Green business among certified companies in Malaysia towards environmental sustainability: benchmarking on the drivers, initiatives and outcomes

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Abstract: In recent years, environmental issues become more intense and widespread. This calls for considering the issues of sustainable development in business operations. This paper utilised interviews with three organisations to identify green initiatives adopted in Malaysia, their drivers and outcomes. Analysis of the interviews indicates that the most adopted green initiatives in Malaysia are eco-design and green purchasing, followed by reverse logistics. The key drivers are regulations, customer pressures, expected business benefits and social responsibility. The study indicates that the outcomes of green initiatives are environmental, cost reductions, economic, in addition to company and brand image and reputation.

Keywords: green initiatives; environmental sustainability; interviews survey; Malaysia.


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1 Introduction

Natural environment becomes a challenging issue to business organisations in recent years as a result of global and local environmental problems. Business operations, such as sourcing, manufacturing and logistics, are believed to be responsible for most of these problems (Beamon, 1999). Consequently, business operations are subject to increasing pressures and scrutiny from various stakeholders inside and outside organisation such as government agencies, workers, neighbours, and not-for-profit groups (Sarkis, 2006). This is over and above the growing demand of customers and environmental societies for more environmentally friendly products. As a result, environmental concerns are increasing in importance and more and more people are choosing to live a greener, healthier and more environmentally friendly lifestyle. Next section provides background information about environmental issues facing the world and Malaysia.

1.1 Global environmental issues

Today, the world witnesses several environmental problems at global level. The most serious of these problems are global warming and ozone depletion. Global warming is considered by many scientists to be the major environmental problem confronting life on Earth (Moffat, 2004). A recently released report by Intergovernmental Panel on Climate Change (IPCC) report that:

“warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.”

(IPCC, 2007a, p.5)

Other than global warming, there exists the problem of ozone depletion. Ozone layer is a layer that protects the earth from harmful ultraviolet radiation. World Meteorological Organization (WMO) reported that ozone layer was found to be eroding, and over the South Pole the average ozone concentration was discovered to be down 50%, and in
isolated spots it had actually disappeared forming what is known as ‘ozone hole’ (WMO, 2007). It should be noted that developing countries are the most impacted by environmental problems. Markandya and Halsnaes (2004) estimated that over 90% of developing parts of the world are negatively impacted by climate change, with South and South East Asia being the most impacted, compared with only 0.1–0.5% in developed countries (Markandya and Halsnaes, 2004). Developing countries suffer the most from climate change partly because the physical impacts are greatest in their regions and partly because of the large populations that are affected (especially in Asia) (Markandya and Halsnaes, 2004).

Beside these problems, countries around the world are suffering from environmental pollution problem. Air pollution, water pollution, environmental degradation and waste disposal represent continuous concern to many governments and societies. Numerous gas, liquid and solid pollutants are produced by modern production and consumption activities that posit serious threats to human, animal and plant health and life. Appendix presents major types of these pollutants, their sources and effects on human health and ecological constituents. It is evident from the table that business activities and their products are the major source of gases and other releases that cause global warming, ozone depletion and other environmental problems. In addition to pollution, there is a problem of rapid consumption of natural resources, especially the non-renewable ones, such as oil, coal, metals and forests to provide raw materials and energy for economic activities. Such rapid consumption of natural resources posits serious questions about the availability of these resources for the coming generations (Buchholz, 1998). Beamon (1999, p.332) believes that “indeed, waste generation and natural resource use, primarily attributed to manufacturing, contribute to environmental degradation”. Therefore, there is a need for us to change our lifestyles to incorporate environmental issues in all of our daily activities. Going green is suggested as a solution to the environmental problems.

1.2 Environmental issues in Malaysia

In Malaysia, environmental issues have become very important issue of concern for the Malaysian government and the public. The Environmental Quality Act was established in 1974 and has been amended a number of times to encompass 18 sets of regulations to help implement projects relating to clean air, sewage and industrial effluent assessment (Rao, 2002, p.292). Moreover, numerous pressure groups were formulated to monitor environmental issues. Pressure groups include Non-Governmental Organizations (NGOs) such as Environmental Protection Society of Malaysia, in addition to intense media scrutiny of environmental problems (Green Purchasing Network Malaysia (GPNM), 2003). Malaysia is moving forward to be an industrialised economy. Malaysia moved from material production to manufacturing. The Malaysian manufacturing sector contributed 32% of the Gross Domestic Product (GDP) in 2007, exports of manufactured products account for 75% of Malaysia’s total export in 2007 (MIDA, 2007). The manufacturing industries have become the economy’s main source of growth in recent years. However, such rapid industrialisation has detrimental effect on the environment due to the increase in the pollution, waste and rapid consumption of natural resources.

Industry or individual corporations are the single most important source of environmental problems. This is because human society depends heavily on industrial
products to sustain its living standard. Corporations consume resources and emit environmental emissions because of the products they manufacture. These are, however, not significant quantities compared with what a product generates during its life cycle. Atypical example would include durable goods such as home appliances and automobiles. Environmental loads from the use and disposal stages are much greater than that from the manufacturing stage. For goods like paper towels and aluminium foil, environmental loads from the manufacturing stage are relatively high; however, the total load is still greater than that from the manufacturing stage. Therefore, environmental loads occurring throughout a product life cycle are the main cause of today’s environmental problem (Abdullah, 1995). The two major environmental issues in Malaysia caused by industrial activities are atmospheric pollution and solid and hazardous wastes.

1.2.1 Atmospheric pollution

Atmospheric pollution has long been associated with the burning of fossil fuels, the resulting sulphur dioxide being a major atmospheric pollutant. Combustion of motor fuels causes an added influx of volatile organic compounds, coupled with carbon dioxide (CO₂) and NOx, nitrous oxides. In Malaysia, local and transboundary emissions play very important roles in determining the status of the atmospheric environment (Hassan et al., 2006). The major pollutants observed are sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃) and total suspended particulate matter, in particular PM10 (Hassan et al., 2006).

1.2.2 Solid and hazardous wastes

Growing affluence and increasing concentration of population in urban areas have increased the generation and types of solid waste produced. Solid waste management is one of the most important issues of local authorities; where much money is spent in the collection and disposal of solid waste (Hassan et al., 2000). Currently, Malaysia produces about 10,000 ton of waste every day, equal to 0.8–1.5 kg per capita (MGCC, 2006). According to a survey, the amount of solid waste collected in Malaysia is 70% of generated waste (Hassan et al., 2006). The remaining 30% not collected ends up in illegal dumping sites, or is diverted at source or during collection for recycling purposes. Recycling activities amount to only 5% of total waste generated. Toxic and hazardous wastes are also one of the major issues in Malaysia.

Whereas end-of-life products are increasingly being considered as environmental liability and business opportunity in many parts of the world, especially developed countries (Geyer and Jackson, 2004), the traditional approach in Malaysia and many developing countries towards end-of-life products is to landfill or incinerate them with considerable cost and damage to the environment (Ferguson and Browne, 2001). Despite concerted efforts to promote reuse, reduction and recycling (3Rs) of materials, the amount of solid waste recycled remained at less than 5.0% of total waste disposed (Ninth Malaysia Plan 2006–2010, 2007, p.455). In summary, 11 environmental impacts are now included in the environmental performance in Malaysia: global warming, acidification, fossil fuel depletion, indoor air quality, habitat alteration, ozone depletion, water intake, criteria air pollutants, smog, ecological toxicity and human health. Therefore, it is crucial for Malaysia, and other developing countries, to look beyond the
end-of-pipe methods to resolve pollution control problems by going green through ‘5Rs’ – reduce, reuse, recycle, recovery and refuse (GPNM, 2003) to achieve the so-called ‘triple bottom line’ of social, economic and environmental benefits (Wells and Seitz, 2005).

