ENVIRONMENTAL CARE STRATEGIES AND ECOSYSTEM HEALTH: CASE STUDY OF THE MANUFACTURING FIRMS IN LANGAT RIVER BASIN, MALAYSIA

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Abstract: The aim of this paper is to analyze the adoption of environmental care strategies by manufacturing firms and their impacts on ecosystem health A conceptual framework based on the core concepts of environmental care, systems theory and ecosystem health is formulated The chosen area of study is manufacturing firms located within the Langat River Basin, Malaysia. The findings of this study indicate that in terms of inputs, the major forces driving the adoption of environmental care strategies are meeting market-driven needs via product quality and profit maximization via cost efficiency for vendor selection and the R&D focus on product development. As a result, ecosystem health has become the indirect beneficiary. The lack of R&D effort on the usage of new materials can have detrimental effect on ecosystem health if there is a faster draw-down on non-renewable resources. For the transformation process, investing in the best available technology is highly dependent on deep financial pockets, which are in turn underpinned by the overarching concerns of market-driven needs and in tandem profit maximization. Energy conservation in the production process has not met with much success and as such has an adverse impact on ecosystem health. Compliance with the various certifications has morphed into standard operating procedures. These certifications, containing ecological characteristics, helped gain access to developed markets and in turn bring about direct and indirect positive impacts on ecosystem health. However, the lack of continuous upgrading of waste management system has an adverse impact on ecosystem health. For outputs, environmental care in the form of product standards especially eco-standards to fulfil the demands of developed markets has a positive impact on ecosystem health. Likewise, waste disposal methods abiding to environmental regulations also help in sustaining ecosystem health.

KEYWORDS: *environmental care, systems theory, ecosystem health, market-driven needs, profit maximization*

Introduction

The transformation and structural change from an agricultural to an industrialized economy has brought about immense development to Malaysia. The growth in Gross Domestic Product (GDP) per capita has risen dramatically but was somewhat tampered by the regional economic crisis of 1997, the slowdown in growth in 2002 and a major recession in 2009. GDP per capita has surged from RM6,298 in 1990 to RM13,359 in 2000 (Department of Statistics 2001) and to RM24,055 in 2009 (Malaysia Industrial Development Authority (MIDA) Online 2010). The genesis of the manufacturing sector started off with import substitution and later had an export-oriented focus. Industrialization has far reaching consequences and in many circumstances brought about direct and indirect positive effects, like for example better employment opportunities, higher standards of living, and increased infrastructural development. However the attendant problems of industrial growth, such as pollution and waste, have brought about environmental problems. Environmental problems can lead to immediate physical degradation and a negative impact on the ecosystem health that has longer-term ramifications (Er 2001a, 2001b). For enlightened industrialists to earn

the license to operate, corporate strategy has to take into consideration environmental concerns. This slow evolution has contributed to the development of an environmental management system to negate environmental degradation. However, this is not the end all. Some industrialists or manufacturing enterprises embrace the green agenda, some only pay lip service and on the opposite spectrum, some have total disregard for it.

Objective of this Paper

This paper aims to analyze the adoption of environmental care strategies by the manufacturing firms in the Langat River Basin. The Langat River Basin is chosen as the area of study as it is located mainly in the state of Selangor, which is undergoing rapid industrial development (Mohd Nordin 2000). Large-scaled enterprises (LSEs), including multinationals with manufacturing facilities together with supporting enterprises are sited in this area as it is one of the industrial development hubs in Malaysia. The supporting enterprises are predominantly small-scaled enterprises (SSEs) and medium-scaled enterprises (MSEs). This article analyzes the major drivers in the adoption of environmental care strategies by manufacturing SSEs, MSEs and LSEs.

Area of Study

The area of study focuses on manufacturing firms that are located in the industrial estates in the Langat River Basin. The industrial estates covered are Teluk Panglima Garang, Bangi, Balakong, Banting, Dengkil, Hulu Langat, Kajang, Kuala Langat, Olak Lempit, Semenyih and Nilai. These industrial estates are as a result of the spillover effect of industrialization in the Klang Valley due to spatial constraint and (expensive) land value (Er Ah Choy, Katiman Rostam and Abd. Rahim Md. Nor 2008).

