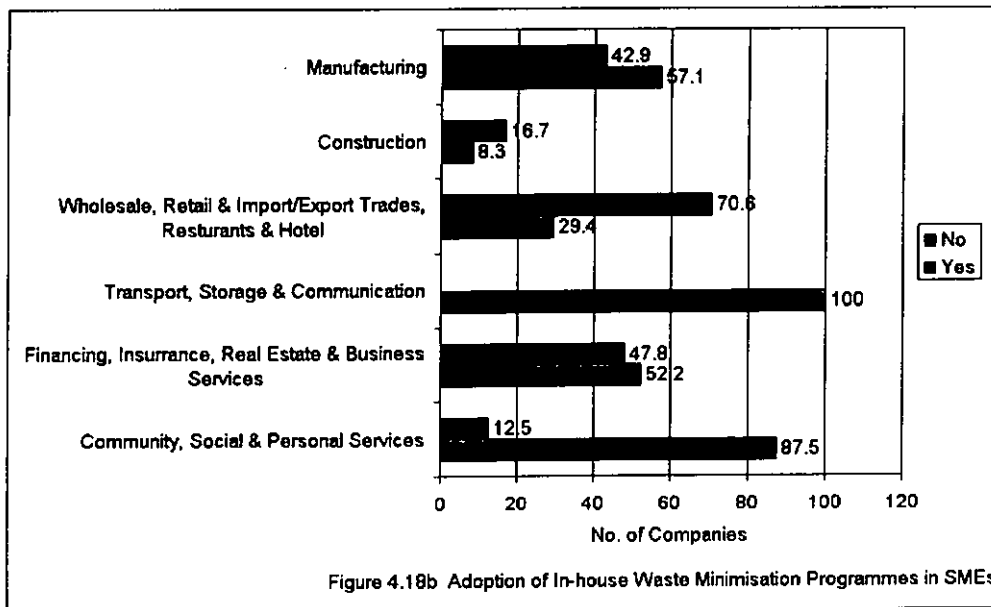
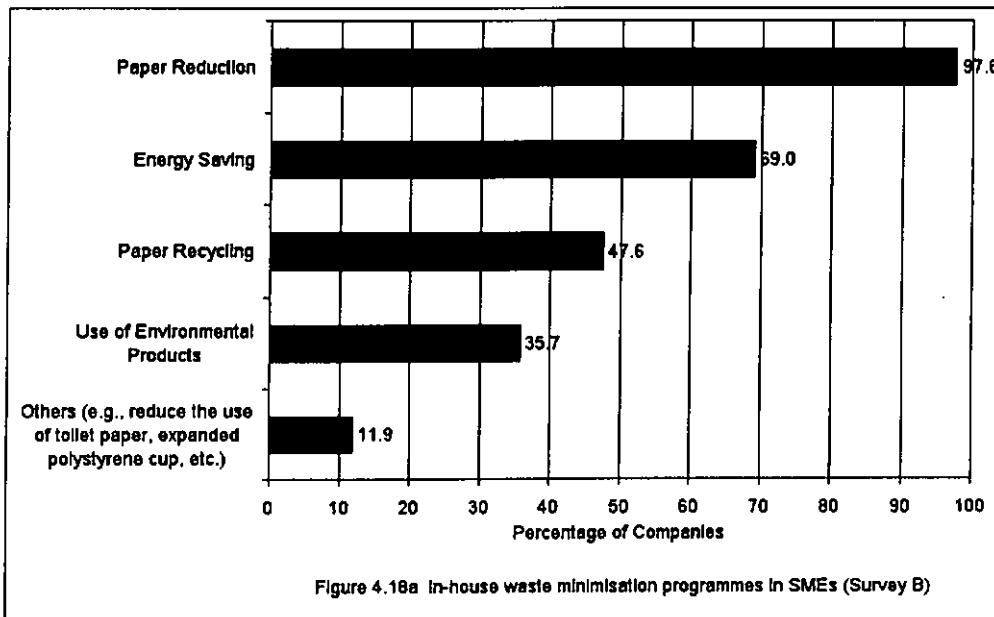
only two companies could provide figures on the type of wastes being generated. Since the costs for waste collection and treatment were covered by SMEs' normal operation costs, many were reluctant to spend extra human resources on waste management.



Despite the low ISO 14001 EMS adoption rate, 57% (forty-one respondents) said that they had in-house waste minimisation programmes. Since paper was the most common type of wastes generated, many in-house waste minimisation programmes listed by the SMEs were also focused in that area (Figure 4.18a). However, the in-house waste minimisation programmes were not formally set up. Usually top management adopted a programme (e.g., paper reduction) and passed it down to the operation level without proper follow-ups. Eventually, the programmes became merely lip service and had little positive impacts in terms of waste minimisation.

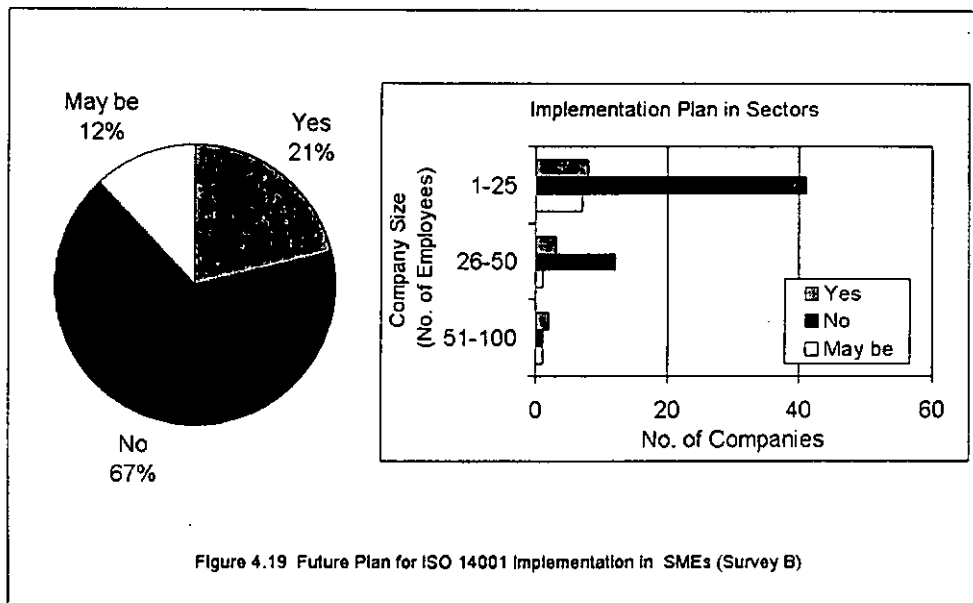
Twelve companies (70.6%) in the wholesale, retail and import/export trades, restaurants and hotel sectors did not have any in-house waste minimisation

programme (Figure 4.18b) partly because of the limited effects of such program on the small amount of waste generated in their daily operations.



Future Implementation of ISO 14001 EMS

The survey result showed that 67% of the companies did not have plans to implement ISO 14001 EMS in the near future (Figure 4.19). Only 12% stated that they might consider implementing ISO 14001 EMS standard depending on their business demand and economic growth. Especially in the small-sized 1-25 companies, 41 out of 56 of them said that they would not implement the standard in the near future.



However, SMEs in the 51-100-company size stated that they intended to implement ISO 14001 in the near future. The results indicated that the larger SMEs tended to be more interested in this standard. These SMEs believed that the ISO 14001 EMS adoption could improve their reputation and provide competitive advantages for their business. Obviously there is a different point of view on ISO 14001 EMS issue in small-sized and large-sized SMEs. The larger-sized SMEs may see things more globally and have a comparatively long-term business plan.

4.3 Questionnaire Survey C – February 2000

The number of certified companies increased gradually in the two-year study period. At the time of the first survey, twenty-three companies were certified to ISO 14001 EMS standard. By February 2000, the number of certified companies increased to fifty-eight. Thirty-eight newly certified companies were surveyed in this second round questionnaire. The surveyed sectors of the certified companies and SMEs in the present study are listed in Table 4.4.

Table 4.4 Types of Newly Certified Companies participated in Survey C

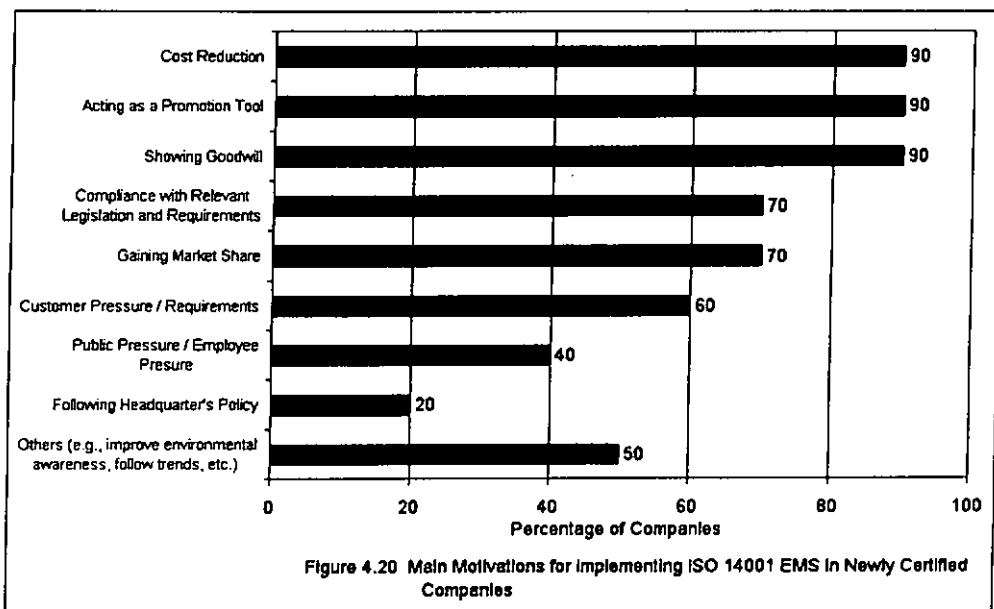
Types of Sector	No. of companies	No. of Replied	Replied %
Construction	10	5	50.0
Manufacturing	6	1	16.7
Electrical & Electronics	9	1	11.1
Transportation	3	1	33.3
Hotel	1	1	100
Government Department	1	1	100
Others	8	0	0
Total	38	10	26.3

4.3.1 Second Survey Results of Certified Companies

Motivations to Implement ISO 14001 EMS

The main motivations for the ISO 14001 EMS certification for these newly certified companies were quite different from the certified companies surveyed in December 1998 (Figure 4.20). Compared with the results of Survey A, the certified companies

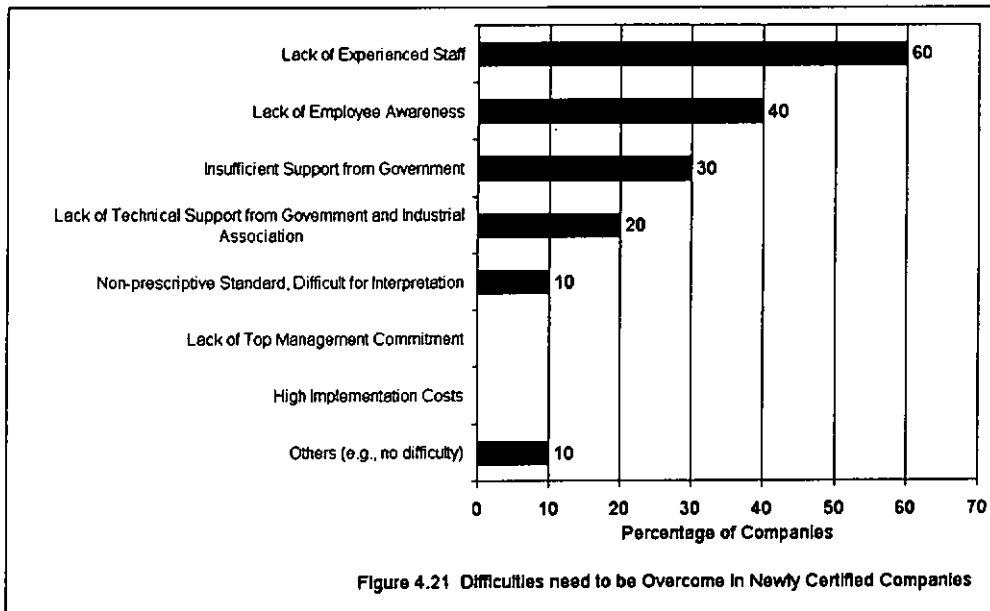
appeared to be more motivated by cost reduction and compliance with relevant legislation and requirements. This result might be due to the business nature of the newly certified companies. The certified companies surveyed in this survey (Survey C) were mainly in the construction sector, which were facing the increasingly stringent environmental regulations and prosecution for non-compliance. Therefore, in order to reduce non-compliance with the environmental regulations and save the operation cost, these construction firms were eager to certify in the ISO 14001 standard. Comparison on Survey A and C was discussed in Section 4.4.



Difficulties needed to be overcome

The major difficulties encountered by these companies included lack of experienced staff (60% of total respondents), lack of employee awareness (40%) and insufficient support from government (30%) (Figure 4.21). Lack of technical support, non-prescriptive standard and difficulty in interpretation were also recorded in this study. Before the ISO 14001 EMS certification, most of the construction companies in this

survey did not have formal environmental management systems. Lack of experienced staff and workers became the major obstacle in ISO 14001 EMS adoption in these certified companies. A comparison of the difficulties faced by the certified companies in Surveys A and C was discussed in Section 4.4.



