

IMPACT OF IMPLEMENTING ENVIRONMENTAL MANAGEMENT SYSTEMS IN DIFFERENT COUNTRIES ACROSS SOUTHEAST ASIA: AN EMPIRICAL APPROACH

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Ever since the term ‘sustainable development’ evolved in the early ’90s, there has been a significant effort by corporations to participate in and promote environment-related activities. Their aim, of course, is to ensure better environmental performance ,to integrate it to their business performance and , also, demonstrate a social responsibility towards the environment. Many of these environmental programs, which are voluntary, try to address public concerns about the potential environmental impacts of products, processes and all other activities the companies are involved with.

Towards the dawn of the corporate environmental awareness phase a couple of decades ago, environmental initiatives were a non-priority issue for most companies. The stress, instead, was laid on the creation of more goods and services – whatever the cost -- especially in third-world countries like those in Southeast Asia.

The companies that did take up some environmental initiatives were doing so primarily to comply with government regulations, which were slowly getting stricter, following major environmental mishaps in many parts of the world. In many cases, these initiatives were little more than end-of-the-pipe solutions, which aimed at controlling, rather than preventing, pollution. This approach helped compliance in countries where law enforcement was effective. However, in most developing countries where the enforcement process lacked funding and skilled personnel, and was often plagued with inefficiency and corruption, companies did not have to meet with with regulatory requirements on the compulsory basis. In other words, despite the existence of comprehensive environment-protection laws, companies continued to pollute the air, land and water. This, in turn, not only caused widespread damage to human health and environment, but was also a travesty of the concept of sustainability.

There were a handful of companies, however, that willingly and voluntarily began taking up green initiatives, especially by implementing a structured environmental management system or EMS. Learning from their experiences, one message soon got across to the rest of the corporations loud and clear: that environment management systems do help to cut costs significantly and lead to a marketing advantage.

This realization provided the impetus for companies to voluntarily begin taking up environment initiatives, not so much for the sake of compliance, but to improve their business performance. The EMS helped reduce both pollution at source and the inefficient use of natural resources, and also minimized waste. While the companies improved their bottom-lines by taking up these green initiatives, governments were happy that the concept of

environmental sustainability was also being adhered to. Thus, not only was the environmental burden [Hart 1997] reduced, but costs were saved and companies improved business performance, thereby gaining a competitive edge.

It may be true that in many cases, this achievement was still a by-product of the companies' endeavor for a better business performance. They did not implement the EMS with sustainability in mind. However, these green initiatives still exhibited enormous potential in developing countries like those in Southeast Asia.

Environmental Challenges in Southeast Asia:

According to some projections, 70 per cent of the world's manufacturing will take place in Asia in the next decade.[Sector based Public Policy in the Asia Pacific Region, US-AEP 1999] . If this indeed happens, then there is definitely going to be an urgent need to make the manufacturing process as clean and green as possible. But environmental protection in developing regions like Asia poses the greatest challenge because of a host of reasons. First, there is a tremendous lack of environmental awareness, both among the local population and in the corporations. Besides, there is so much poverty in Asian countries that there is always a continuous thrust for economic growth at any cost. Finally, there is still a lack of funding and know-how to assist companies going in for, say, wastewater treatment facilities, air pollution abatement systems, replacing ozone depleting substances and so on.

On the last point, there are a few banks, government and non-government organizations and financial institutions that have begun offering loans and guidance to help companies prevent/control pollution at the source. These include Landbank and the Development Bank of the Philippines, various financial institutions and GO/ NGO agencies such as the Thailand Environmental Institute, the SIRIM Berhad in Malaysia and BAPEDAL in Indonesia. These efforts, however, are still in their fledgling state. There is a need for many other instruments, such as the Countryside Loan Fund in Landbank, the Philippines Environment Infrastructure Support Fund in the Development Bank of the Philippines and Green Venture Capitals in Singapore ,to join the efforts to make a major difference.

The numerous environmental challenges that exist in Southeast Asia and the rest of the developing world have caused these regions to often be referred to as 'Pollution Havens'. This theory claims that since environmental laws are more relaxed in developing nations -- and law enforcement is weak -- many large, multinational corporations and manufacturing companies have moved their manufacturing units to this part of the world. On one side ,this makes the companies are closer to huge markets and natural resources. On the other side , they can fully exploit the lax environmental regulations and get away with air emissions, hazardous waste discharge, land contamination by chemical overflows and improper waste removal systems. The impoverished host countries have welcomed these geographical moves on the part of large manufacturing companies because they have opened up new business possibilities and created more jobs. On the other hand, this move also brought with it the associated environmental and pollution burden.

The 'Pollution Haven' theory, though talked about widely, has, however, been disproved by a recent World Bank Report [Greening Industry, 2000].

Apart from the Pollution Haven theory, Southeast Asia also suffers from what is termed an 'Environment Burden' [Hart 1997]. An Environment Burden in a region is the product of three

factors: Population, Affluence and Technology. Population heightens the burden because the greater the Population, the greater the consumption, use of natural resources and waste and pollution. Affluence leads to higher standards of living, which invariably lead to more consumption. Technology, which is the means to all production, is actually what is responsible for emissions and waste and everything else that has a detrimental impact on the environment. As far as population is concerned, Southeast Asia, one of the most populated regions in the world, invariably has high consumption levels causing major pollution and environment degradation.

The current trend of manufacturing and other industries shifting here is expected to spur economic growth in this region. This will surely lead to affluence, more consumption and, unfortunately, environmental degradation. Since so much manufacturing is going to take place here, industry is sure to make use of a lot more technology. While population and affluence cannot be easily reined in, the technology factor offers more choice. Companies can opt for either the traditional, often polluting production facilities or the newly innovated environment-friendly ones. Of course, the green production process has not yet been perfectly designed – in many cases they are not as efficient and economical as the more polluting processes. Still, the design for environment production processes and its associated research is progressing rapidly and worldwide, older technology is giving way to greener ones. For instance, refrigerators, which traditionally used the ozone-layer depleting CFCs, are actually getting phased out. The newer refrigerators use HCFCs, which have far lower ozone depletion coefficients.

A large section of consumers used to consider HCFC refrigerators inferior to their CFC using counterparts. Thankfully, such opinions are changing fast. Nowadays, even hospitals -- such as the St Luke in the Philippines -- use HCFC refrigerators in all patient rooms.

Thus, in order to lower the environmental burden, developing countries in Southeast Asia need to make greater use of cleaner production processes and use substitute raw materials, which produce less waste and pollution.

Again, in this region, the Small and medium enterprises (SMEs) play a pivotal role in the overall manufacturing and service processes, adding to the environmental challenges of this region. Mushrooming in obscure hamlets and sleepy towns, these enterprises are often the sole job-providers and form the backbone of industrial activity in impoverished regions. Being low in capital, SMEs often lack the money and technological expertise to tackle environmental pollution. In the latest manufacturing trend, large global companies often sub-contract items of the manufacturing process to SMEs, with the global companies only ensuring a quality check. Thus, the role played by SMEs is becoming even more significant in this part of the world. However, the SMEs are also the biggest polluters. They are usually so busy operating from day to day, increasing their productivity and maintaining bottom-lines that environmental management is usually not a priority for them – unless, of course, they are penalized for non compliance or threatened with closure.

In order to address this concern, many Southeast Asian companies have begun holding awareness seminars for their small and medium suppliers and contractors, sometimes even offering know-how and technical guidance to help them implement their own environmental management system (EMS). These companies include Texas Instruments (Philippines), Ford Philippines, North Bangkok Power Plant and Changi General Hospital, Singapore. So the

process of reining in pollution caused by the SMEs has made a tentative start, though it is still a long distance away from becoming a widespread reality.