Literature Review

Strategies implemented by companies, consumers and other institutions would have some impact on the environment (Welford 1996). Even substances that in their final form are environmentally benign may have been unfriendly in their manufacture especially if that manufacture was energy greedy. The manufacturing sector must increasingly take into account the impacts of their activities on the environment, especially if that sector is export oriented**.** Companies are encouraged to comply with certain standards like the various ISO certifications. For the export oriented manufacturing sector that focuses on the triad economies of the United States of America (USA), European Union (EU) and Japan, there is a need to push along a very steep environmental learning curve (Er 2007).

From here on, literature review will focus mainly on three areas, namely environmental care, systems theory and ecosystem health. These three will be the constructs for the conceptual framework.

The importance of environmental care is taken seriously by the vast majority of stakeholders. For most multinationals, environmental care is encapsulated in corporate social responsibility. The implications for environmental care in terms of protecting ecosystems, changing production systems, potential trade-offs with economic development and changing institutions are being debated (Van der Zaag, Gumbo, Gunawardena and Rap 2008). Willems (1995) indicated that there is growing interactions between (community) environmental concerns and environmental care in the chemical industry in The Netherlands for the past few decades. Thus, environmental care not only makes ecological sense but also gives rise to economic benefits. However, a contrarian view expressed by Gradus and Smulders (1993) indicated a trade-off between environmental care and long-term growth.

A system is a set of interrelated and interdependent parts arranged in a manner that produces a unified whole (Robbins, DeCenzo and Coulter 2008). A system functions by acquiring inputs from the external environment, transforming them in some way, and discharging outputs back to the environment. Feedback is knowledge of the results that influence the selection of inputs during the next cycle of the process. The business environment surrounding the organization needs to be scanned in an open system and information gathered is integral in the crafting of corporate strategy. Amongst the later researches on industrial ecosystem are studies carried out by Chavalparit, Rulkens, Mol and Khaodhair (2006) and Weerarratne, Salmijah Surif and Sumiani Yusof (2007). The findings of Chavalparit *et al*. (2006) indicated environmental degradation at both the input and output sides of the activities. However, Weeraratne *et al*. (2007) findings indicated that industrial palm oil waste recycling led to almost zero discharge of pollutants.

Ecosystem health is an essential concept in ecological policy (Lackey 2001). The proponents of ecosystem health indicated that the human health metaphor facilitates people's inherent understanding of personal health (Ryder 1990). By extension, a healthy ecosystem is envisioned as pristine or minimally altered by human action. Meyer (1997) thus argued that ecosystem health is easily understood by the general public, policy officials and scientists. However, as pointed out by Lackey (2001), points of controversy surround ecosystem health. Ecosystem health has been depicted as a broad societal aspiration rather than a precise policy goal or management target. Another point of controversy is that ecosystem health is impossible to quantify and is laden with values and judgement, not an independent scientific reality. However, Lackey (2001) counter-argued by saying the concept of ecosystem health can involve inherent value judgement.

The results of a survey by Er (2001b) on the level of adoption of environmental management strategies by SSEs and MSEs in Shah Alam, Selangor, Malaysia indicated that the majority of the respondents focus on customer satisfaction and attaining cost efficiency cum profit maximization. The focus on meeting customer and manufacturing specifications has a *de facto* effect on the application of environmental management strategies. The emphasis on cost-efficiency cum profit maximization is like a double-edged sword. The advantage with regard to cost reduction has led to the efficient utilization of resource inputs. However, the drawback is the employees in the factories are given insufficient training on good environmental practices and a lack of emphasis on research and development.

Conceptual Framework

A conceptual framework is used as it provides focus and coherence to empirical enquiry. Three major theories are outlined in Figure 1. Environmental care is viewed from the perspective of a production system. A production system is part of the systems theory. The production system, i.e. inputs, transformation process and outputs, is influenced by and interact with the environment, thus impacting on ecosystem health.

Inputs viewed from an environmental care perspective cover vendor selection, research and development (R&D) and green product development. The transformation process is management's use of production technology to change the inputs into outputs. Transformation process from an environmental care perspective focuses on best available technology (BAT), energy conservation, standard operating procedures and waste management. Outputs include the organization's products and services. Outputs from an environmental care perspective cover compliance with product standards and waste disposal methods. Feedback and the business environment are implicitly incorporated in terms of the adaptive responses of inputs, transformation process and outputs.