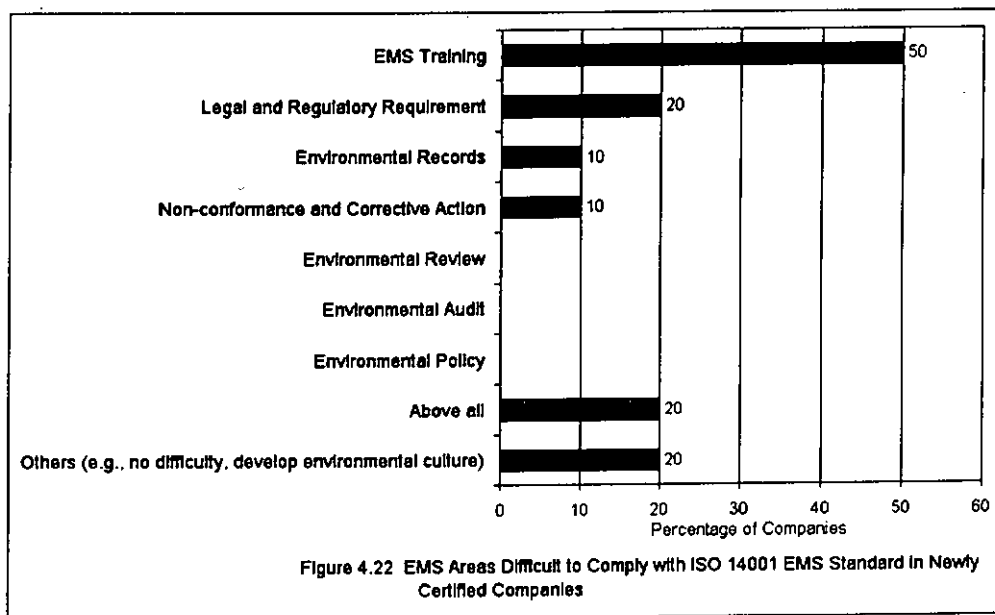
Willingness to help the Suppliers

Nine of the ten respondents in the survey were willing to help their suppliers with the adoption of ISO 14001 EMS standard by providing guidance for ISO 14001 implementation. However, all but one did not require their suppliers or contractors to implement the standard at the moment. The respondents stated that the timing was not good for their suppliers or contractors to follow the standard as the economy was poor. Local suppliers or contractors were mostly SMEs that were not aware of an environmental management system. The certified companies believed that it was meaningless to set a deadline for their suppliers under current situations. Instead of

requiring those SMEs to certify to ISO 14001, the certified companies stated that the government should promote the standard and provide implementation guidance.

EMS Areas Difficult to comply with the ISO 14001 standard

Providing EMS training (50% of total respondents), compliance with legal and regulatory requirements (20%), keeping environmental records (10%), conducting non-conformance and corrective action (10%) were the significant challenges encountered during the ISO 14001 implementation in these newly certified companies (Figure 4.22).

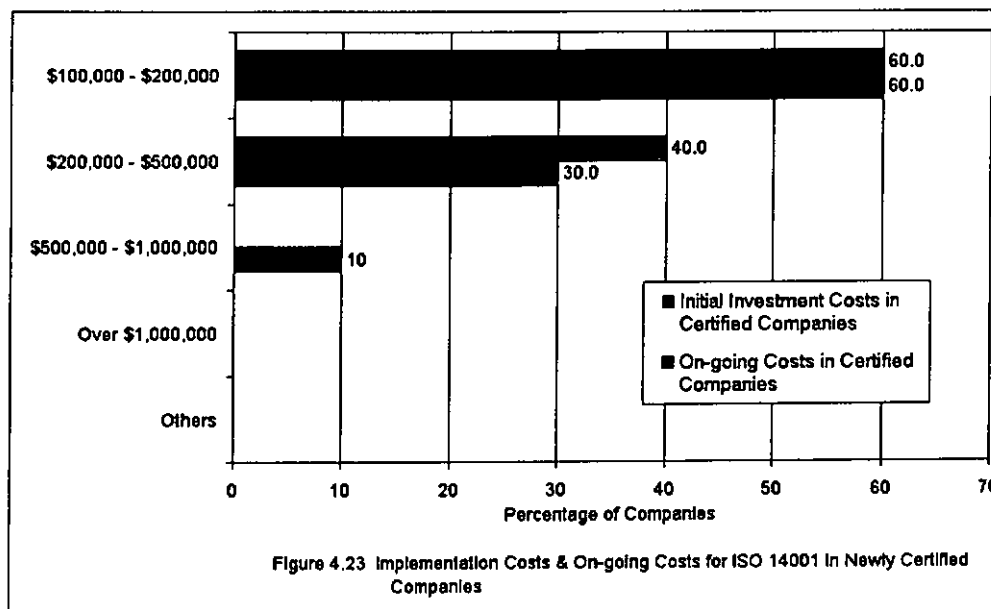


Training was not available for every member of staff, as it would require considerable manpower and resources. Some companies also stated that regular training in terms of basic environmental awareness, operation safety would be provided for middle management and technical staff once a year. The construction companies also expressed that it was not cost effective to provide training for all new staff as they had

a high turnover rate. The discussion on the result differences in Surveys A and C was shown in Section 4.4.

Implementation Costs of ISO 14001 EMS

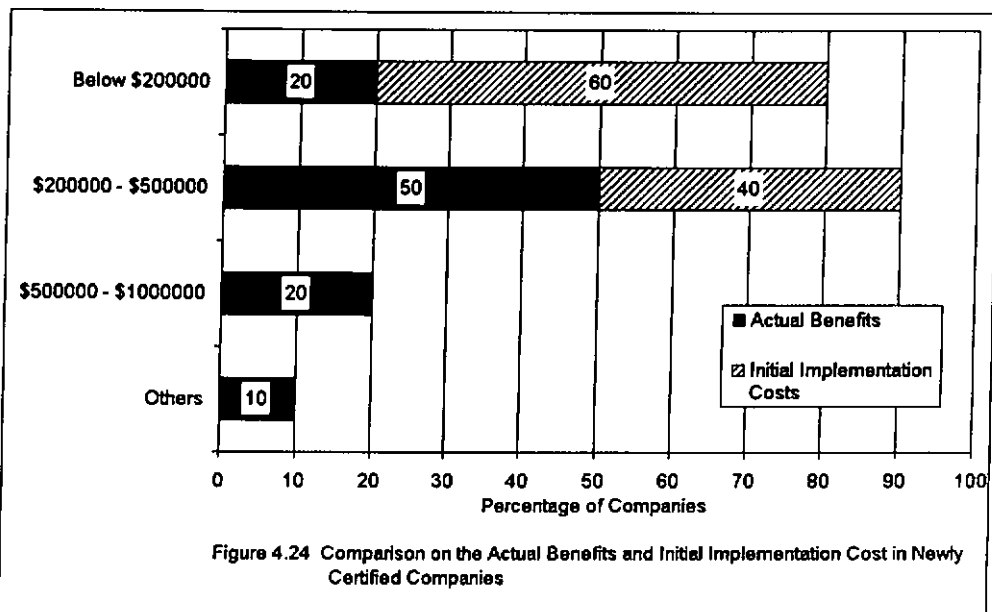
Six respondents indicated that the initial implementation costs of ISO 14001 EMS would range between \$100,000 and \$200,000. Others said that they were around \$200,000 to \$500,000. The on-going costs for ISO 14001 EMS adoption were below \$200,000 (60% of total respondents) (Figure 4.23).



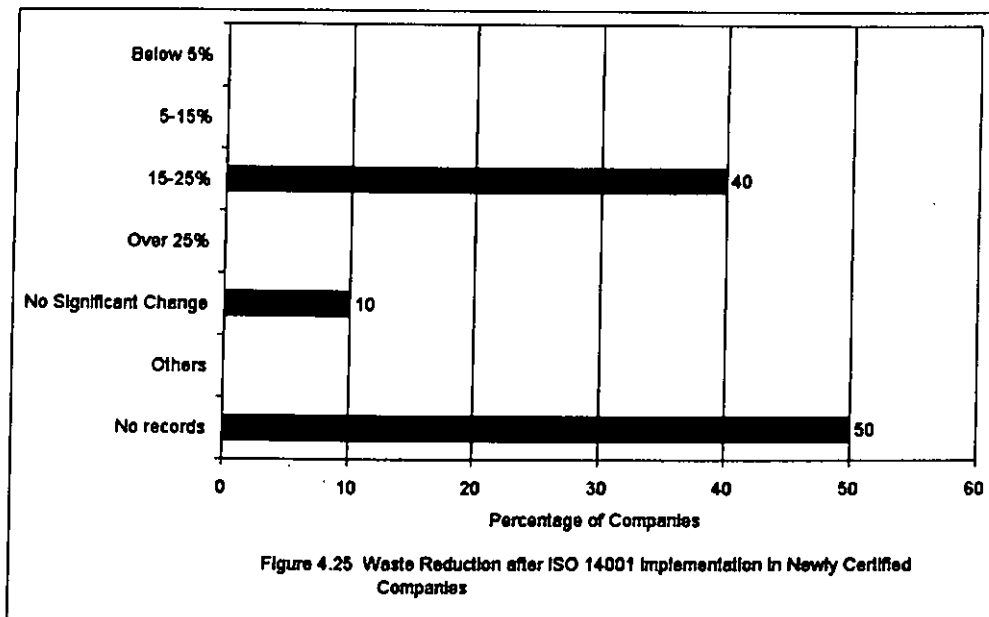
In the survey, about 90% of the certified companies recovered the implementation costs within twelve months through waste minimisation programmes and green practices while one company recovered the implementation costs in approximately two years. In summary, the companies generally thought that the implementation costs of ISO 14001 standard was reasonable and could be recovered within a relatively short period of time.

Actual Benefits of ISO 14001 EMS

Most of the certified companies achieved a reduction in operation costs after the ISO 14001 EMS implementation. Compared with the initial implementation costs, the actual financial benefits could generally cover the initial implementation costs (Figure 4.24). This significant cost saving motivated the certified companies continually to improve the EMS and maintained the ISO 14001 certification.



In addition, four respondents recorded 15% to 25% reduction in waste generation (Figure 4.25). However, one company revealed that there was no significant change in the amount of waste produced. Meanwhile, five other respondents were not able to provide the exact figures. The fact that half of the certified companies could not provide the waste figures possibly indicates that the current record and documentation systems in these certified companies had not been well established and maintained.



4.4 Discussion on the Changes in Attitudes and Operation Conditions in Certified Companies

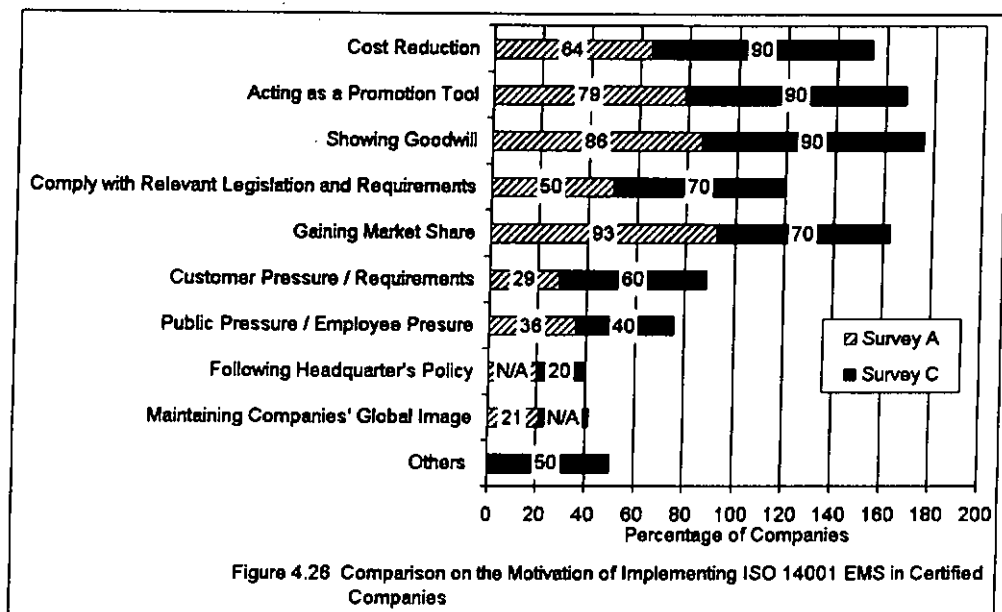
The results of the two questionnaire surveys (Survey A and Survey C) conducted among the certified companies in December 1998 and February 2000 were compared.

The comparison aims at studying the changes of attitudes and operation conditions of ISO 14001 EMS in the last two years.

Recognition of ISO 14001 EMS standard

There was increasing motivation for certified companies to implement ISO 14001 standard (Figure 4.26). The companies with cost reduction increased from 64% increased to 90%. This result may indicate that the cost reduction in certified companies can be an important motivation of ISO 14001 certification. The environmental pressure from customers and public increased from 29% to 60% and

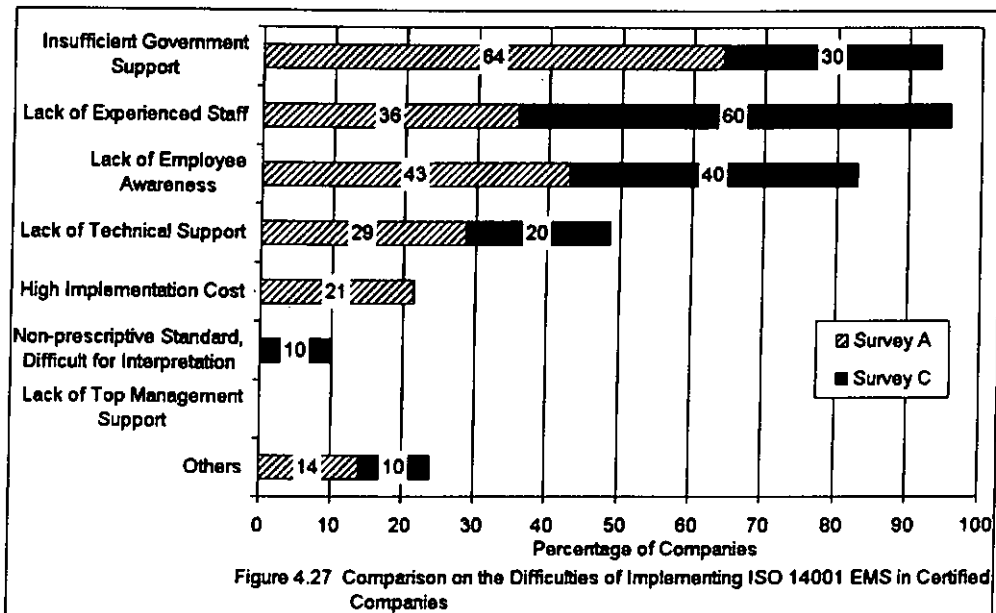
36% to 40% in terms of percentages. The increased pressure from customers can make companies more concerned about environmental issues and more eager to find ways to minimise pollution. In addition, recent degradation of Hong Kong environment (e.g. poor air quality) also alerts the general public to be aware and conscious of environmental issues. This has indirectly increased the companies' interest in the adoption of ISO 14001 EMS.