It is difficult to deny that environmental challenges in Southeast Asia are enormous, largely due to the lack of funds, a scarcity of resources and, in fact, every feature which makes up an underdeveloped economy. But does this mean that environmental degradation will keep on rising endlessly in this region? Is industry only concerned with economic growth and enhancing bottom lines even at the cost of causing chemical pollution and releasing hazardous materials in the water, air and land? The answer is an emphatic “no”. Industry has already moved away from being forced into taking environment-friendly measures because of penalty threats, to voluntarily implementing environmental management systems, which are predominantly market driven [Rao, Purba, Towards a Green Millenium , Environmental Management Systems in South East Asia 2000] .

As expected, this move has brought about a definite marketing advantage and given the companies a competitive edge, among other benefits. The thirst for a marketing advantage has provided many global companies the impetus to go in for an EMS. The result, almost always, has been environment-friendly corporate image and global visibility.

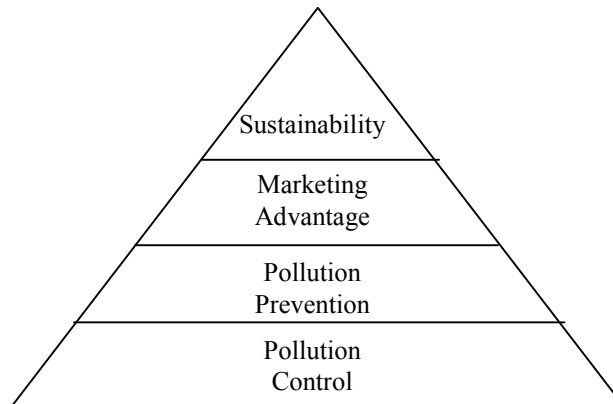
However, while all these corporate environmental phases have played their part in inspiring company strategies, there is another realization that corporations are waking up to -- beyond compliance, beyond productivity and even beyond the bottom line. This is the realization that all of us, wherever we are, want to leave behind us a planet that is still livable, and still green and rich in its natural treasures. Thus companies, while producing world-class goods and services, enhancing productivity, reducing inefficiency and preventing pollution at the source, are nowadays also trying to promote total environmental performance for the sake of sustainability.

To demonstrate that this is not merely a hypothesis but reality, a significant empirical research has been conducted in various Southeast Asian countries.[Rao, Towards a Green Millenium, Corporate Environmental Management Systems in South East Asia, 2000]. The results of the research indicate that corporate environmental initiatives, under various EMS frameworks, indeed have a positive impact on environmental performance. Such initiatives also enhance corporate image, minimize waste, save costs, increase productivity, bring about a huge marketing advantage and help companies contribute towards environmental sustainability.

The companies, thus, have come a long way indeed. In fact, their journey can be likened to the progress of an individual through the various layers of Maslow's need hierarchy model. [Chan,Gloria ,Managing people in Asian Organizations, 2000]. At the bottom layer of the pyramid are the basic physiological needs and the safety-and-security needs of an individual. These needs have to be satisfied before the social needs like the need for recognition are realized and finally the self-actualization needs are fulfilled.

In the same manner, the corporate organizations start their environmental initiatives first with the survival needs of pollution control, waste minimization and the like, so that they could avoid threats of penalty and closure as stipulated in various laws. Thereafter, they tend to strive for an increase in productivity, in pollution prevention and for a competitive advantage

(social needs). Gradually, they begin to appear as role models, giving importance to their need to have an environment-friendly corporate image (recognition). Finally, their genuine commitment towards contributing to the sustainable development (self actualization needs) overtake all other needs and lead them to think of leaving behind a livable planet once and for all...a planet for generations to thrive on in the golden years to come.



In order to validate the above model, let us first consider some relevant literature to analyze the effects of EMS implementation and other environmental initiatives on environmental performance, business performance and sustainability.

Brief Review of Literature

Recognizing the critical impact of industrialization on environment, Prahalad and Hamil [1994] investigated how the idea of being environmentally friendly would impact on all aspects of business --- from the creation of products and services to the use, consumption, and subsequent disposal by customers. Freeman [1995] demonstrated how clean production could improve profits, reduce environmental risk, protect, and even increase, market share. Lord Clinton Davis [1997] evaluated the different aspects of the ISO 14000 series and discussed how these standards affect daily operations, product-design, and manufacture. He also showed how the standards shaped the personal commitment of managers and workers alike, and how they influenced national, regional, and global trade. In his research, he considered industries in Southeast Asia and compared the Asian experience to the Western one. He concluded that in the near future, companies getting EMS certification would become the norm rather than the exception. Kym Anderson and Blackhurst [1994] analyzed the economic implications and global issues resulting from environmental initiatives and EMS certification of companies. They investigated whether optimal environmental policies were able to tackle the environmental issues, despite the institutional and political reasons preventing these policies from being implemented. On a similar theme, Johnson, Kriesler, and Owen [1994] looked at how the five main areas of company operations integrate. They examined the fields of finance, economics, international economics, health policy and public investment analysis, and environmental and resource analysis.

There are conflicting predictions on whether the EMS under the ISO 14000 format will be widely used by businesses. Many experts claim that the ISO 14000 format will unify countries in their approach to Environment Management. For instance, Cascio [1996] predicts that eventually, companies worldwide will accept environmental management systems, which will replace the traditional measures. Hamner [1996] believes that the greatest potential market for ISO 14000 comprises the small, manufacturing firms who will form the supply chain to the global companies. On the empirical research side, Ralph Luken [1997] and Pujari and Wright [1996] measured the perceived specific impact of international environmental standards like ISO 14000 on the trade relations of these countries. They also examined the development of greener production processes in manufacturing industries. Luken, in particular, made a field survey on the ISO 14000 series in emerging economies and developing countries in Africa, Eastern Europe, Latin America, and the Caribbean. He laid special emphasis on small and medium enterprises (SMEs). This paper presented many significant results on the awareness issues, reasons for implementation, perceived benefits and obstacles faced, all pertaining to the above regions.

Chayod [1999] conducted a survey of Thai ISO 14000-certified companies to assess driving forces, obstacles faced, cost factors associated with the implementing process of EMS and so on. According to his survey, the key elements that lead to successful implementation of EMS are:

1. Commitment and awareness of all levels of staff;
2. Top-level executives' commitment and corporate policy;
3. A quality management system (ISO 9000);
4. Adequate budget and
5. Ability to identify environmental aspects and impacts.

Christmann, Petra and Taylor, Glenn [1999] have examined the Pollution Haven and the industrial flight perspective, both of which suggest that cross-country differences in environmental regulations will lead to the migration of polluting production activities from developed countries with high regulation to under developed countries with low regulation. This theory seems to imply that globalization will negatively affect the environment. Christmann and Taylor have suggested an alternative view. They have identified three firm characteristics that could contribute to the implementation of environmental management systems and improve environmental performance. These are firm size, education level of the employees and multinational ownership. To test this hypothesis, they surveyed 118 firms in China. The results were analyzed using multivariable statistical techniques. The study proved that multinational ownership has a positive effect on environmental performance. Firm size and the level of employee education also affect implementation of the EMS.