As ecosystem health can involve value judgment and by extension is used in this research. Ecosystem health is analyzed and evaluated based on the contributory impact on ecosystem health. If human activity were to lead to an impairment of ecosystem health, an adverse negative impact is the outcome and vice versa.

Research Methodology

Data Collection

Primary data was gathered from a survey via face-to-face interviews based on a structured questionnaire with relevant owners or managers of the manufacturing firms. Secondary data was collected from the relevant government departments and agencies such as the Department of Environment, Ministry of Science and Technology and Environment and the Department of Statistics.

Sampling Design

Judgmental sampling was used with the respondents being classified according to the criterion of paid-up capital. Small-scaled enterprises (SSEs) are those that have a paid-up capital of less than RM0.5 million whereas medium-scaled enterprises (MSEs) have a paid-up capital in the range of RM0.5 million to RM2.5 million. Large-scaled enterprises (LSEs) are those that have a paid-up capital of more than RM2.5 million (Rahmah Ismail 1995). Thus three samples were required based on scale or paid-up capital. Judgment sampling was employed with the selection of respondents based on the researcher's judgment due to the sensitivity of divulging environmental data and information. The minimum sample size of 30 respondents (Bailey 1978:84) has been used as the benchmark for statistical accuracy. However, the field survey conducted managed to obtain 14 respondents for SSEs, 39 respondents for MSEs and 42 respondents for LSEs. The low response rate for SSEs is due to the great reluctance of managers or owners of SSEs to divulge, from their perspective, environmentally sensitive data.

Techniques of Data Analysis

Data collected from the survey was analyzed via simple percentage. The justification for using the above statistical tools is the low response rate for SSEs, thus taking into account the limitation due to data. In conjunction, descriptive analysis based on simple percentage is deployed.

Analysis of Data

Environmental care and its impact on ecosystem health are analyzed based on inputs, transformation process, and outputs.

Inputs

An analysis of inputs based on vendor selection, R&D and green product development are discussed below.

Vendor Selection

With reference to Table 1, on an overall basis, the dominant reasons for vendor selection are quality and cost. This is followed co-jointly by relationship and new raw material utilization resulting in

lower usage and cost efficiency, and lastly by an open book policy. This is also reflected in the vendor selection methods adopted by the SSEs, MSEs and LSEs. The overall emphasis on quality and cost indicates that the main drivers are market-driven needs and cost efficiency to attain profit maximization respectively.

Quality and cost efficiency have positive impacts towards ecosystem health albeit on an indirect basis. Better quality products contribute to positive life cycle assessment as a result of longer life span, higher product durability, less wastage and less reworks that will be required. Cost efficiency in terms of higher productivity via the output-input ratio on a pecuniary basis implies efficient utilization of resources. This also has an indirect impact on ecosystem health as wastage is implicitly minimized.

However, an interesting observation is the high response rate for new raw materials that result in lower usage and cost efficiency for SSEs and LSEs and to a lesser extent for MSEs. Although this is related to the maxim of profit maximization, it has an indirect impact on ecosystem health in terms of the reduction in the utilization of resource inputs. However, the overarching concerns are still market-driven needs and profit maximization with the environment as being an indirect beneficiary.

Research and Development (R&D)

Table 2 reveals on an aggregated basis that the majority of respondents do not carry out R&D activities on usage of new materials to reduce input utilization. This applies for all three samples, i.e. SSEs, MSEs and LSEs. The impacts of R&D activities on new materials are manifold. The utilization of better inputs, especially renewable inputs can contribute to lesser wastage, higher productivity, longer life span, lower rejects and reworks. The utilization of better inputs, especially renewable inputs will lead to the conservation of resources. The lack of adoption of R&D on the usage of new materials has at the best a benign effect and at the worst adverse consequence on ecosystem health via a faster draw-down on non-renewable resources.