1.3 Going green

A growing awareness of Malaysian’s grave environmental problems, e.g., dusts, gas emissions, pollution and deforestation has increased Malaysia’s connections to the world. Many international environmental organisations, such as WWF, Friends of the Earth and Greenpeace have set up projects or opened offices in Malaysia (Yang, 2004). A survey by Yang (2004) also shows that while on average Malaysians newspapers carried only 125 papers on environmental issues in 1994, the number had grown to 630 by 2003. Green demand comes from all sectors such as consumer, business and government and is in every instance intensifying (refer to Table 1).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Overall green demand growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Today (%)</td>
</tr>
<tr>
<td>Business</td>
<td>48</td>
</tr>
<tr>
<td>Government</td>
<td>57</td>
</tr>
<tr>
<td>Consumer</td>
<td>54</td>
</tr>
</tbody>
</table>

Green is the subject all over the world and has been for a number of years in other countries. It has been gaining popularity in Malaysia the past few years. Going green is more than changing light bulbs and learning a few new words. Going green is a lifestyle that until recently, only a few could imagine and a smaller group would consider because the green trend no longer simply concerns environmentally friendly packaging, it has evolved into an entirely new mindset and approach to doing business that more and more retailers are embracing. This trend also affects the purchasing decisions of a growing population, with consumers increasingly demanding greener products from retailers and brands that have adopted green practices throughout the entire supply chain. Consumers are becoming increasingly conscious of where and how products are produced, to the amount of energy consumed during production and distribution. While the term ‘green’ in business originally related to environmental issues, it has evolved to embrace all aspects of sustainability and Corporate Social Responsibility (CSR). To be properly green, a company now needs to incorporate sustainable thinking in its decision-making at all levels throughout the organisation. As people become more environmentally conscious, they are looking for additional ways to live green and to make bigger contributions to sustainability. But how can we create a safer environment for the future?

2 Literature review

2.1 Green initiatives

Unlike the traditional environmental management, the concept of green supply chain assumes full responsibility of a firm towards its products from the extraction or
acquisition of raw materials up to final use and disposal of products (Hart, 1997). It represents application of environmental management principles to the whole set of activities spanning the entire customer order cycle, including design, procurement, manufacturing and assembly, packaging, logistics and distribution (Handfield et al., 1997; Zsidisin and Siferd, 2001). Table 2 presents some of the green supply chain initiatives that have been widely discussed in the literature.

Table 2  Green initiatives based on literature

<table>
<thead>
<tr>
<th>Source</th>
<th>Green initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvarez-Gil et al. (2007)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>Zhu et al. (2007)</td>
<td>Green purchasing, eco-design, customer cooperation</td>
</tr>
<tr>
<td>Rao (2006)</td>
<td>Green purchasing</td>
</tr>
<tr>
<td>Vachon and Klassen (2006a)</td>
<td>Environmental collaboration with suppliers and customers</td>
</tr>
<tr>
<td>Hervani et al. (2005)</td>
<td>Green design, green procurement, green distribution, and reverse logistics</td>
</tr>
<tr>
<td>Ravi et al. (2005)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>Richey et al. (2005)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>Murphy and Poist (2003)</td>
<td>Green logistics</td>
</tr>
<tr>
<td>Rao (2002)</td>
<td>Green purchasing, supplier environmental collaboration</td>
</tr>
<tr>
<td>Bowen et al. (2001a, 2001b)</td>
<td>Green purchasing, supplier environmental collaboration</td>
</tr>
<tr>
<td>Canning and Hamner-Lloyd (2001)</td>
<td>Environmental adaptations to supplier–customer relationships</td>
</tr>
<tr>
<td>Min and Galle (2001)</td>
<td>Green purchasing</td>
</tr>
<tr>
<td>Preuss (2001)</td>
<td>Green purchasing</td>
</tr>
<tr>
<td>Hall (2000)</td>
<td>Diffusion of environmental innovations from customers to suppliers</td>
</tr>
<tr>
<td>Beamon (1999)</td>
<td>Eco-design, Reverse logistics</td>
</tr>
<tr>
<td>Blumberg (1999)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>Carter and Carter (1998)</td>
<td>Green purchasing</td>
</tr>
<tr>
<td>Sarkis (1998)</td>
<td>Design for the environment, life cycle analysis and reverse logistics</td>
</tr>
<tr>
<td>Walton et al. (1998)</td>
<td>Design for the environment, green purchasing</td>
</tr>
</tbody>
</table>

2.2  Drivers towards green initiatives

Review of literature related to the drivers for environmental initiatives reveals that there are numerous drivers for green initiatives. Table 3 provides summary of 30 studies that empirically investigate the drivers for green initiatives and there are nine basic categories of drivers:
Green business among certified companies in Malaysia

- **Regulations**: include environmental regulations imposed by the government and other regulatory bodies on organisations to implement specific green practices (Bansal and Roth, 2000; Hall, 2000).

- **Customer pressures**: include pressures or requirements imposed by purchasing firms or individuals specifying certain green requirements in products and services (Blumberg, 1999; Christmann and Taylor, 2001).

- **Supplier pressures**: are pressures exerted by suppliers, who already adopted green initiatives, on buying firms to adopt similar initiatives (Carter and Ellram, 1998).

- **Competitive pressures**: include pressures that induce organisations to adopt green initiatives to combat competition and gain competitive advantages (Canning and Hanmer-Lloyd, 2001; Carter and Ellram, 1998).

- **Market demand**: is recognition of existence of demand for green products which motivates organisations to produce green products to satisfy the demand (Lefebvre et al., 2003).

- **Community pressures**: are pressures exerted by community groups, such as NGOs, environmental societies and media, on firms to adopt more environmentally friendly initiatives (Henriques and Sadorsky, 1996).

- **Social responsibility**: is a voluntary sense of responsibility held by an organisation towards the society that motivates it to work towards the welfare of the society and not harm it (good citizenship) (Florida and Davidson, 2001).

- **Expected Business benefits**: is the anticipation held by a firm that green practices can result in direct financial and non-financial benefits to the firm such as reduced costs, increased revenues and improved organisational or product image (Canning and Hanmer-Lloyd, 2001).

- **Employee pressures**: relate to pressures and demands imposed by employees for a firm to adopt initiatives that at least not harm employee health and safety (Alvarez-Gil et al., 2007; Perry and Singh, 2002).