Changes in Implementation Environment

Compared with the results of Survey A, the complaint of insufficient support from the government decreased from 64% to 30%, which might indicate that the government have improved its measures in helping local companies to implement ISO 14001 (Figure 4.27). Lack of technical support from the government and industrial associations in certified companies also decreased from 29% to 20%. The newly certified companies thought that promotion of environmental management systems and ISO 14001 EMS standard had strengthened. For instance, ISO 14001 EMS

seminars and discussion forums have been held regularly by the government over the past two years.

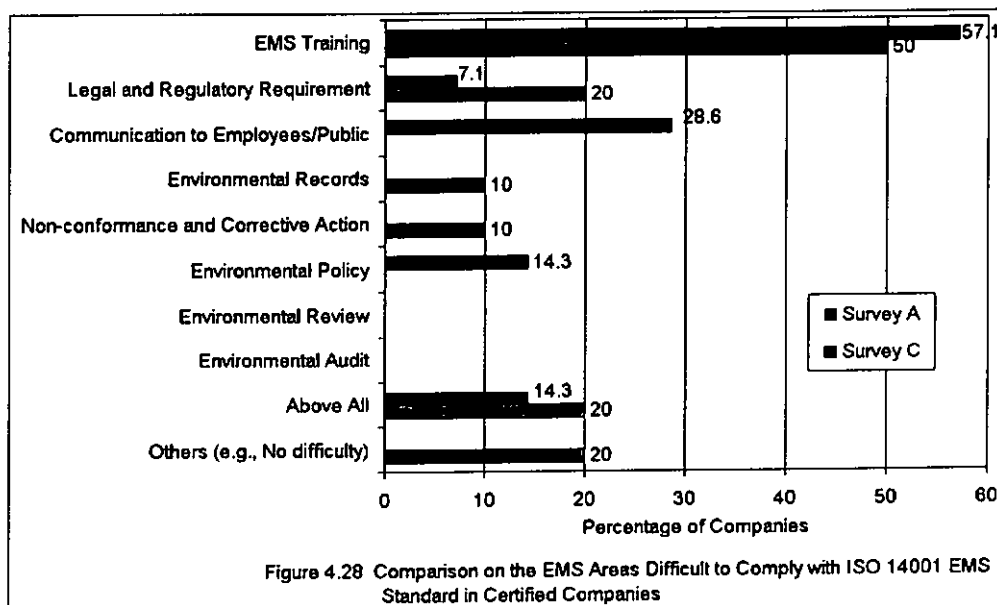


The respondents in both of the surveys stated that changes in operation design and pollution prevention measures were necessary in improving the general environmental performance. However, problems of insufficient experienced staff were commonly found during implementation. Certified companies therefore still strongly request technical assistance from the government.

Survey C also revealed that the amount of ISO 14001 implementation costs accounts for less than 5% of total sales in most of the certified companies. All respondents considered the initial implementation cost worthwhile as it can be recovered within one to two years. Therefore the percentage of certified companies that chose “high implementation costs” as a difficulty decreased from 21% to zero in Survey C.

EMS Challenges Faced by the Certified Companies during ISO 14001 Implementation

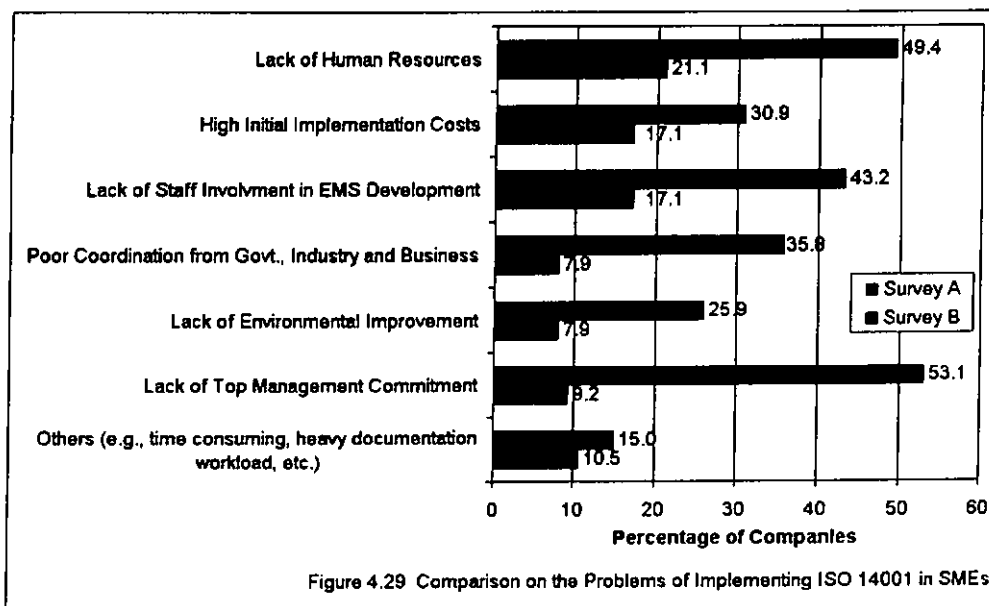
EMS training was one the most significant challenges faced by the certified companies. Both Surveys A and C indicated that the certified companies had difficulty in providing appropriate EMS training to their employees (Figure 4.28). Most of the certified companies also expressed that EMS training was costly and at the moment, they could provide EMS training to selected member of the staff only. Since workers and technicians would handle most of the activities, procedures and products that might cause environmental impacts, they were firstly trained in the EMS programmes. In addition, EMS areas such as legal and regulatory requirement, communication to employees/public, environmental records, non-conformance and corrective action, and environmental policy were also mentioned by the certified companies.



4.5 Discussion on Implementing ISO 14001 EMS in SMEs

Common Difficulties Faced by the SMEs

The results of the two SMEs surveys (Survey A and Survey B) showed low awareness of ISO 14000 in Hong Kong. Over half of the SMEs were not aware of the ISO 14001 standard. Furthermore, many of the SMEs did not realise the importance of ISO 14001 standard and associated long-term benefits. This was especially true for the small companies due to the lack of human resources, high implementation costs and lack of staff involvement in the EMS development (Figure 4.29). Implementation of ISO 14001 EMS seems to be difficult for them.

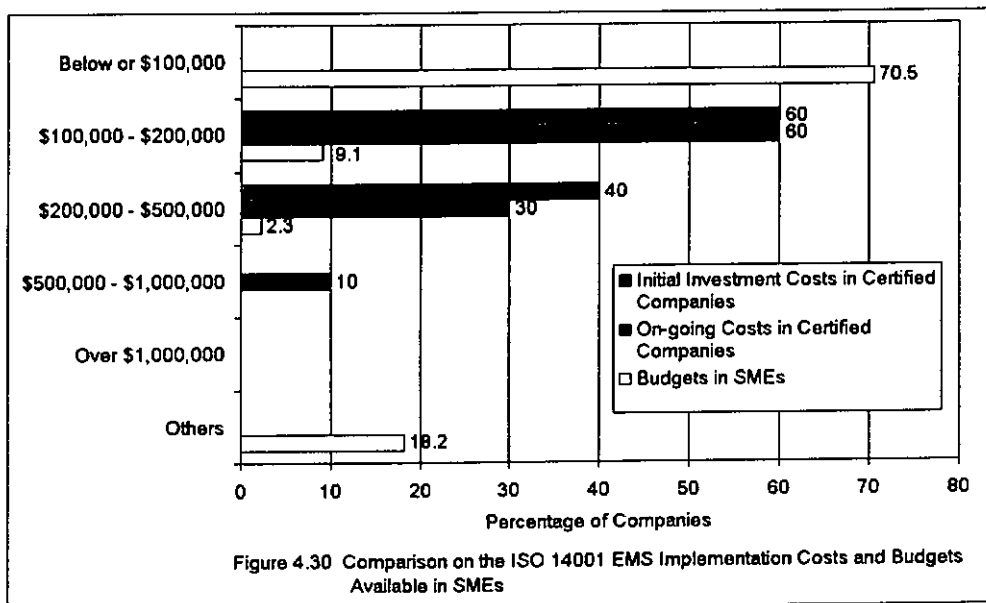


In Survey A, the lack of top management commitment was the main problem in the SMEs, followed by the lack of human resources. However, only 9.2% of the SMEs in Survey B identified problems regarding the top management commitment. The difference may lie in their business type and level of environmental concern in the top

management levels in these SMEs. The SMEs in Survey A mainly belonged to the import and export business, such as watch, toy and electronic sectors. Whilst in Survey B, financing, insurance, real estate and business services contributed a significant percentage. These business sectors usually have a better management structure within the organisations, and higher education level of top management. Therefore top management in Survey B generally would be more likely to accept ISO 14001 EMS implementation than those in Survey A.

Possibilities of ISO 14001 EMS Implementation in SMEs

Companies in Hong Kong, typically the SMEs, are looking at short-term returns rather than long-term growth opportunity. Therefore, ISO 14001 EMS implementation may not be an attractive option to the SMEs. Even the certified companies in Survey C indicated that they spent no more than HK\$200,000 for the implementation. This was still more than what the SMEs could afford (Figure 4.30).



However, the implementation of the EMS in smaller companies with simple organisation structure generally costs less and may still lie within the SMEs' budgets. One of the certified companies achieved an operation costs reduction of up to 35%. This example can act as a model for the local SMEs. Nine of ten respondents were willing to help their suppliers or contractors with ISO 14001 certification by providing technical support. These certified companies expressed that technical support such as implementation guidance and expertise consultation would be provided to their suppliers if necessary.

Even though implementation of ISO 14001 involves an initial investment, its long-term benefits such as energy saving, waste reductions, pollution minimisation, facilitate trades and improvement on management efficiency would justify its efforts. In fact, many SMEs with import and export business may need ISO 14001 EMS certification as a passport for doing business in the future.

Chapter 5 Case Studies – Typical SMEs, Each with a Different Organisational Size

Four companies have been selected for in-depth case studies in this project. The companies are of different sizes, business natures and environmental performance. They are described in the following sections.

5.1 ABC Polystyrene Factory

Company Profile

ABC polystyrene factory was established in Hong Kong in 1980 and later moved to Sha Jin in Mainland China in 1990. Its main products are polystyrene boxes for different types of packaging. The factory in Sha Jin produces approximately 5000 tons of polystyrene boxes annually. There are 60 to 70 workers employed on the production line and 3 to 4 employees in the plant office. The main ABC polystyrene factory customers are Hong Kong toy, games, electronics and home appliance companies. These customers use ABC's polystyrene boxes to export their products to other countries like United States and European union.

On the Sha Jin site, one plant manager is responsible for the daily site operation and reports to the assistant director regularly. Under the supervision of the plant manger are three main divisions: the operation unit, administration unit and engineering unit.

ABC polystyrene factory regards themselves as a proactive company in relation to environmental protection and the polystyrene industry as a whole. They recognise that in order to retain competitiveness in the industry, they have to have a clean environment at the operation site and minimise any adverse impact to the environment throughout their operation processes. ABC polystyrene factory is currently one of the members of the Hong Kong Polystyrene Association and one of the few actively involved in environmental campaigns.

Site Description

The site comprises three stories, occupying an area of 10,000m². The first floor includes the raw material store, preheat tank, loading and unloading machine and site office, the second floor houses the streaming machine and moulding machine, and the third floor includes the drying room, QC checking and packaging.

Operation Process

The production process of polystyrene boxes involves a series of stages including preheating resins, colour addition, streaming, moulding, cooling and packaging. The cost of water and energy usage was about HK\$4500/month. In the moulding process, an average of 5-6% of the total products was normally found to have defects and rejected. The defect percentage had just been recorded in September 1999. The rejected products were collected and reformed into long plastic strips for recycling,

which was collected by the government-appointed waste collectors. Cost saving from this recycled waste was approximately HK\$6000/month.

Key Environmental Issues

- ◆ Steams were ventilated through windows directly to the atmosphere
- ◆ Wastewater was discharged directly to the domestic sewage system without pre-treatment
- ◆ Material spillage and water leakage from moulding machines were resulted during operation
- ◆ Noise was generated from three sets of power generators
- ◆ Blockage of passageways by materials was found
- ◆ Housekeeping was poor

Although the ABC polystyrene factory realised the importance of environmental issues, there was no formal environmental management system on the site. In addition, there were no documents to show or any proper measures to monitor the environmental performance.

In the steaming process, steams were ventilated through windows. No condensation machine was installed and therefore water was not being recycled. The steams, which may contain acidic substances and other hazardous materials, were directly released into the atmosphere without monitoring. Material was observed from the moulding machine and water leakage was also found at some locations. There was no wastewater treatment facility on site. The wastewater discharges may contain

elevated concentrations of inorganic substances and polystyrene residues potentially causing serious water pollution problems. Noise was also generated from the power generators. Noise measures such as the use of barriers and absorbing materials are strongly recommended.