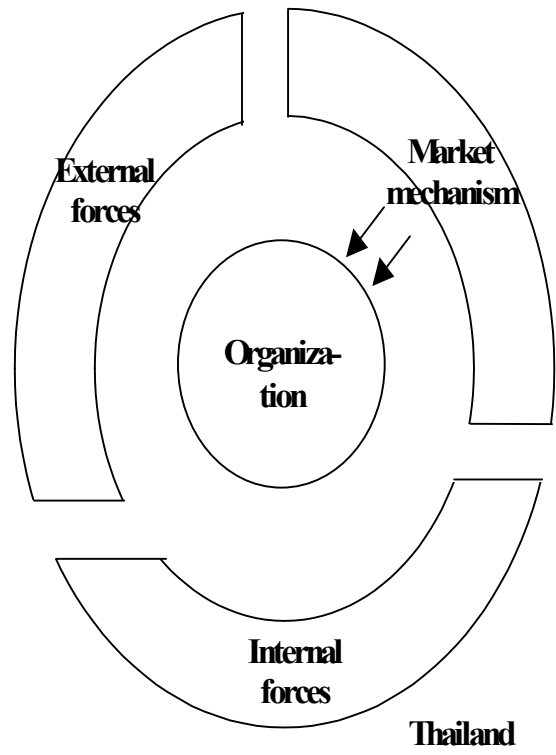
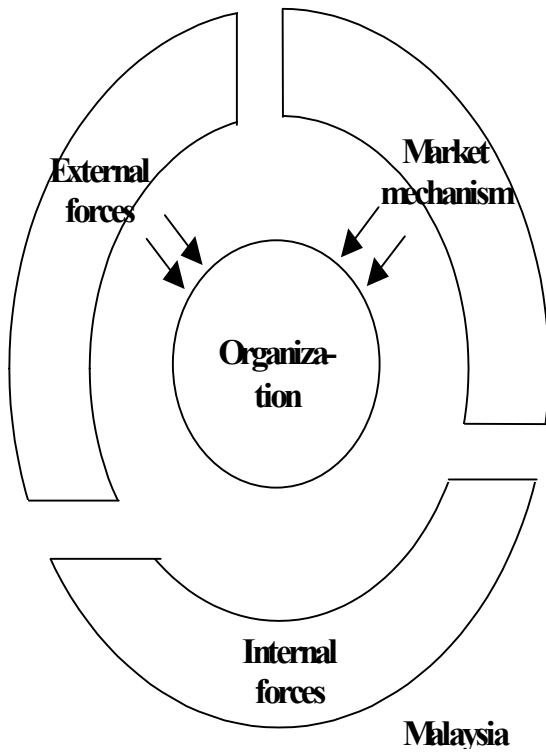
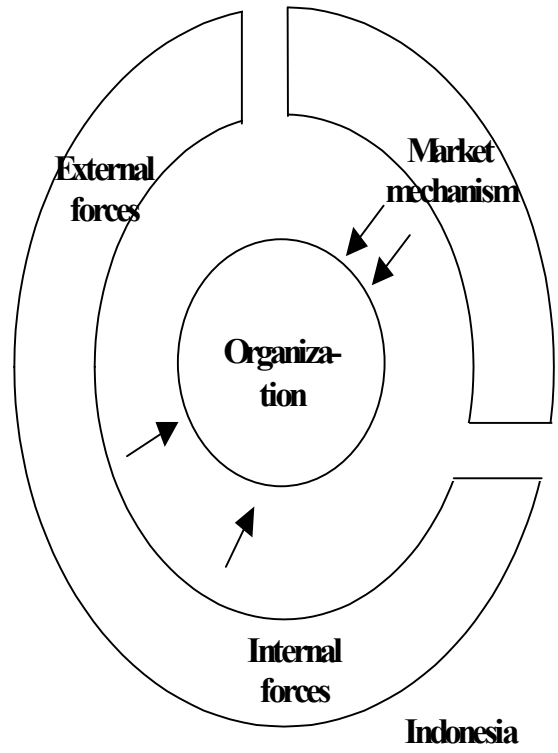
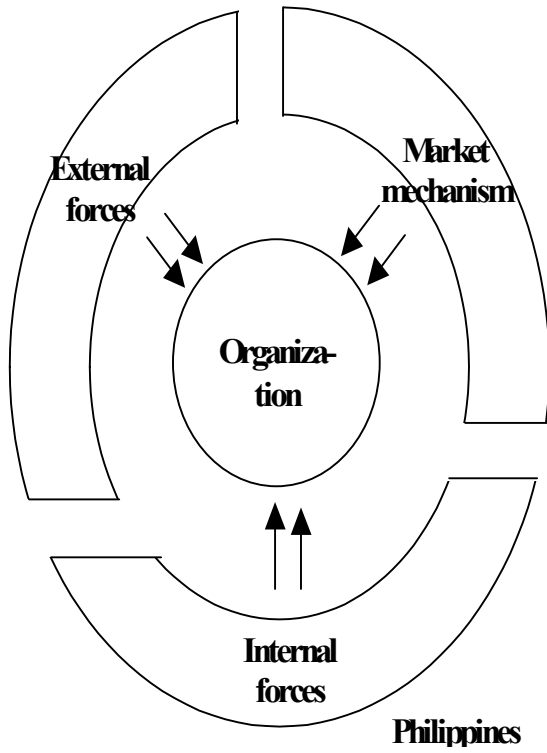
Delmas, Megali, [2000] integrates a stakeholder perspective in the research-based view of the firm to analyze the links between EMS and Competitive Advantage. The paper shows that the economic value of the EMS depends upon the involvement of the firms' external stakeholders (distributors, customers, community members and regulatory agencies). This analysis is supported by primary data from 55 firms with certified EMS in the U.S.

Rao [Towards a Green Millennium, Environmental Management Systems in South East Asia, 2000] investigated the influence of stakeholders on the environmental initiatives of firms in Southeast Asia. Using a research instrument of a detailed questionnaire [Kestemont, Rao, Gavino and Ikeda, International Business Environment Barometer], manufacturing companies among the top 1000 corporations in the Philippines, Indonesia, Malaysia and Thailand were surveyed regarding their driving forces in terms of stakeholder influence, obstacles encountered, expected benefits and so on.

The stakeholders considered were :

- | | |
|---------------------------------|-------------------------------|
| V1. Competitors | V10. Insurance Companies |
| V2. Consumer Organizations | V11. Voluntary Agreements |
| V3. Customers | V12. Local Population |
| V4. Distributors | V13. National Regulators |
| V5. Management | V14. International Regulators |
| V6. Employees | V15. Owners |
| V7. Labor Unions | V16. Press/Media |
| V8. Environmental Organizations | V17. Scientific Institutions |
| V9. Banks | V18. Suppliers |

A total of 159 responses were obtained from a sample size of about 2,000 companies. A Principal Component Analysis carried out thereafter revealed that in all four countries, Market Mechanism -- comprising Customers, Distributors, Competitors and Consumer Organizations -- plays a big role in influencing corporate environmental initiatives. The influence of the other stakeholders is varied.



The questionnaire also asked the ASEAN firms to rate the obstacles they faced from among the following:

- * lack of information regarding the tools
- * lack of management support
- * no feasible technical solution
- * resistance to organize
- * low demand for environmental products
- * too costly
- * no regulatory incentive
- * no competitive advantage etc.