Closer look at Table 3 reveals that the drivers for the adoption of green practices can be ranked as follows: regulations (87% of studies found it significant driver), customer pressures (43%), expected business benefits (40%), social responsibility (30%), community pressures (17%), competition (10%), employee pressures (7%) and lastly supplier pressures and market demand (3%). Nevertheless, the analysis shows that the drivers for green supply chain initiatives have similar ranking: regulations (82%), expected business benefits (54%), customer pressures (45%), social responsibility (27%), competition (18%), supplier pressures and employee pressures (9%), and lastly market demand and community pressures (0%). This result discloses that the top drivers who motivate organisations to adoption general green initiatives as well as green supply chain initiatives are regulations, expected business benefits, customer pressures and social responsibility.
<table>
<thead>
<tr>
<th>No.</th>
<th>Study</th>
<th>Environmental initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alvarez-Gil et al. (2007)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>2</td>
<td>Amundsen and Roth (2000)</td>
<td>Pollution and waste control</td>
</tr>
<tr>
<td>3</td>
<td>Bonsal and Koth (2000)</td>
<td>Corporate ecological response</td>
</tr>
<tr>
<td>4</td>
<td>Blumberg (1999)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>5</td>
<td>Boyce and Verbeke (2003)</td>
<td>Environmental strategy</td>
</tr>
<tr>
<td>6</td>
<td>Canning and Hamner-Lloyd (2001)</td>
<td>Environmental adaptations to supplier-customer relationships</td>
</tr>
<tr>
<td>7</td>
<td>Carter and Carter (1998)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>8</td>
<td>Carter and Eltman (1999)</td>
<td>Reverse logistics</td>
</tr>
<tr>
<td>9</td>
<td>Christmann and Taylor (2001)</td>
<td>Self-regulation of environmental performance</td>
</tr>
<tr>
<td>10</td>
<td>Florida and Davidson (2001)</td>
<td>Environmental management</td>
</tr>
<tr>
<td>11</td>
<td>Forman and Longmore (2004)</td>
<td>Group purchasing</td>
</tr>
<tr>
<td>12</td>
<td>Foster et al. (2000)</td>
<td>Diffusion of environmental innovations from customers to suppliers</td>
</tr>
<tr>
<td>13</td>
<td>Hall (2000)</td>
<td>Environmental planning</td>
</tr>
<tr>
<td>14</td>
<td>Heniques and Sádlovský (1990)</td>
<td>Environmental strategies</td>
</tr>
<tr>
<td>15</td>
<td>Hui et al. (2001)</td>
<td>EMS or green manufacturing</td>
</tr>
<tr>
<td>16</td>
<td>James et al. (1999)</td>
<td>Environmental strategy</td>
</tr>
<tr>
<td>17</td>
<td>Kassenti and Valenzuela (2000)</td>
<td>Reduction of toxic emissions at plant level</td>
</tr>
<tr>
<td>18</td>
<td>Khabir and Anon (2002)</td>
<td>Corporate environmental management</td>
</tr>
<tr>
<td>19</td>
<td>Leščinová et al. (2005)</td>
<td>EMS, environmental policies and procedures</td>
</tr>
<tr>
<td>20</td>
<td>Levy (1995)</td>
<td>Group purchasing</td>
</tr>
<tr>
<td>21</td>
<td>Min and Gille (2001)</td>
<td>Environmental initiatives for corporate environmental management</td>
</tr>
<tr>
<td>22</td>
<td>Murphy and Butler (2003)</td>
<td>Group purchasing</td>
</tr>
<tr>
<td>23</td>
<td>Perry and Strong (2002)</td>
<td>Voluntary environmental activities</td>
</tr>
</tbody>
</table>
Table 3  Summary of empirical studies on drivers for environmental initiatives (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Study</th>
<th>Environmental initiatives</th>
<th>Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Prasad (2006)</td>
<td>Green purchasing, Green purchasing</td>
<td>√</td>
</tr>
<tr>
<td>26</td>
<td>Ross, Shanks, and Train (2005)</td>
<td>Green purchasing</td>
<td>√</td>
</tr>
<tr>
<td>27</td>
<td>Rhee and Lee (2005)</td>
<td>Reverse logistics</td>
<td>√</td>
</tr>
<tr>
<td>28</td>
<td>Thompson and Law (2003)</td>
<td>Environmental management strategy</td>
<td>√</td>
</tr>
<tr>
<td>29</td>
<td>Turner and Wood and Ramsey (2003)</td>
<td>Pollution monitoring and control</td>
<td>√</td>
</tr>
<tr>
<td>30</td>
<td>Williamson (2000)</td>
<td>Monitoring of resource consumption and pollution</td>
<td>√</td>
</tr>
</tbody>
</table>

2.3 Outcomes of green initiatives

Outcomes are defined in this study as the results that are actually realised from adopting green supply chain initiatives by manufacturing firms. While environmental initiatives are considered to involve considerable costs and investments, especially during initial
stages (Min and Galle, 2001), and it is against sound business strategy and a poor allocation of firm investment that generally generate negative returns to shareholders (Walley and Whitehead, 1994), many scholars believe that these initiatives are no longer a threat, but a business opportunity (e.g., Paul, 1995; Porter and van der Linde, 1995; Hutchinson, 1996; Martin, 2005; Heese et al., 2005) and even a source of sustained competitive advantages (Hart, 1995; Sinding, 2000). For green supply chain initiatives, previous studies found that these initiatives result in numerous performance outcomes. Table 4 presents summary of these studies showing the outcomes that were found to be significantly linked to green supply chain initiatives.

Table 4: Outcomes of green initiatives based on the literature

<table>
<thead>
<tr>
<th>Study</th>
<th>Green initiative(s)</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chung and Tsai (2007)</td>
<td>Eco-design</td>
<td>Time to market, quality, market share, cost reductions</td>
</tr>
<tr>
<td>Zhu et al. (2007)</td>
<td>Eco-design, green purchasing, customer cooperation</td>
<td>Environmental performance</td>
</tr>
<tr>
<td>Vachon and Klassen (2006a)</td>
<td>Green partnership</td>
<td>Environmental performance, quality, delivery, flexibility</td>
</tr>
<tr>
<td>Smith (2005)</td>
<td>Reverse logistics</td>
<td>Customer satisfaction</td>
</tr>
<tr>
<td>Rao and Holt (2005)</td>
<td>Green purchasing, supplier environmental collaboration</td>
<td>Competitiveness (efficiency, quality, productivity, cost savings)</td>
</tr>
<tr>
<td>Rao (2002)</td>
<td>Green purchasing, supplier environmental collaboration</td>
<td>Environmental performance</td>
</tr>
<tr>
<td>Bowen et al. (2001a)</td>
<td>Green purchasing</td>
<td>Profitability, effectiveness in managing environmental risks that affect business</td>
</tr>
<tr>
<td>Ritchie et al. (2001)</td>
<td>Reverse logistics</td>
<td>Financial and operational advantages</td>
</tr>
<tr>
<td>Carter et al. (2000)</td>
<td>Green purchasing</td>
<td>Increase in net income, decrease in cost of goods sold</td>
</tr>
</tbody>
</table>

3 Methodology

3.1 Interviews design and administration

The study conducted three interviews with representatives of three organisations. The first interview was conducted with the Environmental Management Systems (EMS) head in SIRIM QAS International head office in Selangor, Malaysia. This organisation was selected because it is the largest, government sponsored, certifying firm in Malaysia.
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The firm has certified hundreds of companies, including EMS ISO 14000 certification, and therefore, is deemed to have a wide experience and knowledge about the situation of green practices in Malaysia. The second interview was conducted with logistics manager of COMPANY A Corporation (Malaysia). This is a subsidiary of American-based Company operating in Penang, Malaysia. The third interview was conducted with quality assurance manager of COMPANY B, which is a Japanese-based company working in Penang. COMPANY A and COMPANY B are from the electrical and electronics industry to provide a homogeneous industry type for comparison purpose. The two companies are considered as large organisations in terms of number of employees (Ministry of International Trade and Industry, 2006).