Table 3 shows that on an overall basis, there is no overwhelmingly dominant main consideration for the R&D focus in product development. Likewise, this is also reflected for the three samples of SSEs, MSEs and LSEs. However, customer consideration, production consideration and financial consideration have a higher response rate for overall LSEs and MSEs as compared to environmental consideration and consumable consideration. For SSEs, all the considerations are evenly rated. The higher response rate for financial consideration, customer consideration and production consideration for overall LSEs and MSEs are linked to market-driven needs and profit maximization. These primary foci of attention outweigh that of environmental consideration and consumable consideration. Consumable consideration also has an environmental facet. The end of life consumables are basically wastes and if disposed indiscriminately will end up as pollutants. As environmental consideration and consumable consideration are slightly under the shadow of the overarching concerns of market-driven needs and profit maximization, the improvement in ecosystem health is at best a slow process.

Green Product Development as Part of the R&D Activities

Table 4 highlights on an overall basis that the majority of respondents are not involved in green product development via their R&D activities. For the LSEs and SSEs, half of the respondents are involved in green product development with the remaining half being otherwise. However, for the MSEs, the majority of the respondents are not involved in green product development as part of

their R&D activities. Green product implies environmentally friendly resource input utilization, preference for preventive technologies as compared to end-of-pipe technologies, better waste management, eco-efficient production, longer life span of the product and cradle to grave product management. Green products will definitely contribute positively to ecosystem health. However, an encouraging development is that a large minority of respondents on an overall basis are involved in green product development. This is possibly a nascent development and if it does come to fruition on a larger scale, the potential contribution to ecosystem health would be immense.

Transformation Process

The transformation process is analyzed via frequency in investing in the best available technology (BAT), steps taken to conserve energy in the production process, compliance with standard operating procedures and continuous upgrading of waste management system to mitigate pollution.

Frequency in Investing In Best Available Technology

Table 5 highlights on an overall basis that the dominant frequency in investing in best available technology is on a sometimes basis. For the LSEs, the dominant frequency is continuous as opposed to sometimes for MSEs and co-jointly on a sometimes and on an urgent need basis for SSEs. This juxtaposition is due to the deeper financial pocket of LSEs as continuous investment in best available technology is not only highly capital but also knowledge intensive.

Continuous investment implies that *kaizen* or continuous improvement is a strategic tool for cost reduction, productivity improvement via efficient resource utilization, product enhancement and higher quality products. Cost reduction and efficient resource utilization have positive impacts on resource conservation. Product enhancement is for the purpose of fulfilling market needs whereas higher quality products yield a longer life span, higher product durability, less wastage and less reworks. Kaizen or continuous improvement has positive contributory impact on ecosystem health.

Steps Taken to Conserve Energy in the Production Process

As illustrated in Table 6, the majority of respondents on an overall basis do not take steps to conserve energy in the production process. The same finding is also reflected in the three samples, i.e. SSEs, MSEs and LSEs. The generation of energy in Malaysia is mainly by fossil fuels and thus will contribute to the greenhouse effect as a result of emissions. The majority of respondents did not take steps to conserve energy as they feel that it is quite difficult to implement such moves and in tandem additional investment is required. A number of respondents also indicated that as industrial energy is being subsidised, cost-down programmes are focused elsewhere. This does not bode well for ecosystem health as a predominantly fossil fuel-based power generation lacking measures to reduce consumption increases the depletion rate of non-renewable resources. However, a large minority of respondents for the LSEs, MSEs and SSEs view that the reduction in energy consumption is a viable alternative as in the long run it will lead to cost efficiency. The overarching concern is still profit maximization but nonetheless has a positive contributory effect to ecosystem health on a long-term basis.

Compliance with Standard Operating Procedures

The results in Table 7 show on an overall basis that the majority of respondents comply fully with standard operating procedures. Likewise, this is also reflected by the majority of LSEs, MSEs and SSEs. The various ISO certifications like ISO 9000 Quality standards, ISO14000 Environmental Management System standards, ISO18000 Occupational Health and Safety standards and industry-

specific standards like ISO22000 Hazard Analysis Critical Control Points standards for the food industry have morphed into standard operating procedures. The compliance to standard operating procedures based on the various certifications is mandatory if these certifications were to be acquired or maintained. The requirement for these certifications is driven mainly by the need to broaden market access in the triad economies of USA, EU and Japan.