In addition, the raw materials normally stored in an area away from the operation plant were found to be stacked in the passageway near the moulding machine. In general, the site appeared to poorly manage. Some storage tanks and rubbish were placed improperly. A labelling system was established in the raw materials and final product packages, but not in the waste storage tank.

Every three months, the provincial China Environmental Protection Agency (EPA) monitor ABC factory in terms of SO₂, NO_x and smoke plume optical density. A non-compliance pollution fee (around HK\$3000) is charged on each visit. The company itself did not implement any in-house monitoring system or waste minimisation programmes to keep track of the environmental performance. Instead of EMS programmes, a Quality Assurance (QA) division was established for a quality check of products.

Each new worker received an initial training course on Health and Safety. Basic knowledge such as the characteristics of raw materials, use of protective equipment and hazardous waste handling was presented during the training programme. However, the company did not provide any follow up training. In general, both the staff and workers surveyed were weak in environmental awareness and had little knowledge of environmental management systems.

5.2 123 Paper Products Manufacturing Company

Company Profile

123 Paper Product Manufacturing Co. was set up in Hong Kong in 1985 and then moved to Buji in Mainland China in 1992. Different sizes of carton boxes are their main products. The company employs 30 to 40 workers on site.

123 Paper Product Manufacturing Co. is a small business firm with little concern for the environment. The company manager regards impacts on the environment as insignificant throughout the whole operation which is purchased from foreign countries, like the United States, Canada and Australia. The purchasing criteria are mainly hardness, texture, durability and price of the cardboard. Most of the cardboard is made from new paper. Main customers of 123 Paper Products are multinational electronic companies in Hong Kong.

Site Description

The manufacturing facility, with an area of 10,000m², consisted of an office, cutting machines, printing and sticking machines, material storage, packaging storage and loading and unloading area.

Operation Process

At the operation area, cartons printed with a logo and words were produced as final products. The process included cutting, printing, sticking, quality checking, packaging and loading. Firstly, the cardboard was cut into the desired size. A different logo and words were then printed onto the sides of the cardboard. The two ends of the cardboard were then attached to form a carton. The quality (e.g. colour and accuracy of the printed words) of these cartons was checked before packaging.

Key Environmental Issues

- ◆ Wastewater discharge was directly into the domestic sewage system without pre-treatment
- ◆ Paper ash and dust were produced during the paper cutting process
- ◆ Noise were generated from machines during operation

The company is relatively small, and therefore there was no formal management structure on the site. During the cutting process, paper ash was produced and scattered throughout the work environment. However, the workers were reluctant to wear facemasks during operations. There was no formal safety and health training.

The dye used during the printing process was water-soluble and met German environmental standard. During the printing and tool cleaning processes, wastewater was produced and discharged into the drainage system directly without treatment. The amount of wastewater discharged daily was not recorded as documentation procedures for handling wastewater were not established. During the operation, the machines produced a degree of noise. However, there were no formal noise

monitoring programmes. In addition, the cardboard was stacked up to a height of 2.5m but there was no safety warning overhead. Housekeeping needed to be improved on this site. The local Environmental Protection Agency (EPA) paid regular visits to the facilities for safety inspections regarding the quantity of fire extinguishers, and passage of exits. The EPA did not fine the company for its effluent discharge.

Since the operation process in this company was simple and on a small scale, fewer environmental issues required attention. The major gaps between the current operation practices and ISO 14001 EMS requirements were in the areas of management structure, documentation and record.

5.3 Goodluck Holdings Limited

Company Profile

Goodluck Holdings Ltd. was established in Hong Kong in 1980 and later moved to Kengai, Mainland China in 1988. It is an electroplating company which produces various products, such as shoe polishers, electric fabric shavers, and paper shredders. The company employs 700-800 workers in the production line and about 50 staff in the office.

The company had implemented ISO 9002 in part of their production lines. The main impetus for implementing ISO 9002 came from customers in Japan. By implementing

a structured quality system, the company hoped to address quality issues in a more efficient and effective way.

In the head office in Hong Kong, there are three main divisions, which include sales, administration and accounting. At the Kengai operation site, the structure is further divided into sales, accounting, electroplating operation, tool and maintenance, research and development, quality assurance and packaging divisions. Each division has its own manager and operational structure. The managers from all the divisions report to the plant manager periodically.

Site Descriptions

The site comprised three floors. The first floor included the raw materials storage, electrical generators, sewage treatment tank and loading and unloading areas. The second and third floors housed the site office, electroplating process, quality assurance, tool and maintenance units. The whole plant occupied approximately 20,000 m² of land.

Operation Process

At the Kengai operation site, the main operation was electroplating. The raw materials were shielded with a metal coating onto the surface of the products making it more durable and attractive. During the electroplating process, different chemical substances were used. First, the articles were cleaned of oil or dirt in a degreasing process. Second, oxides on the substrate surfaces were removed through an acid

picking process. The articles were taken for neutralisation and then electroplated. The articles were then electroplated. In order to form a more protective chromate coating for zinc and cadmium plating, a post surface treatment was needed. Finally, acids (e.g., H₂SO₄, HNO₃, etc.) were used to brighten the articles. The products were checked by the QA unit before packaging.

Key Environmental Issues

- ◆ Disposal of cleaning agents was lacking (e.g., alkali, acid, inorganic substances, etc.).
- ◆ Gas was emitted and released to the atmosphere directly.

The company had its own management system, based on the structure ISO 9002 quality management system. However, this in-house quality management system did not follow every aspect of the standard. Due to budget limit, and other business considerations, only certain production lines were ISO 9002 certified.

The quality assurance (QA) unit kept the overall organisation documents, quality management manual and quality review reports. The current documents were found to be legible, dated and ready identifiable. Documented procedures for operation were established in the ISO 9002 certified production lines.

Many chemicals were used during the production processes (e.g. alkali, acid, organic cleaning agents and heavy metals). The wastewater was collected into a treatment tank for pre-treatment before discharge. Through the neutralisation and precipitation,

the wastewater was adjusted to pH around 7 and discharged into the drainage system. The procedures for wastewater monitoring were established but not well documented. The sludge from the treatment plant was dried and collected by a registered waste collector for further recycling. Gas was also produced during the operation processes. There was no air monitoring programme.

The company is recommended to implement procedures on the use and disposal of chemicals. Improper use of these dangerous substances may lead to serious accidents to the workers. Preliminary safety and health training were provided for all new workers but there was no follow-up training.

Since the company had implemented an in-house quality management system, the gaps on documentation between the current operation practices and ISO 14001 EMS requirements were comparatively small. In contrast, the company needs to put more effort into the implementation of EMS programmes. Documented procedures should be established to identify current environmental issues and monitor the environmental performance within the organisation.

5.4 Best Jewellery Company

Company Profile

Best Jewellery Co. was set up in 1991. It is a subsidiary of a holding company in Hong Kong. The company has an office in Hong Kong while the manufacturing

process is located in Shenzhen, Mainland China. It manufactures many kinds of jewellery products such as necklaces, ear rings and rings. The company employs nearly 1000 workers at the operation site, and about 100 employees in the administrative office in Hong Kong.

In the administrative office, there are five main divisions, namely Sales, Administration, Accounts, Design and Research & Development. On-site work progress is monitored through a computer network in the Hong Kong office. At the Shenzhen operation site, there are five divisions as well, including accounts, assembly, tooling and maintenance, quality assurance and packaging units. About 14 employees at the management level from Hong Kong were responsible for managing daily on-site documentation work.

The company had implemented a quality management system in the office based on the structure of ISO 9001 and ISO 9002 on the operation site. The systems were not certified by a third party. ISO 9000 certification was not compulsory by its clients at the moment. Approximately over 80% of the products are exported overseas. Its major customers are from Europe, such as UK, Germany and Switzerland. Raw materials such as diamonds and crystals, were imported from Europe and Japan. The whole manufacturing process is highly labour intensive as all the products are handmade.

Site Descriptions

The site comprised three floors. The first floor included the raw materials storage, electrical generators, venturi, loading and unloading areas, while the second and third floors included the site office, assembly process, quality assurance, tooling and maintenance units. The whole plant occupied around 25,000 m² of land.

Operation Process

The raw materials are cut into different size and shape, and then assembled to form the final products. Chemical substances (e.g., H₂SO₄, ammonia) were used for cleansing the raw materials. Some articles were gold or silver plated. Finally, the products were polished to improve brightness and smoothness.

Key Environmental Issues

- ◆ Dust and metal aches were produced during cutting and polishing processes
- ◆ Disposal of cleaning agents was lacking (e.g., acid, alkali, ammonia, etc.)
- ◆ Noise was produced from the power generator and cutting machines
- ◆ Gas produced from welding work was directly ventilated to the atmosphere

The company has a big gap on the implementation of EMS programmes as the company did not implement any formal procedures for handling the environmental issues. EMS programmes (e.g., monitoring procedures, recording and control system, etc.) should be established to fulfil the requirements of ISO 14001 EMS standard.

Although the wastewater was pre-treated before discharge, there were no formal monitoring programmes of the wastewater conditions. Ashes produced during polishing process were extracted through an air duct. The labourers were required to wear facemasks during the operation. A labelling system had not been established, but all containers containing solid wastes (e.g., gypsum) were properly stored. Gas produced from welding work was directly emitted to the atmosphere without monitoring. In-house safety and health training was given to all new workers. However, on-job training was not provided at the moment.

The quality assurance division was responsible for monitoring the overall quality performance regarding documentation, quality review and quality checks of final products. The documents were found to be legible, dated and readily identifiable. The company was undergoing computerisation at the time of this investigation. Documents would then be kept in a computer file format gradually replacing the existing hard copy. In general, this site appeared clean and exhibited good housekeeping.

The documentation work that was required by the ISO 14001 EMS standard would not be a major concern for this company, as they had already implemented an in-house quality management system. The company probably could take advantage of the existing quality management system to develop EMS procedures and documentation.

5.5 Gap Analysis

Based on these four case studies and information obtained from the interviews and the site inspection, gaps between the existing systems and the requirements of ISO 14001 EMS Standard were analysed.

Environmental Management System

An environmental management system (EMS) did not exist in all companies surveyed. There was no formal policy on the environmental issues. All of the companies were concerned with the products' quality. For examples, Goodluck holding Ltd. had a quality policy, which specified the organisational objectives and its commitment to quality. However this quality policy were not associated with environmental issues. There were no EMS programmes in their daily operations.

Legal and Other Requirements

All companies in this study did not establish standard procedures to identify environmental regulations relevant to their operation in China. Since the environmental legislation may be amended periodically, the companies would encounter difficulties in complying with the latest environmental laws. The environmental requirements can vary from provinces to province. Therefore, it is difficult for those companies to fulfil the ISO 14001 requirements on legal compliance.

Structure and Responsibility

The roles, responsibilities and authorities of each staff member in the management structure were defined and communicated within the management structure in all of the studied companies. However, most of the companies did not compile the information in a formal document nor did they have a designated staff for managing the environmental issues within their organisations.

Communication and Documentation

Each of the companies had its own internal communication system. The staff could report their ideas to the division manager and the management level. However, in practice, the communication channels may not be effective through several organisation levels. Memos and notices were used for internal communication in the companies. The external communication channels with the local government, interested parties and stakeholders were not clearly established. The companies did not have documented procedures or systems for receiving, documenting and responding to external parties.

Emergency Preparedness and Response

All of the surveyed companies provided training to new staff on handling emergency situations. However, the responses to environmental accidents, such as chemical spillages, and toxic gas leakages were not clearly addressed in safety and health training. On-job training was also not provided.

Checking and Corrective Action

The environmental monitoring and measurement programmes were established in one company studied. With the exception of Goodluck Holding Ltd, the others did not have their own procedures to monitor environmental performance, such as solid waste disposal, air emission and noise level on the operation site. In addition, the companies did not establish documentation procedures for evaluating compliance with relevant local environmental legislation and regulations.

Non-Conformance, Corrective and Preventive Action

All of the companies, except Goodluck Holding Ltd., did not establish documented procedures for defining responsibility and authority for handling and investigating any non-conformance. Goodluck Holding Ltd. had implemented non-conformance and corrective action procedures according to the ISO 9002 requirements. However, the corrective action programmes established did not cover the environmental aspects of the site operations.

Management Review

The top management in Goodluck Holding Ltd. had regular reviews on the quality management system, to ensure its continuing suitability, adequacy and effectiveness. The plant manager would report to the top management if problems existed in the system. Other companies did not implement any management review programme in their organisations.

5.6 Implication of the Gap Analysis

Management Culture within the Organisations

The results of the surveys indicated that the level of environmental awareness within the small and medium enterprises was low. Many workers were unaware of the existing environmental problems and did not receive appropriate on-job training. In the case studies, most of the workers lacked technical training and were reluctant to change from their usual practice. In recent years, environmental interest has risen in China. However, the environmental awareness of the public, particularly the workers remain at the preliminary level. Warren and Ortolano (1998) also mentioned that the workers in Chinese enterprises did not have strong technical backgrounds. Pollution prevention efforts are either overlooked or rejected during technical analysis.

The top management in these companies did not regard environmental issues, as one of the important business considerations. Even though the companies chosen in the case studies were on different scales and business types, none of them had plans to adopt the ISO 14001 EMS standard in the near future.

The top management of these companies did not realise the importance of an environmental management system. They thought that the EMS implementation was unnecessary at the moment. Similar findings were also obtained in a study of electroplating industry in China, where the leaders and staff did not understand that

pollution prevention could be used to improve the overall factory profitability as well as environmental quality (Warren and Ortolano, 1998).

Understanding of Environmental Management System

During the site visit, it was found that most of the interviewees were not familiar with the environmental management system, or even the quality management system. EMS was a new concept to the local industries. In the past, managers tended to focus on the requirements of individual environmental regulations without considering a systematic approach.

Though some certified companies such as Cathay Pacific Airway, Island Shangri-La Hotel have proven that the implementation of ISO 14001 can improve their environmental performance as well as reduce their operation costs. The companies in these case studies remained uncertain as to whether this standard could bring similar results to their companies.