The selection of these two companies is based on the purposive sampling method. According to this method, a researcher targets specific type of subjects who have the expertise or information sought by the researcher (Sekaran, 2003). Since the objective of this research is to investigate green supply chain initiatives, only companies that are actually adopting green supply chain initiatives are deemed to have the information required for the study. Yet, the researcher obtained a list of companies that have clear well-established green supply chain policy from SIRIM representative during the interview. SIRIM representative provided this list of companies based on his experience and knowledge about certified companies. The researcher visited the websites of these companies and ensured that they have green supply chain initiatives. Accordingly, the researcher approached the ten companies, using telephone calls and e-mails, but all do not respond positively to the request to participate in the study due to various reasons such as the responding person is busy or absent. Some of them mentioned that green information is secret type of information and they cannot disclose them. However, upon further persuasion and follow-up and assurance of the confidentiality of information, only COMPANY A and COMPANY B accepted to participate in the interviews.

Prior to the interviews, telephone calls were conducted with the representatives of the two companies to explain the objectives of the interviews and ensure that the companies adopt green supply chain initiatives. Official letter from the School of Management, USM was also presented to the respondents to solicit their participation. Although a list of questions was prepared prior to the interviews, the interviews are managed to be semi-structured in nature. Accordingly, the questions are designed to be of general type to give more freedom for the respondent to reflect their views. This is because, at the initial stages, the study did not develop clear idea about green supply chain initiatives, drivers and outcomes in the context of Malaysia. The interviews were conducted during the month of March, 2007 by the researcher himself at organisational sites except for COMPANY A which is conducted at USM upon the request of the respondent. Prior to asking questions, the interviewer gave brief explanation about the subject of the study and the concept of green supply chain initiatives. Since SIRIM is a certifying firm (not adopt green supply chain initiatives by itself), the questions asked to SIRIM respondent are slightly different from those asked to the two companies which, as evident from initial information collected about the companies, have well-established green supply chain programmes. The questions for SIRIM are:
• What are the characteristics of green supply chain initiatives currently adopted by certified firms in Malaysia?
• What makes organisations decide to introduce green supply chain initiatives?
• What are the benefits of green supply chain initiatives to the organisations?
• What are the obstacles for green supply chain initiatives adoption?
• What are the characteristics of successful green supply chain initiatives?

The questions asked to COMPANY A and COMPANY B are:
• What are the characteristics of green supply chain initiatives currently adopted in your firm?
• What makes your firm decide to introduce these initiatives?
• What are the problems/challenges facing these initiatives?
• What are the effects of these initiatives on your firm?
• What measures your firm has taken to make these initiatives successful?

Each interview took about two hours. The interviews were tape-recorded, with the consent of the interviewees. After finishing the interviews, the interview recordings were transcribed and prepared for subsequent analysis. A copy of the interviews transcripts provided. The following sections provide analysis of the data collected from of the interviews, in addition to other data collected from previous studies about Malaysia and company websites.

4 Analysis

4.1 Green initiatives

This section tries to examine the extent of existence of the five green supply chain initiatives which are eco-design, green purchasing, supplier environmental collaboration, customer environmental collaboration and reverse logistics in the context of Malaysia. The section analyses data from interviews conducted with EMS head of SIRIM, logistics manager of COMPANY A and quality assurance manager of COMPANY B.

4.1.1 Eco-design

The interview with EMS manager of SIRIM organisation reveals that, in Malaysia, eco-design activities mostly applied in Multinational Companies (MNCs). These companies try to adhere to international green standards regarding the specifications of their products. Specifically the respondent states that: “Most multinational companies try to make sure whatever products they produce meet green international standards such as US and European requirements”.

The representative from COMPANY B emphasises further that green designs in the company are done according to standards set by customer companies:

“We design our products according to customers’ green requirements, for example Hitachi, NIC, Canon, and Nikon have their own green standards, such as certain percentage of lead, and we have to comply with these standards in the design of our products.”

However, the representative from COMPANY A mentions that the company set its own standards for green product design:

“When we design a product, we make it more environmental friendly when disposed or scraped. For example, we design products that contain very less lead. Also when packaging products we try to reduce packaging materials, for example, instead of using wood pallets (and cut more trees) we use plastic pallets that can be recycled and reused.”

Similarly, other MNCs, reported in their websites that they have eco-design programmes. HP Company introduced a programme for producing energy-efficient, hazardous free and recyclable products (HP, 2007). Nokia Corporation developed a programme for designing an environment that ensures that new products contain no restricted materials, minimise energy consumption and maximise recyclability (Nokia, 2002). Dell Company sets environmental stewardship programme for designing energy efficient products; absent from restricted substances, promote upgradeability, reuse, and recycling; provide effective and convenient equipment recovery solutions (Dell, 2007). Sony Company set a policy for promoting environmental protection throughout the supply chain. Accordingly, Sony assumes full responsibility for its product during the design stage including recyclability, reusability and safe disposal of its products (Sony, 2007). The above evidences indicate that most MNCs apply the eco-design activities outlined in the literature review, namely, design for reduction or elimination of hazardous materials, design for reuse, design for recycling, design for remanufacturing and design for resource efficiency. However, the most notable activity is the design for reduction or elimination of environmentally hazardous materials in products such as lead. Yet, other eco-design activities, such as design for recycling, reuse and resource reduction are also noticeable among these companies.

4.1.2 Green purchasing

Similar to eco-design, the available evidence indicates that green purchasing is initiated mainly by MNCs. The representative from SIRIM reports that:

“The initiative for green procurement comes from leading companies such as Sony and Matsushita. So any Malaysian manufacturer has business with Sony or Matsushita then has to embark on green purchasing or green procurement and clearly spell out the green requirement to its suppliers in order to produce and supply the required green products.”

The representative from COMPANY B asserts further that the company performs green purchasing based on green specifications provided by customers:

“Based on customers’ requirements, we give our suppliers certain requirements (in a form of survey containing required items) and explain to them these requirements to comply with them. The supplier then give full detail to the
The representative from COMPANY A supports that his company focuses on purchasing environmentally friendly materials and gives its suppliers certain green requirements to comply with:

“The most commonly implemented green practice is purchase of direct material that is more environmental friendly when disposed or scraped. For example, when purchase we look at the material that contains very less lead to support our products. Company A specifies essential green requirements for its suppliers. These requirements include restriction of hazardous substances in materials and packaging.”

The most prominent green purchasing initiative in the electronics industry is the Electronic Industry Code of Conduct (EICC). Leading firms in the electronics industry, such as Sony, HP, Company A and Microsoft, notice that there is overlap among suppliers, i.e., multiple manufacturers of finished products share the same suppliers. Therefore, they established the EICC to set common standards for suppliers’ socially responsible conduct. The code is made up of five sections that outline standards for labour, health and safety, environment, management systems and business ethics. Most leading firms in the electronics industry set their green purchasing standards according to the EICC principles. For instance, Sony designed its own code of conduct for its suppliers (called Sony Group Code of Conduct) that require all its suppliers to adhere to EICC standards that require them to obtain environmental permits and registrations from authorised bodies, reduce or eliminate wastes and air emissions, and adhere to all applicable regulations and agreed-upon customer-specific restrictions on hazardous substances (Sony, 2007). Similarly, Nokia developed a green supplier network programme that oversees the environmental impact of suppliers’ inputs and specify restrictions on these inputs (Nokia, 2002). Dell green purchasing policy is based on two main basic requirements: suppliers must achieve and maintain ISO 14001 certification and suppliers must complete a self-assessment questionnaire (Dell, 2007).