The adoption of standard operating procedures has a positive impact on ecosystem health as the ways and means of dealing with abnormal operating conditions, accidents and emergency situations are formalized to mitigate or reduce negative environmental consequences. Some of the standard operating procedures incorporate preventive or clean technologies, end-of-pipe technologies or a combination of both. The institutionalisation of preventive measures will control pollution at source whereas the institutionalisation of end-of-pipe technologies will lessen environmental damage.

Continuous Upgrading of Waste Management System to Mitigate Pollution

As indicated in Table 8, the majority of respondents on an overall basis do not continuously upgrade the waste management system to mitigate pollution. This same finding is also reflected by the LSEs and MSEs. However, for the SSEs, half the respondents continuously upgrade their waste management system to mitigate pollution with the remaining half otherwise. This is due to some of the SSEs playing catch-up in terms of building the infrastructure for a waste management system as observed during interviewing. The lack of continuous upgrading is due to the capital-intensive nature of such an exercise. This can have negative consequences for ecosystem health as continuous upgrading of a waste management system can help in reducing the number and level of pollutants via better technology. For some industries, a better waste management system can yield by-products of economical value, for example treated palm oil mill effluent from palm oil mills can be used for cropland application.

Outputs

The analysis of outputs based on the compliance with product standards and waste disposal methods will be discussed below.

Table 9 reveals that the majority of respondents on an overall basis have to comply with local customer standards. This is followed by export specific standards and lastly a combination of local customer cum export specific standards. For the SSEs and MSEs, the dominant form is local customer standards. This is due to the fact that many of these SSEs and MSEs are vendors to multinationals sited in the study area. On the other hand, the LSEs are mainly export-orientated with a minority focusing solely on the domestic market. The export specific standards to the EU market most often incorporate eco-standards, like in the case for palm oil related products. Compliance with standards helps in enhancing market access and meeting regulatory requirements. This is especially so for developed markets where the environmental movement, especially the environmental non-governmental organizations, has a prevailing influence. Product standards, especially eco-standards like the utilization of sustainable timber for furniture production, have a positive impact on ecosystem health.

Waste Disposal Methods

Table 10 illustrates on an overall basis that the most dominant methods of waste disposal are outsourcing to normal waste disposal firms and outsourcing to expert waste disposal firms. This is also likewise for the LSEs, MSEs and SSEs. However, the dependence on normal waste disposal

firms and expert waste disposal firms for the LSEs and MSEs are lower than that of the SSEs. This is as a result of LSEs and MSEs having in-house facilities and expertise to manage certain types of waste. For a number of LSEs and MSEs, existing facilities and expertise are in place to treat the effluent. However, for a number of SSEs, the effluents are stored in drums and disposed off via outsourcing. The relatively high percentages for each of the methods indicate that the respondents have employed systematic waste disposal methods in compliance with the Environmental Quality Act 1974 and related amendments, and other local by-laws. The relatively efficient handling of waste has a positive contributory effect on ecosystem health. However, the lingering fear is the circumvention of environmental regulations via crooked means.

Conclusion

Environmental care in the form of inputs, transformation process and outputs is analyzed based on the contributory impact on ecosystem health. For inputs, the overarching concerns of market-driven needs via product quality and profit maximization via cost efficiency are the main drivers in vendor selection and the main considerations of the R&D focus on product development. These overarching concerns are in consonance with the findings of Er (2001b). Even though these overarching concerns have pecuniary interests at heart, ecosystem health has been an indirect beneficiary of higher product quality and cost efficiency. Lack of R&D on the usage of new materials can be detrimental to ecosystem health especially if there is a faster draw-down on non-renewable resources. This lack of R&D effort is akin to familiarity of usage or the adage "if it ain't broke, don't fix it". R&D effort on the usage of new materials is like taking the road less travelled. More problems can unravel and additional investment may be required but if successful can be highly rewarding.