To determine which categories of the above variables (obstacles) have a significant bearing on the lack of commitment on part of an organization to adopt environmental management, structural equation modeling has been applied. In this technique, groups of similar, correlated variables (latent constructs) are considered and the cause-and-effect relationships between them are determined. The latent construct is constituted by a group of variables, which have some inherent common feature. The latent constructs in this case and the variables they comprise are:

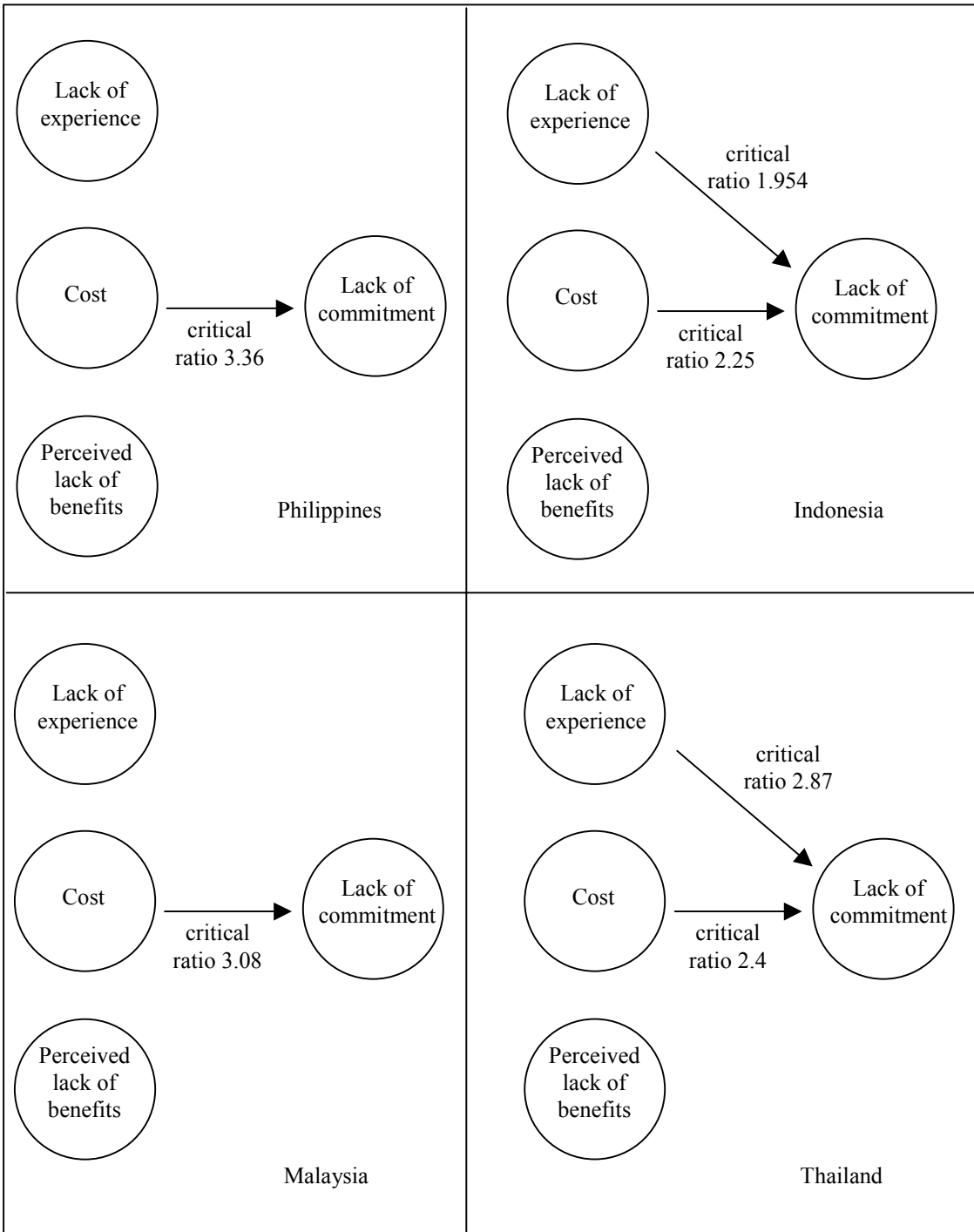
- * Lack of experience,
- * Perceived lack of benefits,
- * Cost and
- * Lack of commitment

Once the above constructs were identified, structural models were developed for the four countries, using four different data files, as obtained from the survey. The models comprise the obstacle categories and depict the significant linkages between them. The significance is evaluated so that, if the critical ratio is greater than 1.96, the associated linkage is taken as significant.

Having reviewed some relevant literature regarding research contributing to the understanding how environmental initiatives are affecting corporate business performance and environmental/social responsibility, let us now set up our research hypothesis or conceptual framework.

The Conceptual Framework

The research objective of this paper is to investigate the impact of environmental management initiatives undertaken by Southeast Asian companies on corporate environmental responsibility, over and above the impact on business performance and competitive edge. For this purpose, we decided to look at the impacts on companies that have already implemented such environmental initiatives. We found that these initiatives were extremely varied in nature. Some of them merely offered piecemeal, end-of-the-pipe solutions, like setting up a waste treatment plant with no documentation and systems procedures. On the other hand, there were some companies that had a world-class integrated approach, comprising product stewardship and design for environment. The research design needed a uniform set of environmental initiatives, whose effects we could study. Thus we decided to choose initiatives with a uniform managerial structure, namely the environmental management systems or EMS under the ISO 14001 format. The ISO 14001 has become widely known in industrial circles in Southeast



Asian. A total of about 400 companies have the certification in the Philippines, Indonesia, Malaysia and Thailand. There are other EMS systems too, such as EMAS and other customized versions developed according to the needs of individual companies. However, they are not too popular with ASEAN companies yet.

The EMS modules, under the guidelines of ISO 14001, comprise environmental policy, planning, implementation and operation, checking and corrective action and management review.

To elaborate some of these modules :

Policy is a statement by the organization regarding its intentions and principles in relation to its overall environmental performance. Policy usually addresses specific aspects and impacts of company activities such as water/air pollution, land contamination, solid waste generation, product impact, hazardous material, waste disposal, recycling etc.

Planning: comprises identification of Aspects ,Impacts, Objectives and target:EMP or Environmental Management Programs to achieve the objectives and targets.

Implementation and Operation including Structure and responsibility ,EMP Performance, Training/Awareness Operational Control etc

Checking and corrective action/Monitoring and measurement: in which the company must monitor and measure the use of natural resources and generation of waste at every process, not just at the end of the discharge pipe. The company should also know how much is spent on waste disposal.

Management Review

When implemented properly, environmental management systems are expected to have a substantial impact on environmental performance and compliance, competitive edge and marketing advantage. They usually also enhance corporate image, save costs, improve productivity, and above all, fulfill the company's urge to contribute to sustainability. To measure the linkages between the EMS modules and environmental performance, leading to enhanced corporate image, a competitive edge and environmental sustainability, the following conceptual models have been set up to be validated by our research:

Model 1

The linkages between the EMS modules and environmental performance

Model 2

The linkages between the EMS modules, corporate image and competitive edge

Model 3

The linkages between environmental performance, compliance, cost saving and productivity, competitive edge and fulfillment of commitment to sustainability

Empirical Research

In order to achieve the objectives described in the previous section, a detailed survey was carried out in which the companies were asked to fill a questionnaire with 71 items. The questions were to be rated on a four-point scale: Strongly Agree (SA), Agree (A), Disagree

(D), and Strongly Disagree (SD). The first 49 of these questions referred to the different aspects of the EMS standard. The last 22 questions referred to specific results on environmental performance, corporate image, competitive edge, and fulfillment of social commitment. For instance, there were questions like the following:

On account of EMS, there has been:

- * Substantial substitution of environmentally questionable material.... SA:A:D:SD or
- * EMS has led to enhancing new market opportunities SA:A:D:SD or
- * EMS has led the company to help preserve the environment.... SA:A:D:SD

In the survey we did need to rely on self assessment of the responded companies, which might be considered unreliable because they might portray the environmental performance of their firm better than it actually is. However, similar scales [Dasgupta et al,1997] have indicated high correlation between self assessment and observable conditions.

Questionnaires were sent out to all the ISO-14001-certified companies in the Philippines, Indonesia, Malaysia, and Thailand. Eighteen completed questionnaires out of 22 certified companies were received from the Philippines. However, only a total of 29 completed questionnaires were received from the other countries.

When we received the data, first we wanted to check if the four samples from the four countries could be combined together to develop one regional model or whether separate models would have to be developed and validated for the four countries. To verify this, we conducted the Kruskal Wallis test, which concluded that all four samples did, in fact, come from the same identical population. Thus a single regional model, rather than four different models, would need to be developed.