The above evidences indicate that green purchasing activities in Malaysia focus on product content restrictions; product content labelling or disclosure, supplier questionnaire, and supplier EMS. The evidences indicate also that these practices emanate mainly from leading firms in the manufacturing industry, mainly MNCs. These firms set strict green standards for their purchased inputs and ask their suppliers to stick to these standards. Suppliers, in turn, set green specifications for their purchased inputs according to the standards set by customers, and so on. This process is referred to in the literature as ‘green multiplier effect’ and considered as important mechanism for diffusing green initiatives among firms (Preuss, 2001).

4.1.3 Environmental collaboration

Environmental collaboration, with suppliers and customers, indicate that a firm goes beyond green purchasing and tries to improve the environmental performance of its suppliers or customers and establish joint green projects. Yet, the respondent from SIRIM reports that such initiatives are not common in Malaysia:
“I don’t see that there is collaboration between suppliers and customers. Most of the initiatives come from the manufacturers themselves. Manufacturer is the one that gives the way, it open up the area and tell suppliers that this is what you need to do. It is all initiated by the manufacturers because they are very big companies and they have very strong and easy influence on them.”

Similarly, COMPANY B representative emphasised that their relationship with suppliers is limited only to giving them green directions:

“Our green relationship with suppliers is limited to sending them the requirements and the website of the customer (parent company) with guidelines of how to fill in and answer the survey. Sometimes, suppliers come to the company and ask for explanation of the items in the survey, we explain the items for them so as to have full understanding of the green requirements.”

The representative from COMPANY A asserts further that green collaborative activities between suppliers and customers do not receive consideration among firms in Malaysia although these practices are beneficial to both parties:

“We need to work along with suppliers for R&D and joint venture for technological investments to develop new materials and provide them with technology and experts to reduce waste and resource utilisation. Actually most companies, including MNCs, don’t pay considerable attention to these collaborative green activities because they don’t see them as opportunities, everybody now working alone inside himself in green products or recycling. If we have some kind of exposures and conferences to small companies and companies come and see how big companies do that then it could be to possible to have these practices in common.”

Moreover, the websites of Dell, Sony, Nokia and HP do not show that these leading companies focus on green purchasing activities in their relationships with suppliers and do not have any environmental collaboration practices. This indicates that environmental relationships in Malaysia are confined mainly to the arm’s length or externalisation type (Vachon and Klassen, 2006b). Firms focus on giving directions, persuasions, evaluations, and control over their suppliers. There is limited involvement or investment in the operations of suppliers or customers and joint venture programmes even from leading MNCs working in Malaysia.

4.1.4 Reverse logistics

The representative from SIRIM announces that reverse logistics activities exist in Malaysia, although few companies perform them:

“Few companies, like TV tubes of Sony or Konica camera or batteries for Motorola auto talky, collect waste and send it to Japan, US, or Europe for recycling, but there is no such recycling activities here in Malaysia. Recycling in Malaysia is only for packaging, e.g. chemical bottles, but not for the product itself. Now there is a trend for companies to have appointed collectors for tires and heavy metals to go back to recycling plants as raw material.”

However, COMPANY B representative states that her company does not take-back products from customers for recycling or reuse, it only returns packaging materials:
“Normally, the product after the end of its life returns to the customer for recycling, not to us. We don’t collect back the product after sale to customer. Customers are required, according to WEEE regulation in Europe, to collect back the product after use. They may give it to another company for recycling but not to us. Some wastes are sold to waste collectors (at not high price) for example carton boxes. It is profitable for collectors. Some suppliers come and collect carton boxes or plastic pins for reuse.”

Similarly, COMPANY A representative mentioned that reverse logistics activities in his company are limited only to commercial returns (products that return as a result of warranty, rejects, etc.) but not environmental returns (end-of-life products return for recycling, reuse or remanufacture):

“We have like warranty, for processors for example; if anything happen to that product it will be send to Taiwan for repair or recycling. We do these returning activities also if a product comes back to us as a result of manufacturing reject. So at the end we usually don’t make recycling for the product itself and recycle only some packaging materials.”

Moreover, some other companies announce in their websites that they have reverse logistics programmes. HP declares that it has two basic programmes for reverse logistics; HP trade-in and HP buy-back. The HP Trade-In programme offers HP customers cash payments for their old equipment when new HP products are purchased. In HP buy-back, HP collects, tests and evaluates the equipment. If the equipment has market value it will be refurbished, resold to the secondhand market. If the equipment has no value, it will be disposed of in accordance to HP’s strict global recycling standards (HP, 2007). Nokia designed a programme for product take-back that aims at collecting products at the end of its service life with a view to recover its material and energy content as well as ensuring safe treatment of substances that may cause harm to people or the environment (Nokia, 2002). Dell apply industry leading recycling programme that enable customers to recycle or donate their PCs for free (Dell, 2007). The above evidences indicate that reverse logistics initiatives are not widespread among the Malaysian manufacturing firms, like eco-design or green purchasing ones. Only few firms declare that they have reverse logistics programmes for returning products at the end of their life. However, reverse logistics is more common for packaging materials. There are manufacturing firms in Malaysia for recycling packaging materials. So, some companies return packaging for reuse or recycling.

4.1.5 Concluding remarks about green initiatives

The previous subsections reveal preliminary idea about the extent of adoption of green supply chain initiatives in Malaysia. For eco-design, analysis of interview data, as well as information from other companies, disclose that the five eco-design activities, namely design for reduction or elimination of hazardous materials, design for reuse, design for recycling, design for remanufacturing and design for resource efficiency, exist in the Malaysian context. The most prominent activity is design for reduction or elimination of hazardous materials. Analysis of the data reveals also that the seven green purchasing activities; product content requirements, product content restrictions, product content labelling or disclosure, supplier questionnaire, supplier environmental management systems, supplier certification, and supplier compliance auditing, are generally performed by Malaysian companies. However, the companies were found to focus mainly on
four activities namely, product content restrictions, product content labelling or disclosure, supplier questionnaire and supplier EMS. For environmental collaboration, the evidences from interviewed organisations and other companies disclose that the two forms of environmental collaboration, supplier environmental collaboration and customer environmental collaboration, rarely exists in Malaysia. No strong evidence was found from the analysed company data that Malaysian firms consistently provide education, support or joint venture to either suppliers or customers.

For reverse logistics, analysis of the data indicates that the three reverse logistics activities, reuse, remanufacturing and recycling are adopted by Malaysian companies. However, the extent of adoption is less than that observed for eco-design and green purchasing. Moreover, reverse logistics was found to be more common for packaging than for the original products. In conclusion, analysis of the interviews as well as evidences from other companies operating in Malaysia indicates that the most adopted green supply chain initiatives in Malaysia are eco-design and green purchasing, followed by reverse logistics. However, the available evidence indicates that environmental collaborations with suppliers and customers are not common in Malaysia. It should be noted that the three green supply chain initiatives described earlier are interrelated together. For instance, Carter and Ellram (1998) suggest that reverse logistics process starts with the design of environmentally efficient products that are easy disassemble and use minimum material inputs in addition to the purchase and use of recyclable and reusable materials. Such minimisation of materials and use of recyclable and reusable materials facilitate subsequent disassembly, reusing and recycling activities during reverse logistics.