For the transformation process, investing in best available technology is highly dependent on a deep financial pocket. This is the rationale why the LSEs are more predominant in investing in best available technology. The adoption of kaizen in terms of continuous improvement via continuous investment in best available technology has a positive impact on ecosystem health. A point to note is that a deep financial pocket is borne out of profit or retained profit. Thus the overarching concerns of meeting market-driven needs and in tandem profit maximization are the main contributory factors to a deep financial pocket. Steps taken to conserve energy in the production process have not been met with much success despite the fact that energy cost is a major component of overall cost. Energy conservation is difficult to implement and may require additional investment. The energy subsidy also acts like a crutch as resources are directed elsewhere for cost-down programmes. Compliance with the various ISO certifications and industry-specific certifications has morphed into standard operating procedures. These certifications aid in broadening market access especially for the triad economies of USA, EU and Japan. These certifications have direct and indirect ecological considerations and likewise also have direct and indirect positive impact on ecosystem health. The lack of continuous upgrading of waste management system to mitigate pollution is handicapped by a lack of capital cum knowledge. Organizations have yet to explore and exploit fully the potential of turning waste into a resource.

For outputs, environmental care in the form of product standards especially eco-standards, driven by the need to fulfil export market requirements in the developed markets have a positive contribution to ecosystem health. Waste disposal methods are mainly in line with keeping to environmental regulations and if abided by closely will contribute to the sustainability of ecosystem health. However, circumvention of such environmental regulations can have dire consequences on ecosystem health.

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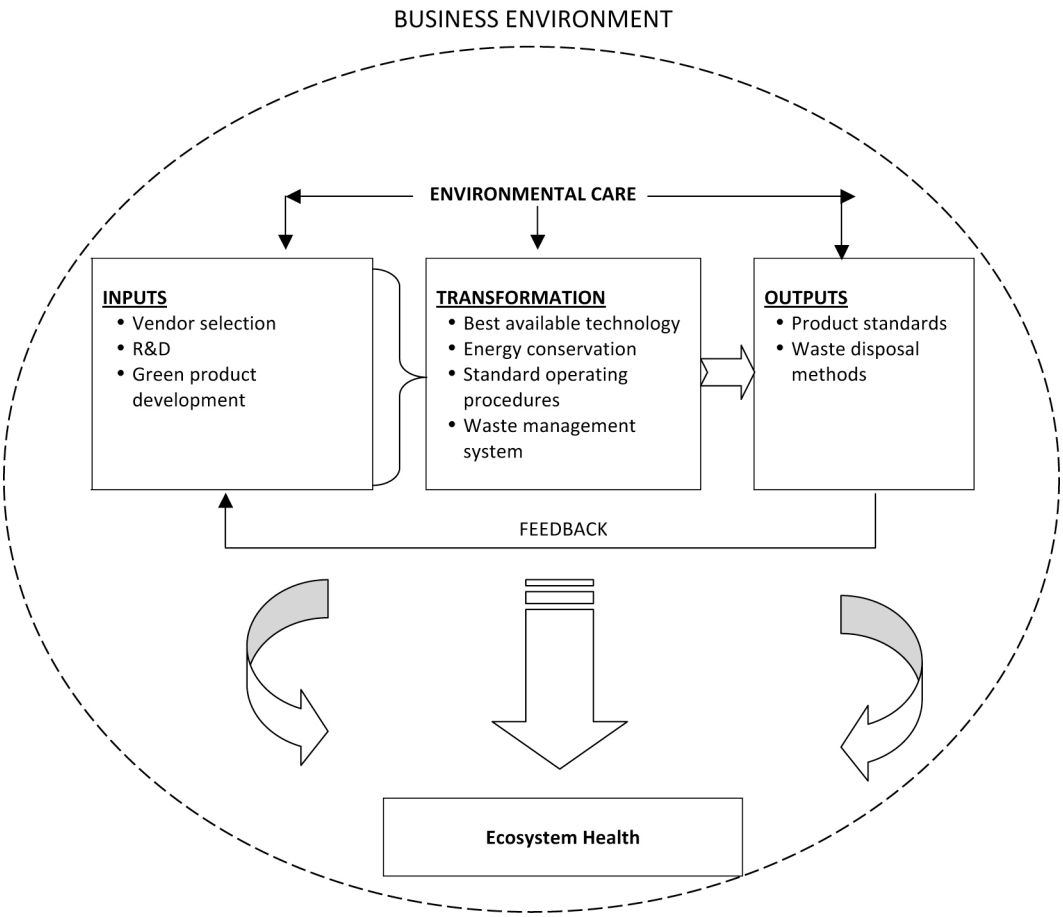