Existing Operation System in Companies

From the results of the case studies, all companies had a wide gap between their existing operation systems and the requirements of ISO 14001 EMS standard. The major problematic areas lie in environmental policies, training, planning and document control. Companies had not established any documentation procedures on environmental issues of their daily operations. Most of the companies were concerned that adopting ISO 14001 EMS standard may require heavy documentation

workload. Due to limited budgets, it was also difficult to allocate manpower to manage daily documentation work for ISO 14001 adoption.

In the case studies, the workers at the operation level were not used to the quality management system, such as recording the daily waste generation and being aware of any possible environmental impacts during production. The workers stated that since there were no incentives and rewards for improving the environmental management practices, they were not obligated to implement measures to reduce pollution from the daily operations.

Deficiencies of Training

Most of the companies did not provide regular training to their staff. Simple safety and health issues were only provided at the orientation briefing for new staff. There is no follow-up on-job training on handling the emergency cases, such as handling gas leakages, hazardous waste disposal and wastewater discharge. This showed that most of the companies did not have a systematic training programme. Awareness and self-motivation for environmental protection at the operation level should be raised through on-job training programmes.

Low Emergency Preparedness and Response

All of the companies studied said that they did not have any serious accidents in the past. There were no procedures for formal accidents and emergency situations, like accidental discharges, hazardous gas emissions, etc. Nevertheless, some of the

operations in the companies required the use of hazardous chemicals, a systematic procedure for handling the safety and health issues should be established and correlated with the emergency plan.

Deficiencies of Non-conformance Tracking and Records

Most of the companies in the case study had designated personnel responsible for handling and investigating non-conformance of product quality. However, these companies except for Goodluck Holding Ltd. generally did not have documented procedures to define clearly the responsibilities of the staff involved. Unclear responsibilities could lead to a delay in corrective actions. In fact, any changes in the operation procedures should be recorded to monitor the effectiveness of the corrective actions.

A wide gap was found between the existing operation practice in these companies and the documentation requirements of the ISO 14001 EMS standard as many of the companies did not maintain a complete set of records, legislative and regulatory requirements, incident reports, reports of environmental audits and reviews, contractor and supplier information and emergency response manuals.

5.7 Summary

A close analysis of the organisational structure and environmental management system has been conducted through the four case studies. Similar to the results of the questionnaire survey, the case studies showed that most of the companies did not have

any environmental management system in place, and the top management was not keen on adopting the ISO 14001 EMS at the moment.

As described in the previous section, the companies typically encountered three main barriers to ISO 14001 adoption: (1) low environmental awareness within the organisation, particularly the top management; (2) lack of human resources and lack of experienced quality and environmental management system staff; and (3) high initial implementation costs.

Other factors involved in the adoption process included: (1) scale of organisation, (2) business types and (3) competitive position within the market. A small-scale company, like 123 Paper Products Manufacturing Co. had little interest in the ISO 14001 adoption as the organisational survival issues tended to be the primary concern. Only the viable and comparatively large companies such as Best Jewellery Co. and Goodluck Holding Ltd. might consider ISO 14001 EMS as a strategic tool to enhance future business. Opportunities.

The business type is also an important consideration for these companies. Industries with greater environmental impacts, like electroplating (e.g., Goodluck Holding Ltd.) had more environmental problems to deal with. Such company generally needs to put more efforts in terms of both financial and human resources, into the environmental control process. As long as the SMEs could run their operations under the existing conditions, many would not have plans to implement the ISO 14001 EMS standard in the near future.



Most of the companies in the case studies regarded the adoption of ISO 14001 EMS as both costly and difficult. Furthermore, these small-sized SMEs (e.g., 123 Paper Products Manufacturing Co.) had less incentive to adopt ISO 14001 EMS than others because its business domain was predominantly within the domestic markets, which were less concerned about the environmental issues than other international markets. These small-sized SMEs did not have an urgent need to implement and certify to ISO 14001 EMS standard given the present business condition.

From the results of the case studies, it was also observed that only the SMEs within the supplier chain of large multinational corporations would be likely to consider EMS adoption. Many literatures also stated the trends that some SMEs began to be concerned with environmental impacts resulted from their business operations due to the supplier chain effects (Blau, 1995; Gunningham, 1995; Begley, 1996; Tibor and Feldman, 1996; Miles et al, 1997). Stakeholders such as the government, multinational clients and environmental groups have also exerted pressures to the SMEs to adopt ISO 14001 EMS (Rothery, 1995; Graff, 1997; Boiral and Sala, 1998; Crick and Chaudhry, 1998). In order to maintain a long-term relationship with customers, SMEs operating in global competitive markets will generally be more interested in the ISO 14001 EMS standard.

Chapter 6 Comparative Study with Other Asian Countries

According to the statistics published by the German Government in November 2000, 21,449 organisations had been certified to ISO 14001 EMS standard around the world (Peglau, 2000) (Figure 6.1). Japan is the world leader with 4636 certifications, followed by Germany and United Kingdom. East Asia is also a strong EMS certification producer, with, 718 in Taiwan, 464 in China, 463 in South Korea, 212 in Singapore, and 91 in Hong Kong. The number of companies with ISO 14001 certification in Hong Kong is very low compared to developed countries and other Asian countries. The concept of environmental management had been promoted to the public since the early 90s in these countries, especially the European countries (BS 7750 & EMAS were published in 1992 and 1993 respectively). In contrast, the Environmental Protection Department in Hong Kong just started the promotion of ISO 14001 EMS standard in the late 90s. The Architectural Mechanical Services Department, Government Chemist, and several divisions in the Electrical and Mechanical Services Department and the Environmental Protection Department had been certified in 1998, 1999 and 2000 respectively. Therefore, the level of environmental awareness among these countries was much higher than in Hong Kong.

A comparison of EMS implementation process in regional countries is described below.

The statistical data was provided by Mr. Reinhard Peglau and graphically processed by ISO world at November 2000 (Federal Environmental Agency, Berlin).

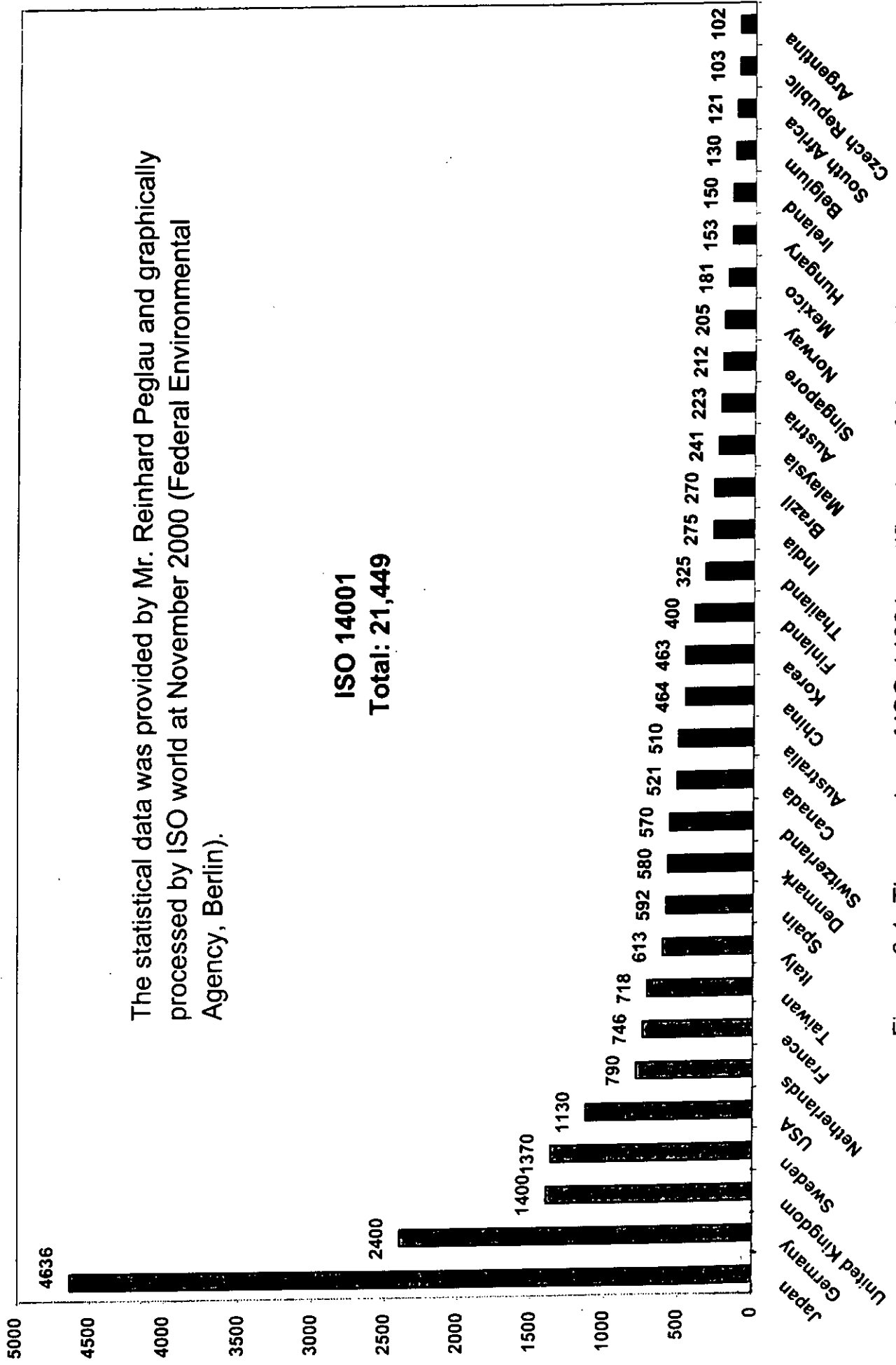


Figure 6.1 The number of ISO 14001 certification of the world

6.1 Government Roles in ISO 14001 EMS Adoption

Successful implementation of ISO 14001 EMS depends on various factors, including government supports, local cultures and organisation practices. In countries such as in Japan, Taiwan and Korea, their implementation pattern such as organisation scale, business types of certified companies and difficulties faced by the companies are similar to those encountered in Hong Kong. However, the implementation progress of ISO 14001 EMS in those countries is significantly faster than in Hong Kong. A major difference lies in the timing and promotional tactics in these countries. Government agencies in Japan, Taiwan and Korea have been actively promoting environmental management system since the early 90s by means of seminars, environmental campaigns, environmental education, implementation guidance and most importantly, financial support. These governments would also offer financial assistance in the forms of grants and loans to organisations with establishing or certifying an EMS (Baurer, 1999; Industrial Development Bureau, 1999; Quazi, 1999). Recently the Chinese government has begun to recognise environmental problems and pledged to concentrate attention on sustainable development concepts with global economic priorities as well (Hale, 1999).

The environmental policies and promotion of ISO 14001 EMS in Taiwan act as a good example. In order to plan for effective implementation of international environmental standards, an ISO 14000 working subgroup was formed in 1995 under the Ministry of Economic Affairs in Taiwan. The ISO 14000 promotion co-ordination was led by the Industrial Development Bureau (IDB), Ministry of Economic Affairs (MOEA), instead of the Environmental Protection Administration. The IDB &

MOEA used “winning market shares” as the slogan for promoting the ISO 14001 EMS standard. The Taiwanese companies envisaged that ISO 14001 EMS certification could bring them the market opportunities and enhance competitiveness. The agencies involved in Taiwan’s overall ISO 14000 promotion are listed in Table 6.1.

Table 6.1 Duties among Agencies to Establish ISO 14000 Framework

Agency	Responsibilities
National Science Council	<ul style="list-style-type: none"> ◆ Implement ISO related research and international academic exchange
Ministry of Education	<ul style="list-style-type: none"> ◆ Public awareness promotion ◆ Develop and implement related education programmes
Environmental Protection Administration	<ul style="list-style-type: none"> ◆ Review and adjust current environmental policies and regulations ◆ Establish environmental labelling system and promote green consumerism
Bureau of Standard, Metrology and Inspection, MOEA	<ul style="list-style-type: none"> ◆ Develop national standards in line with international standards ◆ Formulate environmental standards for green products
Department of Industrial Technology, MOEA	<ul style="list-style-type: none"> ◆ R&D on tools and databases to support EMS implementation, environmental audits, environmental performance evaluation and life cycle analysis
Bureau of Foreign Trade, MOEA	<ul style="list-style-type: none"> ◆ Collect information on relevant trends from foreign sources ◆ Assess impact of ISO 14000 on trade
Chinese National Accreditation Board, MOEA	<ul style="list-style-type: none"> ◆ Establish and implement national accreditation system ◆ Guide certification bodies and auditor training providers
Industrial Development Bureau, MOEA	<ul style="list-style-type: none"> ◆ Overall co-ordination of ISO 14000 programmes ◆ Promote EMS implementation in the industrial sectors

The promotion of ISO 14000 has raised the awareness of pollution prevention among the business sectors. Instead of solely depending on end-of-pipe controls, thousands of firms in Taiwan now consider pollution prevention as a viable option for solving their environmental problems. The aggressive promotion of ISO 14000 EMS by the IDB & MOEA has made Taiwan one of the world leaders with 718 certifications as of April 2000 (Peglau, 2000).

6.2 Technical Approaches in EMS programmes

Recent surveys of certified companies in Japan indicated that their common aims for adopting ISO 14001 are improving the environmental aspects inside the firms and enhancing the employees' environmental awareness and environmental capacity building (Hart, 1998; Mohammed, 2000). The respondents showed that the benefit of having more market share was not the main goal for ISO 14001 adoption. About 30% of certified companies surveyed in Mohammed's study believed that the adoption of ISO 14001 EMS standard can improve productivity and reduce costs. The results indicated that the majority of certified companies in Japan were inspired by the benefits of environmental performance improvement.