4.2 Drivers for green initiatives

As explained in previous section, analysis of the literature indicates that there are nine basic drivers for green supply chain initiatives; regulations, customer pressures, expected business benefits, social responsibility, supplier pressures, competition, market demand, community pressures and employee pressures. The purpose of this section is to analyse the interviews to explore the drivers for green supply chain initiatives in the context of Malaysia. The representative from SIRIM described the drivers for green supply chain initiatives in Malaysia as:

“In Malaysia, green activities are for business reasons because most companies are multinational companies and most of them are Japanese, American or European based companies. These companies try to ensure that whatever products they export to Europe or to US will be accepted. Especially Japanese companies are very concerned of US or European legislations and try to comply with these legislations. So, Malaysian companies do green supply activities so as not to lose their business in Europe or probably in Japan. Most Malaysian companies have green purchasing committee dealing directly with customer and look to what is the customer requirement, and most customers come with specific requirement under green procurement list; nonhazardous metal, recycled content, energy efficiency, use of renewable resources or any other criteria that spelled out in green procurement list. Also, the government promotes green activities and gives financial incentives to the manufacturers to embark on green activities. The government, represented by department of environment, promotes a national environmental policy which contains
‘green consumerism.’ We notice that pressure groups like consumer associations and the media have indirect effect through the government authorities. For example, complaints from the media normally have strong effect on companies through stimulating politicians to exert pressures on companies and make them make changes. Most of the companies now coming from developed countries embrace in sustainable development principles and most of them declare that in their reporting, so they don’t like to produce big impact to the environment. Companies, especially the listed ones, try also to reflect image of themselves that they are inline with the global trend of greening and they are not left behind. This works for the whole company, including subsidiaries, try to reflect that they are environmentally conscious organisations.”

The above statement shows that the drivers who induce Malaysian companies to perform green practices are:

- **Regulations.** Companies adopt green initiatives so as to comply with environmental regulations in Europe, USA, and Japan. Violation of these regulations may result in lose of business of the companies in these countries.
- **Customer requirements.** Customers require suppliers to comply with certain green requirements in products such as non-hazardous metals, recycled contents, etc.
- **Government incentives.** The government gives incentives and promotions that encourage green practices.
- **Pressure groups and media.** Pressure groups and the media have indirect influence on companies to be green. They conduct publicity and campaigns that promote green practices. However, companies do not respond immediately to these campaigns and publicity, only when they translate into binding regulations and policies and decisions from politicians, then companies move to take actions.
- **Social responsibility.** Companies, especially the MNCs, have a sense of responsibility towards the society in which these companies operate. These companies try to reflect images of them that they are in line with the values and obligations of the society.

The representative from COMPANY B describes the drivers for green initiatives in the company as:

“Mostly the driver comes from overseas customers such as Canon which are active in requiring green products. Canon comes every year for green audit. We act as original equipment manufacturer (OEM) for them. The customers, in turn, may have directives from the European markets. There also legal requirements from the government. Government has environmental quality tax. But I see the implementation of these government requirements is not strong (not strong driver). Government makes inspection sometimes to see any pollution or harmful practices to the environment. Sometimes this may result in shutdown production for few days until things are settled. Also cost is important for example, reuse of powder coating save costs of this material. Also media (TV3) presents a show if they notice harmful practices and this influence the government to take immediate action and pressure towards companies.”
The above statement reveals that there are four drivers that motivate the company to undertake green initiatives:

- **Requirements from customers.** Customers, in other countries, ask the company to comply with certain green standards or specifications and exert pressures (audits) to make sure that the company carries out the requirements properly.

- **Government regulations.** Government set regulations that induce the company to undertake green initiatives (environmental quality tax), but not exert strong pressures on the company to be green, compared with customers. Only when the government notices harmful practices (pollution) then it exerts strong pressures (shutdown production) on the company to rectify the problem.

- **Cost savings.** Savings from the reuse of materials (powder coating) in production.

- **Media.** The statement indicates that media put pressures on companies only when there are harmful practices. The statement indicates also that the influence of media is indirect, media only highlights the problem and influence the government to take actions towards companies that do harmful practices to the environment. This is consistent with the statement mentioned by SIRIM representative.

The representative from COMPANY A described the drivers for the green activities in the company as:

> “I think driver mostly comes from environmental regulations like lead free products. Regulations like in European Union (EU) want products to be lead free, that when we export to EU markets we have to meet certain requirements imposed by EU governments and other developed countries that try to reduce waste and pollution as much as possible. Some countries have certain policies, such as we want to be 50% of car use electric power instead of oil, or other kind of policies and regulations. Also our company, as a multinational corporation, wants to meet its corporate objective of social responsibility through research and development to develop new products that are environmental friendly. Regulations are important to attract interest in green activities such as to do greener product and recycling programs. But the main driver is basically cost, if we see cost reductions then we go into these green practices, because green products require huge investment in R&D and technology, so the initial cost is very high. Also demand is very important, we cannot invest money to develop products (even if they benefit the environment) and at the end we find no demand for them, we want to make profit.”

This statement indicates that there are three main drivers for green practices in the company:

- **Regulations:** Environmental regulations and policies in other countries (EU) induce the company to produce environmentally friendly products (lead free) and recycling.

- **Socially responsibility:** The company is obligated to meet its corporate objective of social responsibility through developing environmentally friendly products.

- **Expected business gains:** The Company engages in green practices only when it expect that there are cost reductions and profits from these practices and market demand for green products.
In summary, the interviewees maintain that there are four basic drivers for green initiatives in the Malaysian companies:

- **Regulations**: Include regulations of export countries (EU, USA, and Japan) (more influential) as well as regulations set by the Malaysian government to encourage green practices (e.g., tax reductions).
- **Customer requirements**: Include environmental standards and specifications set by customer organisations for suppliers to comply with.
- **Expected business gains**: Include expected costs savings from green practices and market opportunities for green products.
- **Social responsibility**: Include moral obligation of a company to meet its responsibility towards the society in which it operates.

Although the media and pressure groups are mentioned by two of the representatives, they mentioned that their effects are indirect, through influencing and triggering government actions and regulations. Since this study focuses on direct drivers for green initiatives, media and pressure groups are not considered to be key drivers for green initiatives. This means that there are four key drivers that motivate Malaysian firms to undertake green supply chain initiatives; regulations, customer requirements, expected business gains and social responsibility.

### 4.2.1 Concluding remarks about drivers for green supply chain initiatives

The analysis of the interviews, presented in the previous section, the main drivers that motivate business organisations in Malaysia are regulations, customer requirements, expected business gains and social responsibility. These drivers are consistent with the top four drivers; regulations, customer pressures, expected business benefits and social responsibility. This means that there is a consistency between the findings from the literature review and findings from the interviews. The findings are also consistent with the findings of other studies that identified drivers for general environmental initiatives (not green supply chain ones) in the Malaysian context. Raman and Peir (2006) conducted interviews with 10 SMEs in Malaysia and found that the main drivers for corporate social responsibility activities (waste recycling, paperless technology and use of biodegradable containers) are: professional code of conduct and ethics, customer pressures (for firms who are suppliers to MNCs), expected financial returns (especially from recycling), personal values of the owner and reputation.