Next, we wanted to check if the questionnaire used was consistent, reliable and provided a good scale for measuring the actual impact of EMS. For this, we conducted the Reliability Analysis using Cronbach Alpha. Initially, the test indicated that certain items in the questionnaire were redundant. These were duly discarded and only the non-redundant, consistent part of the questionnaire was considered.

Structural Equation Modeling

It was decided that the Linear Structural Equation Modeling, SEM (Jorekog and Sorborn, 1993) would be the most appropriate technique for validating the causal models presented above, between the different modules of EMS and the results achieved in the areas of environmental performance, competitive edge, compliance and social commitment. A structural model has two analytical components. In the first, a set of indicator variables, (items or questions in our questionnaire), are related to a higher order variable which represents the latent or common characteristics of the indicators. This higher order variable is called a latent construct. The relationship between the indicator variables and the associated latent construct is called the measurement model. The process also investigates whether the indicators are valid measures of the concept underlying the latent construct. Usually the indicators are grouped according to theoretical or logical assumptions, though factor analysis of the variables often helps.

In the second component of the SEM analysis, the structural models with the causal relationships between the latent variables are analyzed by considering error co-variances and regular correlations [Erickson, Johnson, Majkgard, DeoSharma, 1997, Bollen 1989, Bollen and Long 1993, Hayduk, Joreskog and Sorbom 1993]. This analysis is basically confirmatory in nature, validating models, founded on logical assumptions, with the help of empirical analysis.

The significance of the overall models is determined by the Chi-square value, the corresponding degrees of freedom and the associated p-value, which must exceed 0.05. The individual linkages between any two variables are tested using the critical ratio, which is an observation on a random variable that has approximate standard normal distribution. Thus, using a significance level of 0.05, any critical ratio that exceeds 1.96 in magnitude would be called significant. The conventional t-test is exact under the assumptions of normality and independence of observations, no matter what the sample size. The test based on SEM critical ratio depends on the same assumptions, but with a finite sample size, the test is only approximate.

Thus, if there is a significant link between checking and corrective action and environmental performance, it would imply that the former latent construct directly influences the latter. In our analysis, we have presented different structural models, which are essentially causal in nature. The latent variables in each of the models are measured by indicator variables used and rated in the survey. In this two-step confirmatory analysis, one first tests if the variables are relevant to the latent construct they measure. Next, in our second step, one investigates/validates the causal relations between the latent variables looking at the overall Chi-square value, degrees of freedom, p-value and the individual critical ratios. The measurement models used to measure the latent constructs are many. To give a few examples, consider the following:

Environmental Performance

This Latent Construct consisted of :

- Significant optimization of processes to reduce solid waste, water use or air-emissions
- Recycling of materials internal to the company
- Substantial substitution of environmentally questionable materials.
- Introduction of the environment criterion as a significant factor in the choice of suppliers, etc

Competitive Edge

- Increased market share
- New market opportunities
- Sales
- Product price

Contributing towards environmental sustainability

- Fulfill social commitment
- Help preserve the environment

- Top management satisfaction in contributing towards sustainability
- Appear as a role model

Compliance

- Satisfy environment organizations
- Satisfy national regulators
- Satisfy international regulators

The items under each module have been generated on the basis of focus group discussions and interviews with leading environment experts, having both theoretical knowledge and practical experience in the field of environment.

Presentation of Results and Analysis

To test if the data came from same population for all the countries (Kruskal Wallis test)

For the first part of our analysis, we tested whether the four samples from the four countries belonged to identical population segments. Introduced in 1952 by W.H. Kruskal and W.A. Wallis, this is a non-parametric procedure for testing the equality of means such as the one-way analysis of variance when we wish to avoid the assumption that the samples have been selected from normal distribution.

Upon carrying out the test for most of our indicator variables measuring latent environmental performance, competitive edge and social commitment, the test indicated that the samples came from identical population segments. This is perhaps a logical outcome, because for most of the aspects of environmental performance -- in terms of waste minimization, recycling and material substitution -- there is no reason to expect different results in different countries. The results are a direct offshoot of the EMS and a proper management system for addressing the environmental concerns of the company. These impacts thus are equally felt in companies in all four countries, irrespective of different traditions, cultures or even economies and political systems.

Hence, in conclusion, we decided to develop a single structural model for the entire region without incorporating any country biases.

Reliability Analysis: to test internal consistency

Before using the data obtained from the survey for structural analysis, we would have to be sure that the true underlying level of implementation of the different modules of the standard is accurately reflected in the questionnaire score. This refers to reliability, which is defined as the extent to which the measurement is free from random error variance. According to the classical measurements theory, the relationships between the observed score (X), true score (T) and error (E) is given by;

$$\mathbf{X = T + E}$$

Our measurement instrument, the survey questionnaire will be considered properly calibrated if there is a high degree of agreement between observed score (X) + the true score (T). Also the items or questions under one concept or one topic must be such that they all measure the same idea. For instance, all items under the construct called policy must essentially correlate with one another for the questionnaire to have internal consistency. This could be systematically measured by a statistic called Cronbach Alpha, which must exceed 0.8 for the module to demonstrate reliability.

After the reliability analysis for the consolidated data from the four countries was carried out, the Cronbach Alpha for certain modules did not yield acceptable reliability. In order to arrive at a survey instrument with acceptable reliability in each module, those items whose co-efficient of multiple determination with the rest of the items were the lowest, were removed. The final result of the Cronbach Alpha is as follows:

Table 4

Module/Latent Construct	Cronbach/ alpha
Policy	0.79
Environmental aspects	0.82
Objectives/targets	0.91
EMS	0.84
EMS (performance)	0.77
Training	0.87
Checking/corrective actions	0.84
Environmental performance	0.82
Operations/control	0.68
Corporate image	0.89
Competitive edge	0.93
Compliance	0.86
Cost saving and productivity	0.91

Structural Equation Modeling

In this section, the linear structural equation analysis was carried out for three individual structural models, as described earlier on the basis of the information obtained from the questionnaire-based statistical survey, conducted across Philippines, Indonesia, Malaysia, and Thailand. No significant differences among the four samples were found, as indicated by the Kruskal-Wallis test. Thus, the validated models would apply across the four countries and could thus be referred to as regional models. The software used for this was AMOS - graphics for windows.

In our preliminary trial, convergence was obtained but the significance level was really not acceptable. The models were subsequently improved incorporating additional co-variances between the error terms in the indicator variables. Using the criterion that the

overall chi-square for the model should have a p-value greater than 0.05, the finalized model for environmental performance was obtained as follows:

Against every link (arrow), the regression co-efficient is shown and shows the corresponding critical ratio appears in the parenthesis. All latent constructs that do not have significant regression weights with other latent constructs were removed from the model to achieve greater convergence.

Looking at the finalized model for environmental performance, one observes the relevance of the linkages that have emerged from the analysis. Thus, the identification of Environment Aspects would directly and significantly lead to the formulation of objectives and targets. This again would have a significant impact on EMP, Environmental Management Program (regression weight 0.758, critical ratio 3.812). which again has a direct impact on EMP Performance in terms of actual waste reduction etc. This implies that once a proper EMS is established, its performance in terms of the amount of waste generated and their related costs are also computed and reported to the top management at regular intervals.

The next link, between EMP performance and training, has a regression weight 0.181 and critical ratio of 2.281. These significant links imply that after generating the EMP performance reports, the company must train employees so that they can objectively evaluate the EMS performance and identify opportunities of improvement. From training, the link goes directly to checking and corrective action, [regression weight 0.711 and critical ratio 2.117], which measure resource use and waste generation not only at the end of the discharge pipe, but also during each production process.