In fact, most of the ISO 14001 certified companies received environmental performance improvement advantages and also productivity enhancement after implementation. The operation practices of a leading Japanese machine tool manufacturer were described as an example (Hou, 1999). This company had been certified to ISO 14001 EMS standard and stressed the importance of continual employee training. A number of technical approaches had been taken to improve its

environmental performance and productivity. For instance, wastewater generated from the water curtain in the painting room was recycled after proper filtration. Several operational measures for an oily waste streams also improved, including the applications of oil dripping pan, spill containment dike, reuse of process water and recovery/reuse of certain process chemicals. Solid wastes, e.g. metal debris, are often collected and shipped to reclamation factories for recovery. Waste items such as broken pallets, empty containers, used plastic bags or sheets, and waste paper produced during the operation were sorted and reused. The cleaning and painting processes were also modified to reduce VOC. Other alternative processes included restricting operation areas, proper ventilation in the work area and selection of environmental friendly solvents and paints. The whole plant was cleaned and exhibited good housekeeping. The proper EMS programmes and continued employee training were the key to continual environmental performance improvement within the organisation.

6.3 Common Difficulties Faced by Certified Companies

There are always some difficulties encountered by organisations before, during and after the implementation of ISO 14001 EMS, and these difficulties were generally similar in nature despite of different geographical locations. In Mohammed's study (2000), as shown in the diagram below, employee training (called "EMS training" in Hong Kong sample) was the main difficulty faced by certified companies during and after the ISO 14001 implementation in Japan (Figure 6.2). The results indicate that most of the employees do not have ISO 14000 EMS knowledge. Companies have to allocate significant time and resources in adopting EMS training programmes and

improving employees' environmental awareness. Japanese respondents (93%) stated that the government should introduce knowledge of ISO 14000 to the public. The firms (33%) were looking for the collaboration with the government through seminars and lectures. In Singapore, lack of the employee commitment results to the difficulties in interpreting legislation and designing the training courses (Quazi, 1999).

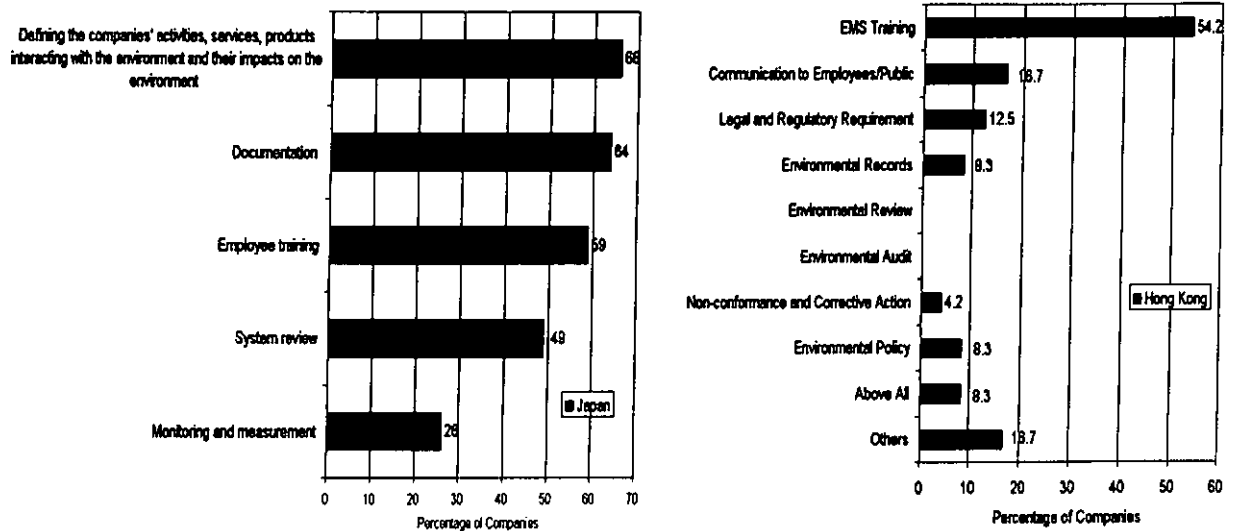


Figure 6.2 Comparison on the Common Difficulties Faced by the Certified Companies in Japan and Hong Kong

6.4 Industrial Sector Breakdown in Certified Companies

In Taiwan, manufacturing companies represented more than 91% of certified firms, with the rest covering service industries, such as consulting firms and waste management facilities. Among the certified industrial firms, the electronic and electrical equipment manufacturers made up the largest portion, about 30% of the total, followed by chemical manufacturers (approximately 20%) (Industrial Development Bureau, 1999). In Japan, electronics and general machinery sectors

accounted for a significant proportion. Furthermore, Japanese sectors such as schools, universities, banks, trading houses and even supermarkets have also obtained ISO 14001 certification (indicated in “Others” category) (Hart, 1999). The results indicated that ISO 14001 EMS had been widely adopted in all types of organisations in Japan but not in Hong Kong. However, the breakdown distribution of the certified companies in Hong Kong was rather different from that of Japan. As shown in the diagram on the right, the construction industry contributed the largest portion (18.9%), followed by the manufacturing and electrical/electronics sectors (Figure 6.3). The future promotion of ISO 14000 in Hong Kong should emphasise that this EMS standard could be applied to all organisations and benefit to the service sectors as well.

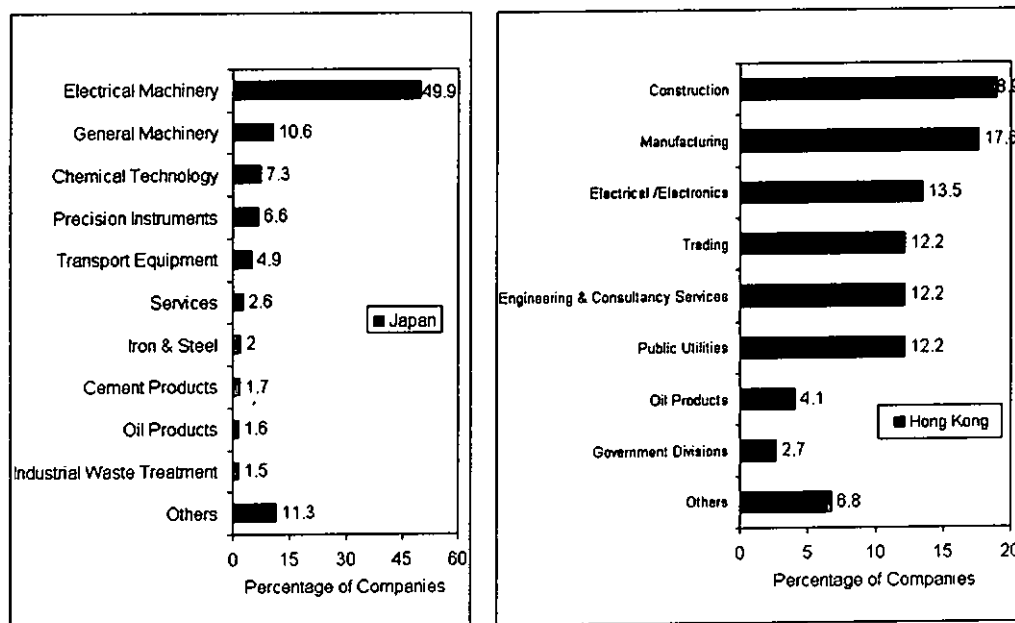


Figure 6.3 Breakdown of Industrial Sectors Certified to ISO 14001 EMS Standard in Japan

6.5 ISO 14001 EMS Adoption Progress in SMEs

The implementation progress of ISO 14001 EMS in SMEs was very slow around the world (Kirkpatrick, 1999). In Japan, a large percentage of certified companies were export/import oriented and belonged to large corporations (MITI, 1997). EMS training programme for SME suppliers and contractors had been provided by some (26%) of Japanese certified companies (Mohammed, 2000). More than 80% of their certified companies mentioned that they would consider having collaboration with SMEs on environmental protection issues. The Japanese companies (60% of respondents) were generally willing to promote ISO 14001 EMS among local people by implementing some environmental programmes, such as tree planting and waste recycling systems.

SMEs in Taiwan and Singapore were also slow in responding to ISO 14001 EMS standard compared with large companies (Industrial Development Bureau, 1999; Quazi, 1999). In Taiwan, less than 15% of companies certified were SMEs. In order to increase the attraction of ISO 14001 EMS implementation, both Taiwanese and Singaporean governments offered a higher level of financial support for ISO 14001 certification to the SMEs. In addition, the government agencies also encouraged large certified companies to collaborate with their suppliers and distributors to adopt EMS. Both of the governments believed that the support from private and public sources could help SMEs to overcome difficulties during certification.

6.6 Implications to Hong Kong

In Hong Kong, the local government pursues a generally non-interventionist approach to economic policy that stresses freedom of doing business in private sectors. The emphasis on free trade policies and a lack of public involvement in environmental decision making have somewhat delayed the environmental improvement progress in Hong Kong. The public generally agreed with the importance of environmental protection. However, there was still a wide gap between environmental awareness and there was still a wide gap between public environmental acceptance and environmental commitment.

Nowadays, the promotion work of ISO 14000 is mainly the responsibility of the Environmental Protection Department (EPD) from which technical assistance such as the guidance of ISO 14000 EMS implementation and introduction of ISO 14000 are provided. However, these ISO 14000 promotions are insufficient as EMS implementation guidance and technical manuals for specific sectors, such as printed circuit boards, synthetic resin, metal parts fabrication, textile dyeing and finishing are not available at the moment. Furthermore, the current promotion of ISO 14000 EMS in Hong Kong lacks financial incentives as it emphasise on the importance of environment rather than the potential economic benefits. As a result, local companies are reluctant to make the implementation of ISO 14001 EMS as a priority. Also the SMEs still have reservations about the values of ISO 14001 certification and implementation costs of ISO 14001 certification.

During visits to the selected manufacturing companies, difficulties in environmental compliance were observed. These manufacturing companies visited faced several environmental challenges that caused compliance problems. These manufacturing facilities generated a wide range of gaseous emissions, wastewater pollutants, and solid waste that lead to environmental pollution problems and wastage of resources.

As of December 2000, only 14.3% of certified companies belonged to SMEs in Hong Kong. Our second survey showed that the large certified companies generally did not require their suppliers and contractors to implement the EMS system. Guidance for ISO 14001 implementation would only be provided to their suppliers and contractors on demand basis. Compared with the ISO 14000 strategies in other Asian countries, there is evident that both the local government and the large certified companies have not play a proactive part in promoting the ISO 14001 EMS standard in Hong Kong.

Chapter 7 Conclusions and Recommendations

7.1 Conclusions

This study was undertaken with the aim at investigating the current implementation trends and difficulties of implementing ISO 14001 Environmental Management System (EMS) in certified companies and small and medium enterprises (SMEs) in Hong Kong. The acceptance of ISO 14001 EMS standard in local industrial firms has been evaluated. In addition, the current implementation progress in other Asian countries has also been discussed and compared with the situation in Hong Kong.

In Hong Kong, the number of ISO 14001 certifications has been increasing gradually from 23 to 91 in the past two years (from December 1998 to December 2000). As of December 2000, about 85.7% of the certified companies were large corporations and the major sectors for ISO 14000 EMS implementation in Hong Kong were manufacturing and construction. The results of our questionnaire surveys showed that the main driving forces to certification were:

- increase market share
- show goodwill
- act as a promotional tool
- cost reduction

The main areas for further improvement in the certified companies included:

- EMS training
- employees / public communication
- compliance with regulatory requirements

The implementation of ISO 14001 Standard in SMEs is limited to the relatively high-profile companies or sectors heavily dependent on exports only. Most of the SMEs in our study have not adopted any environmental management system. The major problems of implementing ISO 14001 EMS standard in the SMEs were:

- low environmental awareness in the top management level
- lack of human resources
- lack of experienced quality and environmental management system staff
- high initial implementation costs.

The companies in the case studies did not make ISO 14001 EMS implementation a priority over and, above other organisational tasks. The SMEs showed reluctance in implementing the ISO 14001 EMS owing to additional resources and time required for the environmental management burden and uncertainties in the value of the standard. Our case studies also showed that the small-sized SMEs had less incentive to apply ISO 14001 EMS than large companies, generally because SMEs were predominantly engaged in domestic markets, which were less concerned about environmental issues than the international market. Majorities of SMEs (over 70%) in

our study did not have plans to implement the ISO 14001 EMS standard at the time of writing this thesis.

Other Asian countries face similar implementation pattern, such as organisation scale, business types of certified companies, and difficulties to local organisations. However, the implementation of ISO 14001 EMS in other Asian countries progressed faster than that in Hong Kong. The major difference is that government in Japan, Taiwan and Korea have been actively promoting the ISO 14001 EMS standard. Training programme for SME suppliers had been provided by some of the Japanese certified companies (Mohammed, 2000). In addition, the government agencies also encouraged large certified companies to collaborate with their suppliers and distributors to adopt the EMS standard.

7.2 Recommendations

At the time of writing this thesis, the Hong Kong SAR government has not adopted any systematic programmes to support the ISO 14001 EMS standard implementation. With the anticipation of worldwide ISO 14000 trend, Hong Kong government should develop a comprehensive plan for ISO 14001 EMS implementation. For examples, the promotion of ISO 14001 EMS standard through our Commerce & Industry Bureau and Trade & Industry Department could be considered, using Taiwan as a reference. Furthermore, technical approaches demonstrated by the leading ISO 14001 certified companies in Japan or other Asian countries could give some insights to our local companies on how to tackle environmental problems associated with their operations. Local industrial associations should try to arrange some visits to production facilities

of some leading ISO 14001 certified companies, from which some solid examples on how to apply EMS could then be observed on site and applied to their own operation. Finally, in conjunction with the government financial supports, the ISO 14001 EMS implementation progress would significantly be increased.