Sulaiman and Ahmad (2002) conducted a survey among 58 ISO 14001 certified sites in Malaysia and found that the most important factor for the certification is improved corporate image followed by market opportunities, compliance with environmental laws and customer requirements. Similarly, Tan (2005) conducted a survey of 38 ISO 14001 certified companies in Malaysia and found that the most significant reasons for the certification are: moral/corporate responsibility, directive from parent company, maintaining competitive position in the global market and customer requirements. Perry and Singh (2002) conducted a survey among 91 MNCs in Malaysia and found that the most important influences to voluntary environmental actions are
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- pressures to conform to corporate head office environmental criteria (mentioned by 48.4% of respondents)
- increased workforce environmental awareness (37.4%)
- consumers (located in high income communities) (23.5%)
- community, NGOs and media (9.9%).

The above studies substantiate the effects of customer pressures, expected business benefits (financial returns, market opportunities, competitive position), social responsibility (professional ethics, moral values, corporate social obligation, image and reputation), and regulations as key drivers for the green initiatives. However, for regulations the studies suggest that the regulations not only come from governments (local and abroad), but also from parent companies. From theoretical perspective, the effect of the four drivers can be explained in terms of the institutional theory. Regulations and customer pressures can be considered as coercive isomorphism because they focus on the use of rules, laws, and persuasion as basis for compliance. Social responsibility can be considered as normative isomorphism because it is based on expectations of the society that organisations should perform appropriate or acceptable practices. Expected business benefits can be regarded as cultural-cognitive isomorphism because it is based on the rational desire of a firm to adopt initiatives that proved to have technical value (business benefits) in other organisations. It can be concluded from the above analysis of interviews, previous studies about Malaysia, that the key drivers for green supply chain initiatives are regulations (set by Malaysian and foreign authorities in addition to parent companies), customer pressures, expected business benefits, and social responsibility.

4.3 Outcomes of green initiatives

The literature review illustrated in Table 4 reveals that the outcomes from green supply chain initiatives can be classified into four main categories: environmental, economic, operational, and intangible outcomes. The purpose of this section is to analyse the interviews and literature about Malaysia to gauge the outcomes from green supply chain initiatives realised by Malaysian firms.

The representative from SIRIM respondent described the outcomes as:

“First, there is assurance of business sustainability, companies at least confident that their products are salable and will be accepted in the global market. Second, most of them claim that they will not only get external recognition but also internal recognition. They get appreciation from their own employees. Third, there is the return from all the green initiatives like selling of normal waste. Some of them claim that once they embark in an energy saving program they have some cost reduction, may be few hundred thousand ringgits a year. Cost savings also come from reduction of wastes.”

The above statement signifies that there are two types of outcomes from green initiatives; economic benefits (market expansion and sales growth), operational benefits (cost savings) and intangible benefits (external and internal recognition). The representative from COMPANY B identified the outcomes of green initiatives in her company as:

“There are cost savings and reduction in waste of material, e.g. powder coating, and CFC gas emission from air coolers as a result of implementing environmental programs.”
The above response indicates that COMPANY B realised two types of outcomes from its green initiatives; operational outcomes (cost savings) and environmental outcomes (reduction of emissions). The representative from COMPANY A described the outcomes of green initiatives in his company as:

“The outcomes are in the form of compliance to environmental government regulations and requirements in each country. Also reduction of costs from recycling activities and the product get cheaper as a result of using recycled materials. For example when we use new pallets for packaging the cost is RM 10,000 but when we use recycled pallets the cost is RM 7,000, so there is cost saving but we have to expend some money in order to get the material back for recycling. But in the long run we see a lot of cost savings and environmental benefits as well.”

The above statement indicates that there are environmental outcomes (environmental benefits and adherence to environmental standards set by governments) and operational outcomes (cost savings) resulting from green practices at COMPANY A. In general, the interviews reveal that the outcomes actually realised by Malaysian firms are:

- **Environmental outcomes**: Reduction of emissions and adherence to environmental standards set by the government.
- **Economic outcomes**: Market expansion and sales growth.
- **Operational outcomes**: Only cost savings.
- **Intangible outcomes**: External and internal recognition and improved image.

Moreover, previous studies in the context of Malaysia reveal similar outcomes of green initiatives realised by Malaysian firms. Perry and Singh (2002) found that the most important advantages of voluntary environmental initiatives reported by MNCs in Malaysia are: enhanced company image among consumers (33.3%), cost savings (21.8%), raised status with the corporate group (18.4%) and reduced environmental liabilities (13.8%). Their study emphasised intangible benefits as most realised outcomes followed by environmental benefits. Ann et al. (2006) surveyed 159 ISO 14001 certified sites in Malaysia and found that the certification impacts positively on both the environmental (waste reduction) and economic performance (benefits outweigh costs). Moreover, the respondents perceived ‘enhanced corporate image’ as the strongest impact of certification (intangible outcome). Similarly, Tan (2005) found that the benefits of ISO 14001 certification are: improved company image (94% of respondents), improved work culture (94%), transparency and openness (94%), less injuries and environmental accidents (88%), and cost reduction (83%). His study indicates that the top benefits are intangible followed by environmental and operational benefits. Sulaiman and Ahmad (2002) also found that the top impacts of ISO 14001 are enhanced company reputation, waste reduction, and improved company position in the market place.

The above evidences indicate that intangible outcomes (company and brand image and reputation) are important outcomes that result from green initiatives in addition to the environmental and economic outcomes. However, for operational outcomes, the interviews as well the literature about Malaysia, indicates that only cost reductions are realised from the green initiatives. This implies that other operational outcomes described in the literature; namely quality, flexibility and delivery, are not found to be realised by the Malaysian firms.
5 Discussions

Climate change is generally recognised within the scientific community as one of the most serious problems affecting the environment in the world today. Malaysia is potentially vulnerable to the impacts of climate change because of its coastal infrastructure, as well as the significant economic role of our natural resource sectors played such as agriculture, forestry, fishing and aquaculture. Today, environmental issues receive increasing level of importance at local and global levels. A clean, healthy environment is crucial for maintaining sustainable communities. Sustainable communities are essential to the future strength and prosperity of Malaysia. In going green, support communities in their environmental management efforts are needed. When communities demonstrate a commitment to environmental responsibility, they help protect the health of their residents and create opportunities for their continued economic development. Recognising the important link between our health and the quality of our environment, the Malaysian government, is committed to continuous improvement in managing and protecting our environment to safeguard the health of all Malaysians.

5.1 Implications for research

On the basis of the above analysis, it is clear that researchers need to conduct studies that help in clarifying the concepts of green management and sustainable development, developing viable solutions to the barriers of green efforts, and disclosing benefits of environmental endeavours. Specifically, future studies are needed in the following areas:

- specifying the requirements of environmental actions in relation to peculiar conditions and situations in Malaysia
- outlining the roles of government agencies, community organisations, NGOs and other institutions in leveraging environmental initiatives in Malaysia
- suggesting solutions for the difficulties and problems facing individual and business in adopting green initiatives.

5.2 Implications for managers/educators

Managers in private and public institutions can take numerous actions to improve and support movement towards green conscious society as follows:

- *Raising awareness of importance and role of green.* Many firms have no awareness of the necessity to go for green. Only some firms whose main markets are abroad or companies that produce parts and materials to be supplied to the manufacturers of products for export have the tendency to practice green (GPNM, 2003). Therefore, efforts are needed to raise the level of green awareness among firms in Malaysia.