Again, we observe that from checking/corrective action, two significant links emanate, one going to environment performance (Reg. Wt. 0.718, critical ratio = 2.765) and the other going back to aspects. The first link signifies that measuring waste generation at every point in the production process, and taking corrective actions if necessary, directly results in improving the environmental performance of the entire company. Thus, merely monitoring wastewater and solid-waste generation or air emissions at every point in the production process is not enough. Corrective action also has to be taken if the performance is not up to expected standards. Such measures, naturally, have a tremendous impact on the environmental performance of the company as a whole.

Checking and corrective action includes the lessons learnt out of non-compliance or less-than-desired performance, which are further incorporated to the identification of aspects and the whole process repeats itself.

The overall fit of the model;

Chi-square = 308.105

d-f = 271

Probability level = 0.06 which is acceptable.

The squared multiple correlation for the measurement models is as follows:

Objectives/t = 0.683

EMP = 0.752

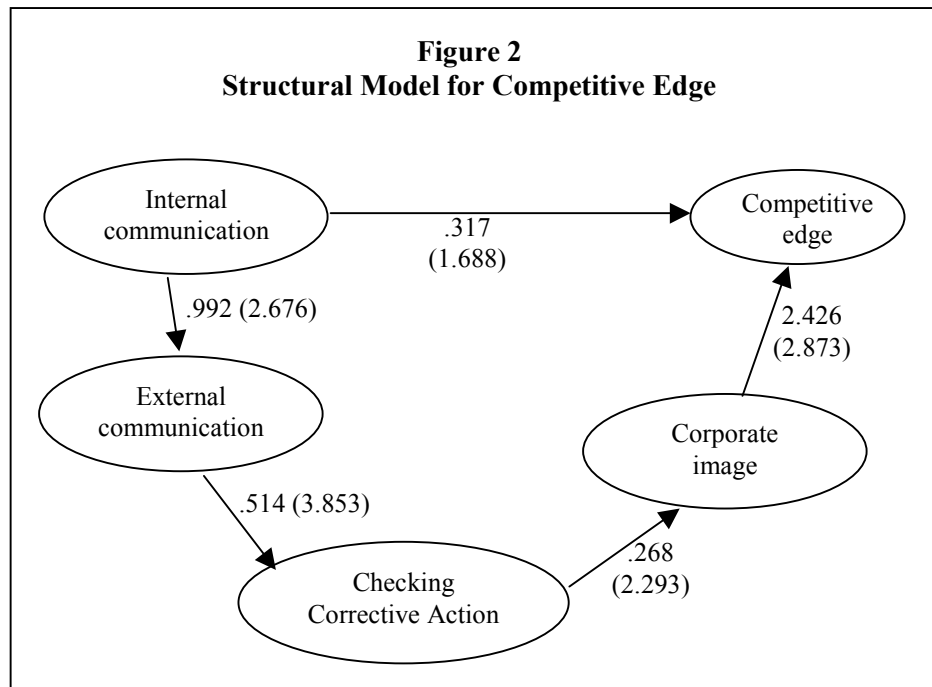
EMP performance = 1.000

Training = 0.454

Control = .942
 Checking and corrective action = 0.556
 Environmental performance = 0.492

The above statistics show that the overall fit of the model is acceptable.

Next, we look at the marketing model. The final, acceptable structural model with the corresponding linkages is shown below. Here we began with the complete set of latent variables, such as policy, aspects etc, but finally only the following variables survived:



Internal communication refers to the employees meeting regularly and discussing environmental performance or publicizing environmental accomplishments within the company. This seems to have a direct impact (reg. Wt. .992, critical ratio 2.676) on external communication, which includes maintaining contact with various environmental organizations, subscribing to environmental-management publications or encouraging relationships with external groups such as the community and government. This, in turn, significantly encourages (reg. Wt. .51, critical ratio = 3.853) the measurement of waste generated at every stage and setting up corrective procedure so that the company's environmental performance always meets the desired standards. This continuous endeavor to monitor environmental performance leads to a competitive edge (reg. Wt. 2.426 and critical ratio = 2.873) and encompasses increased market share, new market opportunities, enhancement of sales etc. The overall fit of the model was given by:

Chi-sq = 84.276
 d-f = 70
 p-value = 0.11

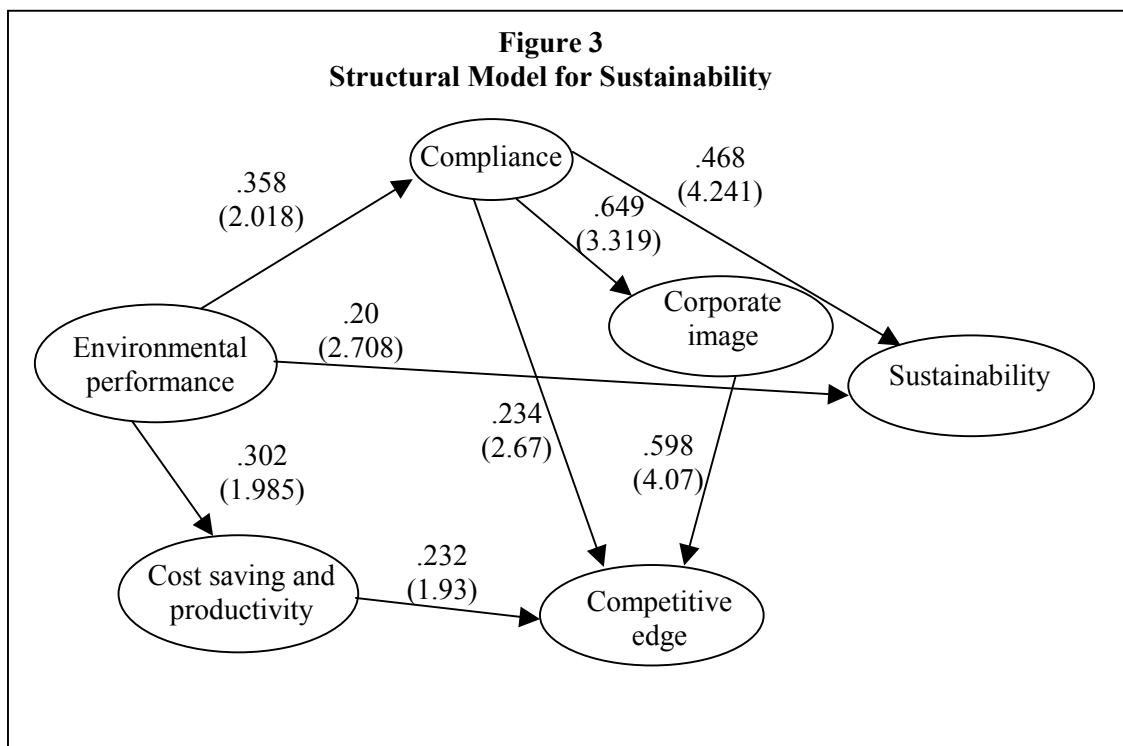
Squared Multiple Correlation

Internal communication 0.273
External communication 0.791
Checking/corrective action 0.443
Corporate image 0.370
Competitive edge 0.880

Finally, we analyze the structural model for environmental/social commitment, integrating both the earlier models developed so far.

Firms implementing EMS are often believed to be driven by the marketing advantage that the certification brings. However, in our analysis we wanted to check if over and above marketing advantage, the fulfillment of social commitment or sustainable development is also very much an outcome of the certification. Also, we wanted to find out which latent constructs lead to social commitment and which ones lead to competitive advantage.