Education

Education is an important and effective method to enhance public environmental awareness. Children are the future of a society. The government should consider the introduction of environmental subjects to the primary school or even kind garden syllabuses and help students to build up an environmental awareness.

Environmental Protection Department (EPD) could also consider implementing a programme to encourage the adoption of ISO 14001 EMS in schools, colleges and universities and in which students could share the responsibility of environmental protection. The adoption of ISO 14001 EMS probably can improve environmental performance as well as an environmental culture within the society.

At present, there are not many research studies focusing on the development of ISO 14001 EMS in Hong Kong. The government should increase research funding for assessing the actual environmental performance of selected industries and setting up several industrial sectors as examples for ISO 14001 adoption.

The SAR government could collaborate with large certified corporations to hold ISO training courses and seminars for the SMEs. From the experience of large certified

companies, the SMEs can understand more about the implementation process of ISO 14001 EMS, areas of concern as well as the importance of management commitment. The certified companies may also benefit as it could serve a way to develop good supplier-chain relationship and publicise their successful EMS.

Environmental Policies and Legislation

The results of the questionnaire surveys showed that only a few companies knew ISO 14001 EMS through the government campaigns. However, the government should therefore devote more promotional efforts in areas, such as publishing ISO 14000 magazines and websites, examining environmental management issues and reporting the latest ISO news around the world. The ISO magazine could facilitate information exchange within local companies. Moreover, individual ISO guidance for different industry sectors should also be provided.

Similar to the promotion of ISO 9000 series, government departments such as the Housing Authority, could require the ISO 14001 EMS certification as a pre-requisite for bidding government construction projects. With the implementation of this pre-requisite, local construction firms will be more eager to adopt the standard in order to gain government projects.

Financial Incentives

As indicated in the surveys, most of the SMEs faced difficulties in implementing ISO 14001 EMS because of financial constraints. In order to accelerate the adoption of the

standard in Hong Kong, the government could consider providing financial incentives for the SMEs. For example the establishment of an ISO fund to cover a certain portion of initial implementation costs will help more SMEs to adopt the standard. Selected SMEs in different sectors could receive financial support and serve as demonstration models for ISO 14001 implementation.

Role of Certified Companies

At the moment, there is little communication between certified firms and the public. Moreover, interested parties cannot easily access the environmental performance of a certified company. The certified companies should do it proactively as a model to their suppliers and contractors. The link between certified companies and their suppliers and contractors should be improved, for instance, by training programmes and collaboration.

Finally, certified companies, especially the large corporations could incorporate more stringent environmental requirements into contract agreements and specifications. For example, in the construction industry, the main consultant may require their contractors to submit an environmental management plan that identifies environmental impacts associated with the work (e.g., air, noise, water and waste) and their minimisation measures. In a longer run, certified companies should only appoint suppliers or contractors that have achieved the ISO 14001 EMS certification to show their support to the standard.

7.3 Future Trends on ISO 14000 in Hong Kong

In Hong Kong, the number of ISO 14001 certifications has increased steadily. Ninety-one companies were certified to ISO 14001 EMS standard in December 2000. The ISO 14001 certification is expected to become more popular in local business sectors, especially in the construction industry. There is a trend for ISO 14001 EMS to become the pre-requisite for bidding construction projects, just as the case in ISO 9000. More and more construction companies are actively adopting EMS in order to gain competitive advantage.

The limitations in this study included low response of companies to questionnaire surveys, difficulty in finding suitable companies for detailed studies, insufficient time and human resources to carry out pilot programmes in the SMEs studied. At the moment, research in ISO 14001 implementation in Hong Kong is still limited. Further studies could focus on the details of ISO 14001 implementation process in the SMEs. Several industrial sectors could be selected for pilot schemes from which typical environmental issues, difficulties and actual investment costs associated with the implementation of ISO 14001 EMS standard should be further explored. While each business sector has its own characteristics, such as operation processes, products and markets, the present research and case studies may help the HKSAR Government in developing a sustainable, practical and effective ISO 14001 implementation plans for local industries.

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Appendix I

List of ISO 14001 EMS certified companies in HK (as at 31 December 2000)

Company Name

- 1 Aberdeen Marine Club Limited
- 2 Aleph Hong Kong Company Limited
- 3 Anderson Asphalt Limited
- 4 Antonio Precise Products Manufactory Limited/
Sun Fat Electronics & Plastics Factory/Sun Fat Industrial Limited
- 5 Architectural Services Department - The Government of the HKSAR
- 6 C & C Joint Printing Company (Hong Kong) Limited
- 7 Caltex Oil HK Ltd.
- 8 Carven Circuits Ltd.
- 9 Casio Computer (Hong Kong) Limited
- 10 Cathay Pacific Airways Limited - Airline Services Department
- 11 Cathay Pacific Catering Services (Hong Kong) Limited
- 12 China Areospace International Holdings Ltd.
- 13 China Overseas Building Construction Limited
- 14 China Overseas Civil Engineering Limited
- 15 China Overseas Foundation Engineering
- 16 China State Construction Engineering Corporation
- 17 CLP Power Hong Kong Limited - Generation Business Group Black Point
& Penny's Bay Power Stations
- 18 CLP Power Hong Kong Limited - Generation Business Group
Castle Peak Power Station
- 19 CLP Power Hong Kong Limited - Power System Business Group
- 20 Dickson Construction Company Limited
- 21 Dritech Ground Engineering Limited
- 22 Dunwell Petro-Chemical Company Limited/
Dunwell Environmental Management Company Limited
- 23 DB Products Limited
- 24 Elec & Eltek Company Limited
- 25 Electrical and Mechanical Services Department - The Government of HKSAR
(Airport Sector Divisions)
- 26 Electrical and Mechanical Services Department - The Government of HKSAR
(EMSD Corporate Services)
- 27 Electrical and Mechanical Services Department - The Government of HKSAR
(Health Sector Division, Medical Electronics Projects & Procurement Sub-Divisions)
- 28 Electrical and Mechanical Services Department - The Government of HKSAR
(Vehicle Engineering Divisions)
- 29 Electrical and Mechanical Services Department - The Government of HKSAR
(Waste Facilities Business Unit)
- 30 Epson Hong Kong Limited
- 31 Epson Precision (Hong Kong) Limited / Seiko Epson Corporation (Hong Kong Branch)
- 32 First Pacific Davies Property Management Limited
- 33 Fujidenki (Hong Kong) Co. Ltd.
- 34 Government Laboratory - The Government of the HKSAR
(Air Chemistry Section, Waste Chemistry Section and Water Chemistry Section within
Analytical & Advisory Services Division)
- 35 Group Sense (International) Limited
- 36 Hang Yick Properties Management Limited - Grand Panorama Management Office,
Beverly Hill Estate Management Office, Sunshine City (E-M) Management Office,
Tolo Place Estate Management Office
- 37 Havering Radcliffe Limited
- 38 Hip Hing Construction Company Limited

- 39 Hitachi Elevator Engineering Company (Hong Kong) Limited
- 40 Hitachi Koki Asia Co. Ltd.
- 41 Hsin Chong Real Estate Management Limited
- 42 Hong Yuen Electronics Limited
- 43 Hotel Nikko Hong Kong
- 44 I-P Foundation Limited
- 45 Island Shangri-La Hong Kong
- 46 Isotec (Hong Kong) Ltd.
- 47 Ivanho Architect Limited
- 48 K A Kho & Associates Architects & Consultants Ltd.
- 49 Kai Shing Management Services Ltd., Palm Springs Management Office,
- 50 Kalex Circuit Board (China) Limited
- 51 Kin Wing Engineering Co. Ltd.
- 52 Kong Tai Shoes Manufacturing Company Limited
- 53 Kowloon Canton Railway Corporation - Bus Department
- 54 Kowloon Canton Railway Corporation - East Rail Division, Freight Department
- 55 Kowloon Canton Railway Corporation - East Rail Division, Operation Department
- 56 Kowloon Canton Railway Corporation - East Rail Division, Rolling Stock Department
- 57 Kowloon Canton Railway Corporation - Infrastructure & Buildings Department
- 58 Kowloon Canton Railway Corporation - Light Rail Division, Engineering Department
- 59 Kowloon Canton Railway Corporation - Light Rail Division, Operations Department
- 60 Kowloon Shangri-La
- 61 Kwong Wah Hospital - Facility Management Department
- 62 Legend Techwise Circuits Limited
- 63 Leighton Contractors (Asia) Ltd.
- 64 Macda Kensetsu Kogyo Kabushiki Kaisha
- 65 Mak Hang Kei (Hong Kong) Construction Limited
- 66 Materialab Consultant Ltd.
- 67 Matsushita Electronic Components (Hong Kong) Company Limited
- 68 Matsushita Seiko Hong Kong International Company Limited
- 69 M-B Sales (Asia Pacific) Ltd.
- 70 Mitsui High-Tech (Hong Kong) Limited
- 71 Mobil Hong Kong Limited
- 72 Ng Fung Hong Limited - Sheung Shui Slaughterhouse
- 73 Philips Hong Kong Ltd.-Business Group Audio
- 74 Philips Hong Kong Limited - LCD Cells & Modules
- 75 Philips Semiconductors-Electronic Devices Ltd.
- 76 Possehl Besi Electronics Hong Kong Limited
- 77 Quon Hing Concrete Company Limited
- 78 Sanyo Energy (Hong Kong) Company Limited
- 79 Sony International (Hong Kong) Limited
- 80 Shell Hong Kong Ltd.-Tsing Yi Installation
- 81 Shui On Building Contractors Limited
- 82 Shui On Construction Company Limited
- 83 Skanska International Civil Engineering AB, Hong Kong Branch
- 84 The Hong Kong and China Gas Company Limited - Tai Po Gas Production Plant
- 85 The Marketing Store World Wide Asia Limited
- 86 Tokyo Byokane Company Limited
- 87 Tomy (Hong Kong) Ltd.
- 88 Topsearch Printed Circuits (Hong Kong) Limited
- 89 TQM Consultants Company Limited
- 90 Uniden Hong Kong Limited
- 91 Wong's Circuits (PTH) Limited

Appendix II

Questionnaire Survey A – Certified Companies

Please spend a few seconds to fill in the following questionnaire and return it by ~~31 December 1998~~:

Implementation of ISO 14001 EMS in Hong Kong

Background Information

Company Name: _____
Company Address: _____
Telephone no.: _____ Fax no: _____
Contact Person: _____ Position: _____
Number of Employee: _____
Business Nature: _____

Attitudes towards ISO 14001 EMS Standard and its Certification

1. Does your company establish any environmental management system (EMS) in certain functions/levels?

Yes/ No

If "yes", what kinds of EMS is/are used in your company?

BS 7750

Eco-Management and Audit Scheme (EMAS)

ISO 14001

Others, please specify: _____

2. Do you think your company can get benefit from the implementation of EMS?

Yes/ No

If "yes", what is/are the advantage(s) of the EMS?

Reduces risks and liability

Facilitate trade

Save energy or other resource consumption

Improve compliance with regulatory requirements

Improve public image

Reduce environmental inspections from EPD

Others, Please specify: _____

3. Have your company implemented ISO 14001 EMS Standard? If yes, in certain departments or entire organisation? If no, will your company implement the standard in near future?

4. Is your company certified in ISO 9000?

Yes / No

If "yes", do you think the ISO 9000 provide a well based for your company to adopt the ISO 14000 EMS standard?

If "No", do your company prepare to obtain ISO 9000?

5. Which factor(s) your company would be considered when you are deciding whether to implement ISO 14001? Include any of the followings:

Comply with relevant legislation and requirements

Gain market share

Goodwill

Customer pressure

Employee pressure

Cost reduction

Public pressure

Act as a promotion tool

Others, please specify: _____

4. What is/are the main difficulties your company encountered during the implementation process/preparing to implement the ISO 14001 EMS?

High implementation cost

Lack of technical support

Lack of employee awareness

Lack of top management support

Insufficient supporting infrastructure or technology

Not enough support from government

Non-prescriptive standard, difficult for interpretation

Others, please specify: _____

7. Will your company's plan for adopting the ISO 14001 EMS be affected because of the Asia economic crises?

Yes / No

If "yes", what ranking of your company's environmental issues in such economic situation?
(Rating 1-5: 1=Very Important, 2=Important, 3=Average, 4=Not Important, 5=Not Consider)

8. Do you think the Hong Kong government should give direct support in the implementation of ISO 14001 EMS, such as financial assistance and technical support?

Yes/ No

If "yes", what kinds of support is/are necessary?

9. Which area(s) of your company's EMS need to be improved?

Environmental Policy

Environmental Programme

Communication to employees/public

Compliance with regulations

Training

Others, please specify: _____

Any recommendations?

The End

Thank you for your consideration!

Questionnaire Survey A – SMEs

Please spend a few seconds to fill in the following questionnaire and return it by ~~31 December 1998~~:

Implementation of ISO 14001 EMS in Hong Kong

Optional Information:

Company Name: _____

Company Address: _____

Telephone no.: _____ Fax no: _____

Contact Person: _____ Position: _____

Essential Information:

Number of Employee: _____

Business Nature: _____

Attitudes towards ISO 14001 EMS Standard and its Certification

1. Does your company hear about any environmental management system (EMS) before?

Yes/ No

If "yes", how your company knows?

From Customers

Business Magazines

HKPC Workshop

Government Campaign

Newspaper

Others, Please specify: _____

2. Does your company establish any environmental management system (EMS) in certain functions/levels?

Yes/ No

If "yes", what kinds of EMS is/are used in your company?

BS 7750

Eco-Management and Audit Scheme (EMAS)

ISO 14001

Others, Please specify: _____

3. Do you think your company can get benefit from the implementation of EMS?

Yes/ No

If "yes", what is/are the advantage(s) of the EMS?

Reduces risks and liability

Facilitate trade

Save energy or other resource consumption

Improve compliance with regulatory requirements

Improve public image

Reduce environmental inspections from EPD

Others, Please specify: _____

4. What is/are the main difficulties your company encountered during the implementation process/preparing to implement the ISO 14001 EMS?