- *Education and training for green management.* This involves designing educational programmes for sustainability. Education programmes involve product design, waste management and pollution control. Such programmes can help in raising skills and capabilities related to the implementation of environmental initiatives.
• Designing of appropriate regulations. There is a general lack of appropriate regulations by government as well as business organisations. Most regulations encourage waste minimisation but not higher levels of green activities such as DFE and green supply chains. Examples of these regulations include packaging waste order in Germany, the packaging covenant in the Netherlands, Waste of Electrical and Electronic Equipment directive (WEEE) in European Union and voluntary agreement on the cost bearing of waste automobile treatment among German automakers (Hassan et al., 2006; Lee, 2008).

5.3 Barriers to green movement

The barriers can be divided into four categories (Sinding, 2000):

Institutional barriers

Government institutions are considered as barriers to developments in environmental management in the sense that institutional processes for environmental management are still ongoing, whereas there is limited institutional support for the ideas embodied in environmental management. The tendency of government to establish institutional framework that become barrier (encourage old practices).

Economic barriers

Engaging in environmental management involves two types of cost; direct costs and transaction costs. Both types of costs are likely to constitute significant barriers to go for green.

Organisational barriers

Relate to the difficulty of implementing fundamental change. This is especially true when there are changes in core features of organisations (organisational goals, forms of authority, core technology, and operational and marketing strategy).

Informational barriers

These include problems of standardisation, exchange and control of environmental information. Establishment of green activities requires additional specialised system to handle informational flows associated with both forward and backward flow of materials.

6 Conclusion

Environmental issues become a major concern for business as well as public organisations. Therefore, efficient policies need to be designed to alleviate these issues. However, proper design of these policies require proper understanding of the steps needed towards sustainability as well as barriers and obstacles facing greening activities. Much research and efforts need to be done to support the evolution of business activities towards sustainable development. This paper is an attempt to clarify the path towards that end and highlight steps to be taken by business organisations to make sustainable development a reality.
References


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**Bibliography**


### Table 1  Major environmental pollutants, their sources and effects

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Sources</th>
<th>Effects</th>
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<tbody>
<tr>
<td><strong>Particulate Matter (PM&lt;sub&gt;10&lt;/sub&gt;):</strong> Is the general term used to describe respirable particles of less than 10 µm in size</td>
<td>Particulate matter mainly come from motor vehicle exhaust, heat and power generation, industrial processes and open burning activities</td>
<td>PM&lt;sub&gt;10&lt;/sub&gt; can cause eye and throat irritation, and its accumulation in the respiratory system is associated with numerous respiratory problems such as decreased lung functions. PM&lt;sub&gt;10&lt;/sub&gt; can cause also undesirable impact on environment such as reduced visibility and hazy condition, also can affect plant, soil, and water sources</td>
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<tr>
<td><strong>Ozone:</strong> A colourless gas that is the major constituent of photochemical smog at the earth’s surface. In the upper atmosphere (stratosphere), however, ozone is beneficial, protecting the earth from the sun’s harmful rays</td>
<td>Sources of this pollutant include vehicles, factories, landfills, industrial solvents, and numerous small sources such as gas stations, farm and lawn equipment, etc.</td>
<td>Ozone causes significant health and environmental problems at the earth’s surface. It can irritate the respiratory tract, produce impaired lung function. It can also reduce the yield of agricultural crops and injure forests and other vegetation</td>
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<tr>
<td><strong>Carbon monoxide:</strong> Odourless and colourless gas emitted in the exhaust of motor vehicles and other kinds of engines where there is incomplete fossil fuel combustion</td>
<td>Automobiles, buses, trucks, small engines, and some industrial processes</td>
<td>Reduces the ability of blood to deliver oxygen to vital tissues, affecting primarily the cardiovascular and nervous systems</td>
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<td><strong>Nitrogen dioxide:</strong> Light brown gas at lower concentrations; in higher concentrations becomes an important component of unpleasant-looking brown, urban haze</td>
<td>Result of burning fuels in utilities, industrial boilers, cars and trucks</td>
<td>One of the major pollutants that causes smog and acid rain. Can harm humans and vegetations when concentrations are sufficiently high</td>
</tr>
<tr>
<td><strong>Sulphur dioxide:</strong> Colourless gas, odourless at low concentrations but pungent at very high concentrations</td>
<td>Emitted largely from industrial, institutional, utility, and apartment-house furnaces and boilers, as well as petroleum refineries, smelters, paper mills and chemical plants</td>
<td>One of the major pollutants that causes smog. It can also, at high concentrations, affect human health and harm vegetation and metals</td>
</tr>
<tr>
<td><strong>Lead:</strong> Lead and lead components can adversely affect human health through either ingestion of lead-contaminated soil, dust, paint, etc., or direct inhalation</td>
<td>Transportation sources using lead in their fuels, coal combustion, smelters, car battery plants, and combustion of garbage containing lead products</td>
<td>Elevated lead levels can adversely affect mental development and performance, kidney function, and blood chemistry</td>
</tr>
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</table>
Table 1  
Major environmental pollutants, their sources and effects (continued)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Sources</th>
<th>Effects</th>
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<tbody>
<tr>
<td><strong>Toxic air pollutants</strong>: Includes pollutants such as arsenic, asbestos and benzene</td>
<td>Chemical plants, industrial processes, motor vehicle emissions and fuels, and building materials</td>
<td>Known or suspected to cause cancer, impairment of immune and nervous systems, respiratory effects, birth and reproductive defects</td>
</tr>
<tr>
<td><strong>Stratosphere ozone depleters</strong>: Chemicals such as chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform. These chemicals destroy the protective ozone layer that screens out harmful ultraviolet (UV) radiation before it reaches the earth’s surface</td>
<td>Industrial household refrigeration, cooling and cleaning processes car and home air conditioners, some fire extinguishers, and plastic foam products</td>
<td>Increased exposure to UV radiation could potentially cause an increase in UV radiation, increased cataract cases, suppression of the human immune response system, and environmental damage</td>
</tr>
<tr>
<td><strong>Greenhouse gases</strong>: Gases that build up in the atmosphere that may induce global climate change – or the ‘greenhouse effect’. They include carbon dioxide, methane, and nitrous oxide</td>
<td>The main human-made source of carbon dioxide emissions is fossil fuel combustion for energy use and transportation. Methane comes from agricultural processes. Nitrous oxide results from industrial processes, such as nylon fabrication</td>
<td>The extent of the effects of climate change on human health and the environment include increased global temperature, increased severity and frequency of storms and other “weather extremes”, melting of the polar ice cap and sea-level rise</td>
</tr>
<tr>
<td><strong>Persistent toxicants</strong>: PCBS, DDT, heavy metals, and so on</td>
<td>Industrial discharge; wastewater from cities; pesticides from farms, forests, home use, and so on; seepage from landfills</td>
<td>Poison or cause disease in coastal marine life. Contaminate seafood. Fat-soluble toxicants that bio-accumulate in predators</td>
</tr>
<tr>
<td><strong>Oil</strong>: Crude petroleum oil and its products</td>
<td>Runoff from cars, heavy machinery, industry, other land-based sources; oil tanker operations and other shipping; accidents at sea; also offshore oil drilling and natural seepage</td>
<td>Low-level contamination can kill larvae and cause disease in marine life. Oil slicks kill marine life, especially in coastal habitats. Tar balls from coagulated oil litter beaches and coastal habitat</td>
</tr>
</tbody>
</table>

Source: Buchholz (1998, pp.143, 144, 195)