Figure 1: Conceptual Framework

Table 1: Vendor Selection Methods

Vendor Selection Methods	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Cost	13	92.9	36	92.3	38	90.5	87	91.6
Quality	13	92.9	36	92.3	39	92.9	88	92.66
Relationship	12	85.7	32	82.1	33	78.8	77	81.1
Open book policy	10	71.4	26	66.8	35	83.3	71	74.7
New raw materials that result in lower usage and cost efficiency	12	85.7	29	74.4	36	85.7	77	81.1

Notes:
SSEs: n=14, MSEs: n=39, LSEs: n=42.

Table 2: R & D on Usage of New Materials to Reduce Input Utilization

R & D on usage of new materials to reduce input utilization	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	6	42.9	9	23.1	17	40.5	32	33.7
No	8	57.1	30	76.9	25	59.5	63	66.3
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 3: Main Considerations of the R&D Focus in Product Development

Main Considerations of the R&D Focus in Product Development	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Financial consideration	6	42.9	13	33.3	19	45.2	38	40.0
Customer consideration	6	42.9	13	33.3	20	47.6	39	41.1
Production consideration	6	42.9	13	33.3	20	47.6	39	41.1
Environmental consideration	6	42.9	12	30.8	18	42.9	36	37.9
Consumable consideration	6	42.9	11	28.2	16	38.1	33	34.7

Notes:
SSEs: n=14, MSEs: n=39, LSEs: n=42.

Table 4: Green Product Development as Part of the R&D Activities

Green product development as part of the R&D activities	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	7	50.0	15	38.5	21	50.0	43	45.3
No	7	50.0	24	61.5	21	50.0	52	54.7
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 5: Frequency in Investing in Best Available Technology

Frequency In Investing In Best Available Technology	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Continuously	2	14.3	8	20.5	18	42.9	28	29.5
Very frequently	2	14.3	8	20.5			10	10.5
Sometimes	5	35.7	17	43.6	16	38.1	38	40.0
On an urgent need basis	5	35.7	6	15.4	8	19.1	19	20.0
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 6: Steps Taken to Conserve Energy in the Production Process

Steps Taken to Conserve Energy in the Production Process	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	6	42.9	18	46.2	20	47.6	44	46.3
No	8	57.1	21	53.9	22	52.4	51	53.7
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 7: Compliance with Standard Operating Procedures

Compliance with Standard Operating Procedures	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Ad-hoc compliance	4	28.6	7	17.9	11	26.2	22	23.2
Full compliance	9	64.3	30	76.9	27	64.3	66	69.5
Alternate between ad-hoc and full compliance	1	7.1	2	5.1	4	9.5	7	7.4
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 8: Continuous Upgrading of Waste Management System to Mitigate Pollution

Continuous Upgrading of Waste Management System to Mitigate Pollution	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Yes	7	50.0	6	15.4	18	42.9	31	32.6
No	7	50.0	33	84.6	24	57.1	64	67.4
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 9: Compliance with Product Standards

Compliance with Product Standards	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
Local standards	9	64.3	21	53.9	12	28.8	42	44.2
Export specific standards	4	28.6	10	25.6	23	54.8	37	38.9
Local and export specific standards	1	7.1	8	20.5	7	16.8	16	16.8
Total	14	100.0	39	100.0	42	100.0	95	100.0

Table 10: Waste Disposal Methods

Waste Disposal Methods	SSEs		MSEs		LSEs		Total	
	Freq	%	Freq	%	Freq	%	Freq	%
In-house storage	7	50.0	12	30.8	22	52.4	41	43.2
Out-sourcing to normal waste disposal firms	12	85.7	22	56.4	23	54.8	57	60.0
Out-sourcing to expert waste disposal firms	11	78.6	20	51.3	17	40.5	48	50.5
Send to waste disposal facilities, e.g. Bukit Nenas	8	57.1	18	46.2	19	45.2	45	47.4

Notes:
SSEs: n=14, MSEs: n=39, LSEs: n=42.