In this analysis the final acceptable model obtained is the one presented below, which is our regional model for environmental sustainability. This model proves significantly that environmental performance, which is an outcome of the EMS, actually leads to cost saving /productivity, corporate image, competitive edge and achievement of environmental sustainability. This is demonstrated by the regression weights shown against each link between the latent constructs and their associated critical ratios. Thus using EMS framework, the companies in South East Asia can for sure achieve all of the lower echelon needs, referred to earlier on page- 9 before actually attaining the environmental/social sustainability, which is the primary goal for our planet to survive.



The Chi-square for this model was 183.995.

Degrees of freedom 169

Significance = 0.204

The squared multiple correlation for the measurement models:

Social commitment = 0.977

Corporate image = 0.587

Competitive edge = 0.438

Discussion of Results and Concluding Remarks

In our analysis of the data as presented above, in particular in the model for sustainability, it may be observed that environmental performance and compliance have a significant impact on sustainability, because our planet can be sustainable only if pollution is minimized (compliance) and resource utilization is substantially reduced (environmental performance). Compliance surely leads to not having to pay penalty and avoiding environmental scandals, thus ensuring competitive edge. Compliance also leads to a good name and thus to enhanced corporate image. What is remarkable in this model is that a good environmental performance significantly saves costs, improves productivity and reduces the cost of operations, thereby once again leading to a competitive edge.

Thus, companies could go in for an EMS to achieve compliance and competitive edge, but, at the same time, through an EMS they may achieve their goal towards sustainability and even achieve significant cost saving. This finding is encouraging because many companies do not go for formal EMS because it is perceived to be involving a lot of expenses. Now if these companies can be assured that there is statistical evidence that EMS saves costs too, in fact in most cases the payback is less than two years [Chayod, 1999], they would be definitely motivated. Hence in their journey towards Sustainability, our Southeast Asian companies would accomplish marketing benefits and economic benefits to serve as short term goals before achieving the ultimate goals towards building a sustainable world.

Towards a New Model of Enhancing Environmental Performance

From our quantitative analysis, presented in the preceding section, it is evident that companies that have implemented the EMS have significantly enhanced their environmental and business performance and fulfilled their corporate social/environmental responsibility. Now, in the following section, we would like to focus on how this is happening, with the help of real-life examples from what is taking place in this region. We will also try and demonstrate some novel features of such initiatives and show how companies are being led on the path towards sustainability with the help of governments, markets and local communities. This phenomenon has been referred to as the Broader View of Regulation [World Bank Report 2000] or the New Model for enhancing environmental performance.

Philippines

In the Philippines, for instance, an NGO called Philippine Business for Environment, has organized a very effective Industrial Waste Exchange Program. The program is based on the concept that waste generated from one industry can very well be used as raw material by

another industry. Thus, the waste producer not only saves on disposal and waste treatment cost but also earns from the sale of the waste. The waste buyer, on the other hand, gets the necessary raw materials at a much lower cost. Besides, since the waste items involved would have either been thrown in landfills or discharged into water bodies, the environmental benefits of recycling waste are immense. The companies involved benefit as well. They get to reduce costs substantially and even contribute to corporate environmental responsibility by avoiding pollution in a very ingenious manner.

In the banking sector in the Philippines, at least two banks have always been committed to the environmental cause. These two banks, the Landbank and the Development Bank of the Philippines, have initiated many programs that have contributed significantly towards improving the environmental performance of various corporations and helping in their quest for sustainability.

Some of the programs initiated by these banks are:

- * Countryside Loan Fund (CLF), under World Bank funding,
- * Industrial Forest Plantation Management Agreement (IFPMA), under the Asian Development Bank,
- * ODS (Ozone depletion substance) Phase Out Investment Program, under World Bank Funding,
- * Environmental Infrastructure Support Credit Program, under Overseas Economic Cooperation Funding,
- * Small Group Program under UNDP

Till date, there are many environment-related projects that have been handled by Landbank in co-ordination with the larger, multinational banks. Among them, we have the ODS (Ozone Depleting Substance) – Phase Out Investment Program, which aims to recycle, reduce and ultimately phase out from Philippine industry the use of hazardous substances such as CFCs (Chlorofluorocarbons). The CFCs are typically used as working fluids in refrigerators, as solvents in the electronic assemblies, or as blowing agents in the manufacture of foam products [Bacallan, J. J, 1999]. In this program, which aims to support 16 sub-projects through the fund provided by the Montreal Protocol, through the World Bank, the main task will be to convert ODS-using technology to a much more environment friendly one and eventually phase out these harmful substances.

Indonesia

In Indonesia, several manufacturing companies were led to enhance their environmental performance and fulfill their commitment to sustainability in a very unique manner. Like many of its Southeast Asian neighbors, Indonesia has experienced severe environmental degradation in terms of rising industrial pollution -- in land, water and air -- and through hazardous waste production. As a result, both government and industry have been under pressure to tackle these issues efficiently. Environmental legislation is still in the process of being strengthened. The government is trying to increase the penalties for violation [RIET 1997]. However, the real problem in Indonesia with regard to the environment is the difficulty the government is facing in enforcing green laws. This is partly because of a lack of funds and partly because of the lack of manpower. These hurdles have forced the government to

encourage a number of innovative responses from Indonesian industry, highlighting self-regulation.

In general, the overall responsibility for environmental matters rests with the State Ministry for Environment and the design and implementation of the new laws is supervised by the Environmental Impact Management Agency (BAPEDAL). This agency, along with Indonesian government, has pioneered many, many non-regulatory mechanisms, crafting a series of innovative co-operative ventures with companies to improve their environmental performance. Through these initiatives -- which encourage environmental improvement and champion concepts such as cleaner production -- the government will be able to achieve better enforcement, voluntary compliance driven by potential, positive incentives and outside assistance and indirect pressure by publicizing persistent offenders [World Bank Report, 2000].

Over the past few years, programs have been developed for rating and publicly disclosing whether individual factories are complying with local environmental regulations. One such program, called PROPER or the Program for Pollution Control, Evaluation and Review, attempts to rate many Indonesian factories on their environmental performance.

The program gives a “black” rating to polluters who have not made any attempt to control pollution and are thus causing serious damage to the environment. Those who have taken some initiatives, but whose performance still falls short of legal compliance standards are rated “red”. Factories who are just about meeting standards are given a “blue” rating and those whose emission control, production and waste management procedures significantly exceed national standards receive a “green” label. Finally, those factories which have world-class environmental performance standards receive a “gold” rating.

The factories getting a black or a red rating are first notified privately. They are also given time to improve their environmental performance, after which time their ratings are made public. The factories with gold and green ratings are felicitated in large public gatherings, with the minister himself present to honor them. This initiative has forced many factories with low ratings to take special steps to improve their environmental performance, so that they do not have to bear the shame of public exposure in front of the community.

This environmental rating scheme is based on the ASEAN value of saving face or *hiya* (shame, in Tagalog), where, in the face of some wrongdoing, an individual or an organization will do anything to save itself from the shame of public disclosure.

This “face-saving method” helped Indonesia implement the New Model employing a broader view of Regulation [World Bank, 2000]. In view of the country’s lack of a sufficient budget to enforce all the regulations required to improve the environmental performance of Indonesian factories, this innovative move has already supported and encouraged the implementation of this New Model by providing information on performance ratings. These ratings have empowered local communities to be “in a much stronger position to negotiate pollution control agreements with neighboring factories”. For example, in addition to water pollution, which can be seen and air emission, which can be smelled, there could be emissions of metal and other toxins, which accumulate in organic tissues. Without PROPER-type information, the local communities would not be in a position to evaluate the severity of

impacts of such polluting factories and, thus, the most serious polluters may often go unnoticed.