High implementation cost

Lack of technical support

Lack of employee awareness

Lack of top management support

Insufficient supporting infrastructure or technology

Not enough support from government

Non-prescriptive standard, difficult for interpretation

Others, please specify: _____

5. Will your company implement the standard in near future?

Yes/ No

Not Certain, please specify reason(s): _____

The End
Thank you for your consideration!

Questionnaire Survey B – SMEs

Please spend a few seconds to fill in the following questionnaire and return it by ~~30 August 1999~~:

Implementation of ISO 14001 EMS in Hong Kong

Optional Information:

Company Name: _____

Company Address: _____

Telephone no.: _____ Fax no: _____

Contact Person: _____ Position: _____

Essential Information:

Number of Employee: _____

Business Nature: _____

Attitudes towards ISO 14001 EMS Standard and its Certification

1. Does your company hear about any environmental management system (EMS) before?

Yes/ No

If "yes", how your company knows?

From Customers

Business Magazines

HKPC Workshop

Government Campaign

Newspaper

Others, Please specify: _____

2. Does your company establish any environmental management system (EMS) in certain functions/levels?

Yes/ No

If "yes", what kinds of EMS is/are used in your company?

BS 7750

Eco-Management and Audit Scheme (EMAS)

ISO 14001

Others, Please specify: _____

3. Do you think your company can get benefit from the implementation of EMS?

Yes/ No

If "yes", what is/are the advantage(s) of the EMS?

Reduces risks and liability

Facilitate trade

Save energy or other resource consumption

Improve compliance with regulatory requirements

Improve public image

Reduce environmental inspections from EPD

Others, Please specify: _____

If "No", what is/are the difficult(ies) of implementing an EMS?

Poor co-ordination from government, industry and business

Lack of top management commitment

High initial cost

Lack of staff involvement in EMS development

Lack of environment improvement

Lack of resources and expert help in the implementation process

Others, Please specify: _____

4. Have your company been certified for the ISO 14001 EMS Standard?

Yes/ No

If yes, in certain departments?
or entire organisation?

If no, will your company implement the standard in near future?

Yes/ No

5. If your company is interested in the ISO 14001 Environmental Management System (EMS) implementation, then how much of the initial investment cost your are willing to pay for?

Below \$100,000

\$100,000 - \$300,000

\$300,000 - \$500,000

\$500,000 - \$1,000,000

Others, please specify the range: _____

6. What kind(s) of technical support your company need?

Guidelines of ISO 14001 EMS (e.g. steps for ISO 14001 implementation)

Held the introduction session for ISO 14001 implementation

Provide linkage for expert help (e.g. help from consultation firms)

Others, please specify:

Business Situation

1. What is the export percentage of the business?

Below 5%

5% - 10%

10% - 15%

15% - 20%

Over 20%, please specify: _____

2. Does your company affect by the Asia Economic Crises?

Yes/ No

Any drop in sales amount?

Below 5%

5% - 10%

10% - 15%

15% - 20%

Over 20%, please specify: _____

Any lay-off? How many?

Yes/ No

1-5

6-10

11-15

Over 15, please specify: _____

3. How much of waste generated (per year) during the operation?

Quantity (kg/yr)

Paper _____

Plastics _____

Wood _____

Metals _____

Others, please specify: _____

4. Is there any in-house environmental management system?
(e.g. waste minimization program)

Yes/ No

Reduce the paper use (e.g. use both sides for drafting purposes)

Collect the used paper for recycling

Energy saving program (e.g. switch off the lights once they are not in use)

Use of environmental friendly stationery (e.g. use refillable ball pen, printer cartridge)

Others, please specify: _____

The End

Thank you for your consideration!

Questionnaire Survey C - Certified Companies

Check the background information, if any discrepancies.

Please spend a few seconds to fill in the following questionnaire and return it by ~~28 February 2000~~:

Implementation of ISO 14001 EMS in Hong Kong

Background Information

Company Name: _____

Company Address: _____

Telephone no.: _____ Fax no: _____

Contact Person: _____ Position: _____

Number of Employee: _____

Business Nature: _____

Attitudes towards ISO 14001 EMS Standard and its Certification

1. Does your company establish any environmental management system (EMS) in certain functions/levels?

Yes / No

If "yes", what kinds of EMS is/are used in your company?

BS 7750

Eco-Management and Audit Scheme (EMAS)

ISO 14001

Others, please specify: _____

2. Do you think your company can get benefit from the implementation of EMS?

Yes/ No

If "yes", what is/are the advantage(s) of the EMS?

Reduces risks and liability

Facilitate trade

Save energy or other resource consumption

Improve compliance with regulatory requirements

Improve public image

Reduce environmental inspections from EPD

Others, Please specify: _____

3. Have your company implemented ISO 14001 EMS Standard? If yes, in certain departments or entire organisation? If no, will your company implement the standard in near future?

4. Is your company certified in ISO 9000?

Yes/ No

If "yes", do you think the ISO 9000 provide a well based for your company to adopt the ISO 14000 EMS standard?

If "No", do your company prepare to obtain ISO 9000?

5. Which factor(s) your company would be considered when you are deciding whether to implement ISO 14001? Include any of the followings:

Comply with relevant legislation and requirements

Gain market share

Goodwill

Customer pressure

Employee pressure

Cost reduction

Public pressure

Act as a promotion tool

Others, please specify: _____

6. What is/are the main difficulties your company encountered during the implementation process/preparing to implement the ISO 14001 EMS?

High implementation cost

Lack of technical support

Lack of employee awareness

Lack of top management support

Insufficient supporting infrastructure or technology

Not enough support from government

Non-prescriptive standard, difficult for interpretation

Others, please specify: _____

Implementation of ISO 14001 EMS Standard

1. What is the export percentage of the business?

Below 5%

5% - 10%

10% - 15%

15% - 20%

Over 20%, please specify: _____

2. Which area of the operation cost is reduced after implementation of ISO 14001?

Energy resources

Use of paper

Use of disposable material (e.g.

Prosecution fine

Others, please specify: _____

3. What is the actual business benefit?

Increase _____% of market shares

Increase _____% of sales

Decrease _____% of operation cost

Others, please specify: _____

4. How much of waste generated (per year) before and after the implementation of ISO 14001?

	Quantity (kg/yr)	
	Before	After
Paper	_____	_____
Plastics	_____	_____
Wood	_____	_____
Metals	_____	_____
Others, please specify:	_____	

5. Does your company certified to ISO 14001 EMS standard due to the compliance with headquarter policy?

Yes / No

6. How much of your company spends on the initial investment cost? (i.e. hire consultant for initial review)

Below \$500,000

\$500,000 - \$1,000,000

\$1,000,000 - \$1,500,000

\$1,500,000 - \$2,000,000

Over \$2,000,000, please specify the range: _____

How much of the on-going cost?

(i.e. set up corresponding programmes, documentation and training)

Below \$500,000

\$500,000 - \$1,000,000

\$1,000,000 - \$1,500,000

\$1,500,000 - \$2,000,000

Over \$2,000,000, please specify the range: _____

7. How long of the expected recover period?

Expected recover period: _____ month(s)/year(s)

8. What percentage(s) of this initial investment cost over the total sales?

Below 5%

5% - 10%

10% - 15%

15% - 20%

Over 20%, please specify: _____

9. How much of your company's operation cost is reduced after the implementation of ISO 14001 EMS standard in last year?

Below \$500,000

\$500,000 - \$1,000,000

\$1,000,000 - \$1,500,000

\$1,500,000 - \$2,000,000

Over \$2,000,000, please specify the range: _____

10. Any future plan on EMS improvement?

Policy

How?

Please specify:

Environmental Programmes

How?

Please specify:

Communication to employees/public

How?

Please specify:

Compliance with regulations

How?

Please specify:

Training

How?

Please specify:

Others,

Please specify:

11. Any suggestions on the implementation of ISO 14001 EMS standard in H.K.?

Please specify:

The End

Thank you for your consideration!

Appendix III

Checklists of the Case Studies

Name of the Company: _____
Department/Site: _____
Date of Checking: _____

Company Profile

Company Size: _____
Business Nature: _____
Company History: _____
Kinds of products/services provided: _____
Monthly Sales Amounts: _____

Site

Site Location: _____
Physical Appearance: _____

	Yes	Partially	No
Overall Management			
1. Is there any management framework? What is it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Any quality management system in place?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Any management system environmental manual/quality manual? Really implement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Any problems in current management? What is it?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Any top management/employee(s) responsible for environmental management?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Policy			
6. Any company policy? Specify if possible. Any relation to environmental performance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Is the policy documented, implemented, reviewed and made known to all employees? By what channels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Legislation & Regulations			
8. Any procedures for identifying and access to the legislation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

applicable to your company?

9. Does the environmental legislation permits/license keep up-to-date/ review regularly?
10. Does all of the relevant regulations associated with your organization have been considered?
11. Any prosecutions due to the breach of environmental laws? How many? Fine amounts?

In-house EMS (Confirm with survey)

12. Have you established any EMS? What is it?
13. Do your EMS programmes have milestones, time framed and assigned responsibilities?
14. Does your EMS programme implement by action? Ways to implement?
15. Do your EMS programmes establish the means and schedules to achieve the target? How?
16. Are your EMS programmes regularly reviewed (targets, budgets, responsibilities)? /revised?
17. Any evaluation of EMS programmes? Who is responsible for initiating & monitoring corrective action taken?
18. Have roles, responsibilities been established for reporting on the performance of the EMS to top management?

Environmental Management Manual?

19. Does it specify the date for prepared, last revised?
20. Any page no.? table of content?
21. Any description of how to use? Where are the copies?

Documentation

- 22. Any procedures for storing, amending & revising EM documents?

- 23. Documents clearly marked with date prepared, date to revise, title & version?

Environmental Aspects & Impacts

1. Description of site operation

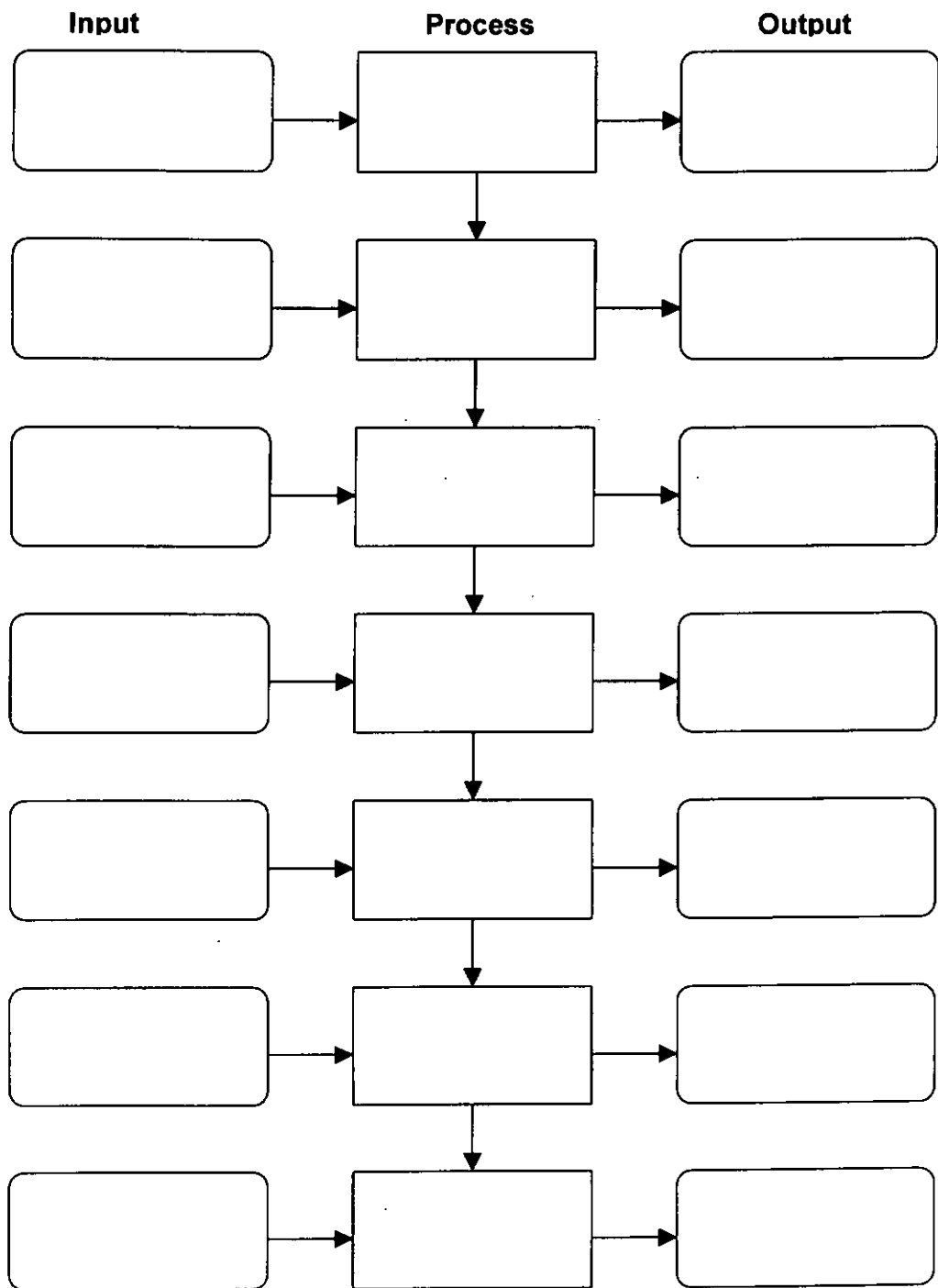
Step 1

Step 2

Step 3

Step 4

2. Flowchart of operation



3. List out the possible environmental impacts during company's activities, products and operation process.

4. Existing in-house management programmes/ environmental management system

- _____

How?:

- _____

How?:
