



UNIVERSITI PUTRA MALAYSIA

**ISO 14001 COMPLIANCE WITH
ENVIRONMENTAL REGULATIONS BY THE
MALAYSIAN ELECTRICAL AND ELECTRONICS INDUSTRY**

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**ISO 14001 COMPLIANCE WITH ENVIRONMENTAL REGULATIONS BY
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By

HARJEET KAUR

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DEDICATION

Specially dedicated to my parents, Indra and Nirmal whose love, laughter, encouragement and values will always inspire me.

To the happy memory of my grandparents, Nikki, Jaibha, Miss Choong and Mr. Kang who taught me to love, to learn and to live for a purpose higher than oneself. Your love, perseverance and integrity will always guide me.



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LIST OF ABBREVIATIONS

BOD	Biochemical Oxygen Demand
DOE	Department of Environment
DSM	Department of Standards Malaysia
EQA	Environmental Quality Act
EMS	Environmental Management Systems
EPA	Environmental Protection Agency
FMM	Federation of Malaysian Manufacturing
ISO	International Organisation for Standardization
MDBs	Multilateral Development Banks
MIDA	Malaysian Industrial and Development Agency
MOSTE	Ministry of Science Technology and the Environment
NGOs	Non-Governmental Organisations
RTK Laws	Right-To-Know Laws
SIRIM	Standards and Industrial Research Institute of Malaysia
SMIs	Small and Medium Industries
TRI	Toxic Release Inventory
U.S.	United States of America



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in partial fulfilment for the degree of Master of Science.

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This study focuses on voluntary environmental initiatives through the implementation of the ISO 14001 Environmental Management Standard (EMS) particularly by the electrical and electronics industry in Selangor. The standard is expected to upgrade an organisation's overall environmental performance and could also pose trade barriers if used as a precondition for international trade as experienced with the ISO 9000 Quality Management Standards.

The ISO 14001 EMS variable, several organisation characteristics and regulatory enforcement activity were included into the compliance model to determine factors contributing to non-compliance. Data were obtained through the use of the mail-questionnaire method and analyzed using the maximum likelihood technique. The Shazam econometric program was used for the estimation.



Though constrained by small sample size, results obtained have *a priori* expected signs at 5 and 1 percent level of significance respectively. Non-compliance is likely to be present among organisations that are generally older, incurring high compliance costs, obtaining external funds and receiving less regulatory enforcement. Profit, plant ownership and the ISO 14001 EMS standard were insignificant. The ISO 14001 EMS standard coefficient though positive is insignificant and thus provides insufficient evidence for enhancing an organisation's environmental compliance. Nine percent of respondents had difficulty in accessing international markets confirming that the standard is being used as a precondition for doing business. In summary, findings show organisation characteristics and regulatory enforcement activity influences an organisation's decision to comply with environmental regulations.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi sebahagian keperluan untuk ijazah Master Sains.

**PEMATUHAN ISO 14001 DENGAN UNDANG-UNDANG ALAM SEKITAR
OLEH INDUSTRI ELEKTRIKAL DAN ELEKTRONIK MALAYSIA**

Oleh

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Pengerusi: Profesor Madya Khalid Abdul Rahim, Ph.D.

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Kajian ini menumpukan inisiatif sukarela melalui implementasi piawai global alam sekitar ISO 14001 EMS oleh industri elektrik dan elektronik di Selangor. Piawai ISO 14001 EMS dijangka dapat meningkatkan tahap pematuhan alam sekitar sesebuah organisasi dan kemungkinan dikenakan sebagai syarat asas untuk perdagangan antarabangsa seperti yang dialami dengan piawai ISO 9000.

Variabel ISO 14001 EMS, aktiviti penguatkuasaan undang-undang dan ciri-ciri organisasi disertakan dalam model pematuhan bagi memastikan faktor-faktor yang menentukan ketidakpatuhan. Data dikumpul melalui kaji selidik dan dianalisis dengan kaedah maximum likelihood menggunakan program Shazam. Walaupun terbatas dengan saiz sampel yang sedikit, hasil kajian mempunyai tanda seperti yang dijangkakan serta signifikan pada 1 dan 5 peratus.

Ketidakpatuhan lebih nyata bagi organisasi yang lama beroperasi, mengalami perbelanjaan kos pematuhan yang tinggi dan mendapatkan pinjaman kewangan eksternal serta menerima kurang aktiviti penguatkuasaan undang-undang. Keuntungan bersih, pemilikan (bilangan kilang) dan piawai ISO 14001 EMS didapati tidak signifikan. Oleh kerana koefisien piawai ISO 14001 EMS tidak signifikan maka tiada bukti yang kukuh untuk mempertahankan pendapat yang ia mampu meningkatkan tahap pematuhan alam sekitar sesebuah organisasi. Sembilan peratus responden mengalami kesulitan menembusi pasaran antarabangsa membuktikan bahawa wujudnya sekatan perdagangan di mana piawai tersebut digunakan sebagai syarat asas untuk berdagang. Secara kesimpulan, ciri-ciri organisasi dan aktiviti pihak penguatkuasaan undang-undang mempengaruhi keputusan tahap pematuhan undang-undang alam sekitar oleh sesebuah organisasi.

CHAPTER I

INTRODUCTION

This introductory chapter highlights the significance of the ISO 14000 voluntary environmental standards in upgrading an organisation's environmental performance and the potential trade implications associated with respect to the Malaysian electrical and electronics industry.

Malaysian regulatory body is based on the Command and Control framework whereby uniform environmental standards are imposed on industries irrespective of non-uniform marginal abatement cost and damages faced by the individual organisation. Dion *et al.* (1996) find that due to limited resources, regulators allocate monitoring efforts in order to maximise the rate of compliance with regulations and require self-reporting by firms. The frequency of monitoring and enforcement by regulators is dependent on heterogeneous local conditions such as local labour market conditions, organisation's historical compliance performance, net political support and environmental damages across location.

Environmental Quality Report (1997) show that in terms of number of enforcement visits, notices issued and court cases conducted by state, Selangor received 26 enforcement visits, 24 notices and 4 cases were filed in court.

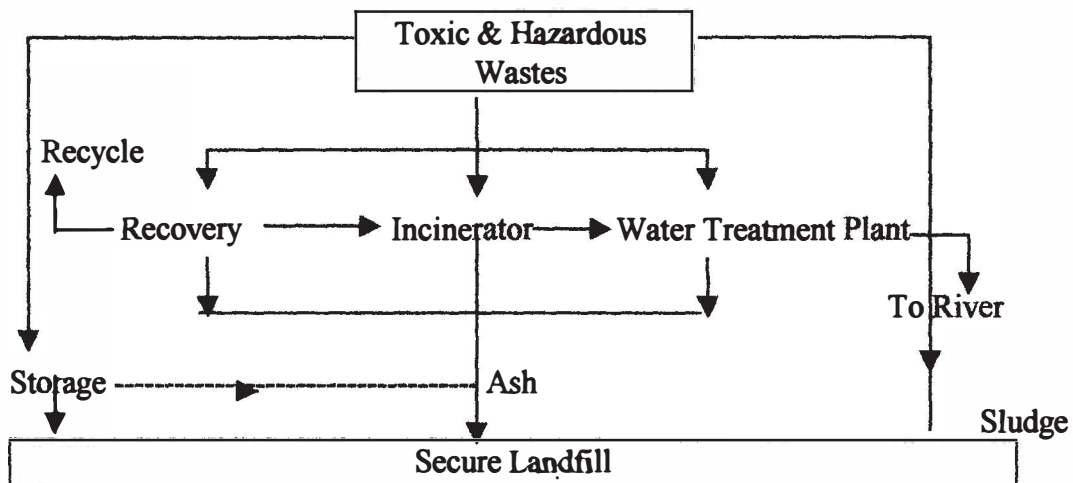


Gray and Deily (1996) find that non-inspection enforcement action which include phone calls, letters and enforcement orders are expected to have a greater affect on a firm's compliance decision. Magat and Viscusi (1990) show that inspections can reduce reported emissions and induces frequent reporting from plants.

Environmental Quality Report (1996) show a total of 1562 enforcement visits for at least 17 major industries were conducted relating to the Sewage and Industrial Effluents Regulations, 1979 of which 1298 sources were compliant. Not taking into account the number of enforcement visits carried out each year at a single plant, an estimated average of 92 (1562/17) enforcement visits were carried out for each industry grouping at the national level.

Doubtless regulators are unable to monitor and enforce compliance at each organisation. Voluntary initiatives are preferable for solving environmental problems as it encourages commitment beyond compliance and minimises regulatory burden. In this regard the ISO 14001 Environmental Management System (EMS) voluntary standard can play a complementary role to regulations because it promotes compliance. By incorporating the ISO 14001 EMS standard into the compliance model and if a direct positive relationship can be demonstrated between ISO 14001 certification and higher rates of compliance, the Department of Environment (DOE) would benefit from the results and use it for purposes of targeting inspections. This would relieve government resources devoted to inspection of facilities and engaging in enforcement action.

Apart from installing appropriate pollution control equipment, additional cost of compliance is incurred for the implementation of the ISO 14000 series standards. Small and Medium Industries (SMIs) with limited resources not capable of implementing any environmental programs are unlikely to meet the standards. Federation of Malaysian Manufacturers (FMM, 1998/99) industry directory show Malaysian Small and Medium Industries (SMIs) account for more than 80 percent of total manufacturing establishments. Figure 1.1 depicts the various methods and practices that an organisation may adopt for the disposal of toxic and hazardous wastes.



Source: Environmental Impact Assessment Guidelines for Toxic and Hazardous Waste Treatment and Disposal Projects by Department of Environment Ministry of Science, Technology and Environment, Malaysia (December 1995).

Figure 1.1: Flow Chart for the Disposal of Toxic and Hazardous Wastes.

Potential trade barriers could also result if the standard is used as a precondition for international trade as experienced by the ISO 9000 Quality Management Standards.

The electrical and electronics industry is one of the chief contributor to the Malaysian economy, thus the imposition of trade barriers by the international markets will effect the volume and direction of future exports of electrical and electronics products. It is clear in the long-term interest of Malaysia's electrical and electronics industry to adopt the ISO 14001 EMS standard because it will help meet regulatory requirements and ensure wider access to the international markets.

Among other highlighted issues are the need to consider alternative approaches through public and market mechanisms, enforcement of Right-to-Know Laws granting stakeholders access to environmental information and increasing community involvement in project development and environmental awareness. The study proceeds as follows: Chapter II examines the literature related to the current study while Chapter III presents the research methodology and survey instrument. A detailed discussion on the results obtained is provided in Chapter IV and Chapter V discusses several concluding remarks, recommendations and suggestion for future research.

Background of Study

Environmental management through voluntary initiatives is preferable for solving environmental externalities beyond regulatory requirements and can minimise regulatory burden. Today the emphasis has shifted from compliance management (pollution control) to the establishment of a sound Environmental Management System (EMS).

Environmental Management System (EMS) focuses on continual improvement that is not only consistent with compliance with regulatory limits but is also cost effective in the long run with all environmental concerns being within the control of the organisation.

The International Organisation for Standardisation (ISO) body has recently developed the ISO 14000 series of international environmental standards. The ISO 14001 compliance standard specifies the requirements of an Environmental Management System (EMS) in which various types and size of organisations will set their own environmental policies, objectives and targets as well as determine the extent of coverage. The ISO 14001 EMS standard aims to improve the environmental performance of an organisation and attain benefits such as to enhance corporate image, penetration of new markets, compliance with legislation, reduce cost of waste management, reduce waste generation, increase output and revenues.

Organisations registered with ISO 14001 are required to show commitment to comply with environmental regulations and undergo environmental auditing to monitor their performance. ISO 14001 allows organisations to consider all possible technology options and establishes an environmental ethic in the workplace in which all of its employees are committed to continually improve and prevent environmental accidents. Organisations are required to develop environmental policy and ensure commitment to their EMS. Implementation of the ISO 14001 standard requires tedious preparation and commitment from all relevant functions and level especially from top management and adequate training to enhance knowledge and skills to staff.

Cascio (1996) specifies that the ISO 14001 EMS standard requires an organisation to be aware of existing environmental laws and regulations applicable to its environmental aspects. The ISO 14001 EMS standard is a voluntary standard and currently there is no legal requirement for industries to comply with such standards in Malaysia.

Malaysian Electrical and Electronics Industry

The manufacturing sector is shown as the largest contributor to Malaysian total exports in the 1996/97 Economic Report. During the first seven months of 1996, manufactured exports increased by 14.9 percent (January-July 1995: 21 percent) and accounted for 81 percent (January-July 1995: 78.2 percent) of total exports. Out of this 81 percent of total exports, the electrical and electronics products constitute the largest share contributing 66 percent. In 1998 (at the time of study), 50 organisations were registered with ISO 14001 EMS standard. They are Electrical and Electronics 31; Engineering 6; Scientific 11 and Services 2 companies respectively.

FMM Electrical and Electronics Industry Directory (1997/1998), show in 1996, a total sale of RM85 billion was reported by the electrical and electronics industry of which electronic products contributed RM54.4 billion while electrical products contributed RM30.6 billion. Exports of electronic products totalled RM32.5 billion and electrical products to RM63.3 million in the first eleven months of 1996. Major export markets for electronic products were to Singapore (25.9 percent), USA (25.8 percent) and Taiwan (9.5 percent) while electrical products were exported to USA (24.4 percent), Singapore (23.9 percent) and Japan (11 percent) respectively.

Report by the Malaysian Industrial and Development Agency (MIDA) in January 1997, show in 1995 a total of 215 projects were approved for this industry as compared to 194 projects in 1996 while potential employment was estimated to increase from 37,865 to 39,821 from 1995 to 1996 respectively. Tables 1.1 and 1.2 depict the number of projects by industry approved by the Selangor state government.

Table 1.1: Projects by Industry approved by Selangor State Government.

INDUSTRY	1994	1995	1996
Food Manufacturing	11	5	7
Beverages & Tobacco	-	2	-
Textiles & Textiles Products	5	5	9
Leather & Leather Products	-	1	-
Wood & Wood Products	6	2	5
Furniture & Fixtures	11	9	7
Paper, Printing & Publishing	8	4	8
Chemicals & Chemical Products	13	22	11
Petroleum Refinery/ Products	-	2	-
Rubber Products	9	13	5
Plastic Products	22	25	5
Non-Metallic Mineral Products	11	30	11
Basic-Metal Products	15	9	13
Fabricated Metal Products	15	19	21
Machinery Manufacturing	17	13	19
Electrical & Electronics Products	57	38	54
Transport Equipment	23	26	24
Scientific & Measuring Equipment	5	1	2
Miscellaneous	5	2	2
Total (Number)	233	228	214

Source: Selangor State Government.

Table 1.2: Industrial Projects Approved by Selangor

Year	Number of Projects	Potential Employment	Total Proposed Capital Expenditure (RM Million)
1993	196	24,260	4,345.7
1994	233	29,438	3,429.3
1995	228	17,668	4,357.7
1996	214	20,117	716.4

Source: Selangor State Government.

Problem Statement

Using Bernheim's (1994) theory of conformity, organisations are expected to conform because their behaviour (activities) is motivated by social influences such as desire for prestige, esteem, popularity or acceptance. Penalty is imposed upon organisations that make the slightest deviations from accepted regulatory requirements (norms). Despite penalty, organisations that refuse to conform nevertheless desire popularity will change their choices towards meeting regulatory requirements (norms). Penalty may be in the form of legal costs, fines, imprisonment and loss of reputation.

Environmental Quality Report (1997) show Selangor's electrical and electronics industry achieved 83 percent compliance with the Sewage and Industrial Effluents Regulations, 1979 and 60 percent (electronics industry only) compliance in 1995. Selangor's Department of Environment has 5 enforcement officers to monitor its various industries and therefore additional resources will be required as industries expand.

Selangor Department of Environment until mid October 1998 conducted 283 monitoring visits for its various industries. FMM electrical and electronics directory (1997/98) listed about 165 electrical and electronics companies in Selangor.

A study of the Indonesian manufacturing industry by Pargal and Wheeler (1996) show organisation characteristics determines the level of pollution intensity. Gray and Deily (1996) find organisation characteristics have little impact on compliance as compared to regulatory enforcement in the U.S steel industry. Some of the organisation characteristics included into the compliance model include plant ownership, source of funding for pollution abatement activities, number of years in production (age of organisation) and gross profit.

ISO 14001 EMS standard aims to improve the environmental performance of an organisation and attain benefits such as enhance corporate image, penetration of new markets, compliance with legislation, reduce cost of waste management, reduce waste generation, increase output and revenues. Apart from enhancing an organisation's environmental performance, ISO 14001 certification is expected to secure access to international markets by removing potential trade barriers if used as a precondition in doing business with developed countries as experienced by the ISO 9000 Quality Management Standards. Apart from installing appropriate pollution abatement equipment, additional cost of compliance is incurred for the implementation of the ISO 14001 EMS standard.

Organisation characteristics, regulatory enforcement and the ISO 14001 EMS standard were included into the compliance model to determine which of these factors contribute to non-compliance with the Sewage and Industrial Effluents Regulations, 1979 by Selangor's electrical and electronics industry.

Objectives of the Study

General Objectives

In general, the objective of the study is to determine factors contributing to non-compliance with environmental standards by the Electrical and Electronics industry.

Specific Objectives

1. To identify factors affecting non-compliance.
2. To determine the role of regulatory enforcement in increasing environmental compliance.
3. To identify problems faced by industry in relation to the implementation of the Environmental Management System and Sewage and Industrial Effluent Standard of the Environmental Quality Act, 1974.
4. To seek alternative approaches in increasing environmental compliance.
5. To determine whether the 14001 EMS standard induces compliance with environmental regulations.

Research Justification

Standardisation reduces the gap and cost of transferring technology between industrialised and developing countries. ISO Bulletin (January,1996) reported greater participation to the International Organisation for Standardisation (ISO) body by developing countries has increased their market share in world exports of manufactured products from 11 percent in 1992 to 20 percent in 1994.

Environmental standards are naturally based on the environmental conditions of the importing country and therefore trade barriers may arise if the exporting country fails to meet the requirements. Small and Medium Industries (SMIs) in developing countries were reported to have difficulties in obtaining market access because they were unable to meet the standard specifications.

ISO Bulletin (January 1997) reported that on an international scale, SMIs contribute 70 percent to 90 percent of global output. FMM industry directory (1998/99) show Malaysian SMIs account for more than 80 percent of total manufacturing establishments with 88 percent classified under small-scale and remaining 12 percent under medium scale industries. Only 20 percent of SMIs actually export their products. Malaysian SMIs have expanded from 29.6 percent in 1995 to 30.5 percent in 1996. If SMIs are to maintain their competitiveness in both national and global markets, they will have to incur additional costs in adopting cleaner technologies. Most SMIs do not have sufficient resources for implementing environmental programs or install pollution abatement equipment and therefore face greater difficulty in complying with environmental regulations.