This bank of information can also influence the 'market' side of the new model in the sense that with Bapedal's ratings, the 'stock market can more accurately value a company's environmental performance. Besides, banks can factor pollution-related liability into their lending decisions'. Also consumers may only like to deal with factories having gold and green labels, which they could easily check up from the Internet site that Bapedal has provided.

Thailand

The Asian economic crisis over the past 2-3 years, has led to a chronic shortage of funds. This, in turn, has adversely affected the enforcement of green laws in the region. Innovative, low-cost environmental initiatives have thus become the only viable way to regulate the environmental performance of Indonesian firms. Because of its low cost leveraging of communities and market action, this has come out to be effective in spite of dramatic cuts incorporated in Bapedal's budget.

In Thailand, the government and NGOs such as the Thailand Environmental Institute (TEI), have always cooperated with each other in their effort to green Thai industries. Over the past few decades, Thailand has been hurtling along a path of phenomenal economic growth, becoming one of the most prominent tiger economies in Southeast Asia. During this period, while industrialization was pursued with a vengeance, environmental protection was not. Gradually, however, an awareness about the adverse effects of unchecked industrial pollution began to seep into the national consciousness. Companies too began to realize that they could never reach their goal of sustainability without taking up environment-protection initiatives. Such initiatives were thus incorporated in their operations.

The Thai government has also played a very supportive role in the greening of Thai industry, encouraging companies to take up environmental initiatives and, in the process, motivating them to be competitive and gain global visibility. The government has also supported the endeavor of small and medium enterprises (SMEs) to get their own environment management systems, because such enterprises are often the biggest polluters and they are the ones who need help most.

The TEI, which is the secretariat of the Thailand Business Council for Sustainable Development, has also played a major role in motivating many Thai companies to go in for EMS and ISO 14001 certification. The Business and Environment Program under TEI, had organized a pilot project three years ago in which it convinced 10 large companies in Thailand, such as National Petrochemical and Amway, to begin designing and implementing the EMS in their operations and even opt for certification.

There were some companies in this pilot who were already aware of environmental concerns in the industry. Others, meanwhile, were not. Under the leadership of TEI, the companies who were ahead in their environmental practices and had some kind of EMS in place already, came forward and provided the essential guidance and assistance required by these newer companies to help formulate their EMS.

Today, the TEI also gives the ISO 14001 certificate to Thai companies that have successfully implemented the

EMS and conducted external audits. Across the whole industrial scene, the TEI commands tremendous respect and gratitude, for the environmental concerns it has instilled in Thai companies, which they are so proud of.

One organization with a reputation for environmental excellence is Amway Thailand, a direct-selling company with six categories of products, including food supplements, cosmetics and home-care items. It has always been Amway policy to produce and distribute items that are environmentally friendly. Their cosmetic line, for instance, is totally against animal testing, all chemicals like liquid organic cleanser (LOC) are bio-degradable, their packaging is predominantly with recycled paper and they try and minimize the use of CFCs in their refrigeration systems. The manufacturing process is environmentally friendly.

Besides, the company in Thailand believes in the reuse/ recycle philosophy. A large percentage of empty, plastic bottles, for instance, is got back from customers and sent to recycling plants. The plastic obtained thereby is reused, either in the manufacture of new bottles or in the manufacture of plastic bags. The customers are given incentives to hand over the bottles to the Amway distributor who originally sold them, rather than throw them away.

The company has also established an Environment Management System to ensure a better environmental performance and continuous improvement in the supply chain, from the time the product is delivered to the main warehouse of the Thailand company, to when the product is distributed at all the regional distribution centers. The company strongly believes in minimizing the use of natural resources by reducing its need for paper, tap water, computer paper and so on. Amway Thailand also has good emergency procedures and has conducted widespread training for all its staff regarding environment and sustainability concerns.

Malaysia

Malaysia, in the process of becoming a developed nation and a knowledge-based economy by 2020, has encouraged clean industries as part of its development strategy. The Department of Environment and the Standards and Industrial Research Institute of Malaysia (SIRIM) have extensive training programs. Besides, the country has many large companies both in the manufacturing and service sector, which have certified environmental management systems.

A well-known resort hotel in Penang, Malaysia -- the Rasa Sayang Resort Hotel -- is a prime example of how an organization can turn an environmental performance program into an effective strategy for motivating the entire population to reach out and sharing environmental ideas within communities and other organizations. Situated on the Batu Feringgi Beach, towards the northwest coast of Penang, the hotel is set amid 15 acres of lush green fields, studded with rain trees towering above giant swimming pools.

When it was started, the resort consisted of only two blocks, with about 160 rooms. The only bungalow, which was meant for personal friends, was called the Tranquil Suite. By 1999, the hotel had 514 guestrooms, but the presidential suite was still called the Tranquil Suite.

Despite the tremendous growth in its size, number of customers and the volume of business over the years, Rasa Sayang has retained its impeccable professional standards, thus receiving awards and recognition from different national and international agencies. From quality service, the hotel is now seeking to achieve proactive environment management, taking an active interest in environmental preservation. Its greening efforts bore fruit in 1998, when it was awarded the ISO 14001 certification for continuous improvement in its environmental performance.

Ever since the Rasa Sayang received the ISO 14001 certification, the spirit of environmental awareness and commitment has spread widely in various organizations. The management and staff of the resort have pledged to improve environmental performance by lessening pollution, practicing effective waste management, and reducing, reusing and disposing of waste in an environment friendly way, even when the alternatives were more economically viable. They also participated in environmental activities such as the *gotong royong* exercise of cleaning up the golden sands of Monkey Beach and Penang's shoreline along Penang Kota. The staff also collected 1,000 kg of old newspapers for the New Strait Times' National Environmental Education Programme, as part of their recycling project, and underwent extensive training. They were also encouraged to make their families conscious of the environment.

The difficulties and obstacles encountered in mobilizing the 700-odd personnel were overcome very gradually. As Anand Sud, who was part of the Environmental Committee and handled training awareness and competence, pointed out, "The greatest difficulty in implementing EMS is changing the mindset of human beings, the most complicated machine around." He explained that if a machine were to be adjusted in order to conform to specifications, one only needed to turn a knob or a screw. "However, with human beings, it is another story. Motivating people to get excited about the environment requires a lot of training, familiarization and charisma on the part of change leaders; but this can be done and Rasa Sayang is a living example of that."

There are many organizations in Malaysia, mostly in the manufacturing or the service sector, which have received the ISO 14001 certification. Some of these companies have implemented the standard to enhance their marketing advantage, some to improve compliance, and others to comply with a directive from the parent company in some other country.

Whatever the reason, whatever the driving force, the idea has been to get the whole organization to share the common cause of building together a sustainable world. It is this culture that Rasa Sayang has been able to achieve -- a commitment to environmental protection that many other certified companies do not have. While these companies have the necessary certification, they have no excitement or motivation to foster a joint effort for environmental preservation, which Rasa Sayang has demonstrated so impressively.

Concluding Remarks

In this paper which presents a combination of qualitative and quantitative analysis on corporate environmental management systems in South East Asia and their implications on environmental responsibility, we have tried to demonstrate that environment management has actually started to make a difference in the business performance in this region. In their struggle towards economic progress, the companies did start with a phase which assigned a low priority to environment management but that stage has been left behind long back. Now when we talk to the same companies which worked only for economic progress and bottom line, decades ago, one observes a new enthusiasm on their part to reach out to the world around them, sharing experiences of environmental/ social responsibility and of striving to help others who are still struggling.

The South East Asian people are not really very materialistic in nature – they have always had a heritage of spiritualism. Perhaps because of this they align themselves very naturally to the environmental/social responsibility of reaching out and working for the greater welfare of the humanity. It is because of this that environment management is catching up so fast in this region, inspite of all the challenges , and , using unique and innovative measures , becoming so effective in enhancing Sustainability .

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