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Integrated and Holistic Management of Chemicals in Malaysia: Opportunities for Effective Multi-stakeholder Collaboration

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Abstract:
A network for research, for promoting good practices, and for discussion involving various aspects of management of chemicals and hazardous substances was officially established in Malaysia in 2005 by relevant stakeholders. This network is co-chaired by the Institute for Environment and Development (LESTARI) of Universiti Kebangsaan Malaysia (UKM) and the Conservation and Environmental Management Division-Ministry of Natural Resources and Environment, Malaysia (CEMD-NRE). The main objective of this network, known as MyNICHE, is to provide a platform for discussion and deliberation, through multi-stakeholder, multi-sector, multi-discipline and multi-scale approaches, towards the establishment of a sound Chemical Management System (CMS) for Malaysia. This paper will review and discuss several past and current initiatives pertaining to the management of chemicals and hazardous substances in Malaysia in relation to global initiatives such as the Strategic Approach to International Chemicals Management (SAICM), the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), and Registration, Evaluation and Authorization and Restriction of Chemicals (REACH) by the European Union. The paper will also present perspectives from the government, business sector, NGOs, academia, researchers, and the public, and discuss the initiatives taken by these various stakeholders for the protection of the environment and human health, and for maintaining competitiveness in business and trade.

Keywords*: Chemicals, Hazardous Substances, Management, Integrated, Multi-stakeholder*

Introduction

We are living in a chemical world and chemicals are an integral part of our lives. Man-made chemicals are found in almost every product we use or consume [1]. The chemical industry is involved in virtually all economic sectors of a country ranging from electronics to modern apparel, from petroleum to energy and from agriculture to medicinal requirements. Dealing with chemicals involves manufacturing, processing, transportation, storage, distribution, use, recycle and waste disposal (these activities are also known as the life cycle of chemicals); and more than 4 billion tonnes of hazardous chemicals are moved each year around the world by motorway, rail, and pipeline systems [2].

Chemicals have been used in agriculture and industrial activities in Malaysia since the early 20th century especially when plantations and manufacturing industries flourished. In 2007, chemicals and chemical products ranked second highest among manufactured exports, after electrical and electronic products. A report of the Ministry of International Trade and Industry revealed that the chemical industry, comprising three sub-sectors (petroleum and plastic products; basic industrial chemicals and chemical products; and pharmaceuticals) had contributed about RM84.8 million (export) and RM65.5 (import) of manufactured goods in 2006 [3].

The management of chemical life cycles in Malaysia is regulated and monitored by various agencies through their respective acts and regulations (Table 1). Chemicals are managed properly in Malaysia, but these existing acts and regulations are decentralized or fragmented, i.e. there is no single chemical act to regulate chemicals throughout their life cycles. Thus, there might be 'grey areas' that are not regulated by existing regulations. This is unlike the case of New Zealand, where hazardous substances are regulated under one single act, i.e. Hazardous Substances and New Organisms Act (HSNO Act) that was gazetted in 1996 to cover the entire lifecycle of chemicals. In addition, when there are various agencies collecting chemical data for their respective purposes, e.g. data such as physical properties, toxicity, ecotoxicity and tonnages, the industries might be obliged to submit the same data to different agencies, resulting in a duplication of effort.

Currently, there is no holistic mechanism or system for inter-agency coordination for chemicals management, be it for information sharing, enforcement, or compliance measures. The time has come for the various stakeholders in Malaysia to cooperate and collaborate in determining approaches that are likely to be most effective in managing chemicals and hazardous substances, and chemical wastes in the country.

Table 1 Chemical life cycle management in Malaysia

Stages	Agencies	Relevant Legislation
Import		
Pesticides	Pesticides Board	Pesticides Act 1974
Industrial Chemicals	Royal Malaysia Customs	Customs Act 1967
Drugs	Ministry of Health	Poisons Act 1952
Food	Ministry of Health	Food Act 1983
Production		
Emissions to air and water	Department of Environment	Environmental Quality Act 1974
Workers' health and safety	Department of Occupational Safety and Health	Occupational Safety and Health Act 1994
Food industry	Ministry of Health	Food Act 1983
Transport of Hazardous Goods		
By air, road, sea and rail	Ministry of Transport	Civil Aviation Act 1969; Road Transport Act 1987
Use / Handling		
Pesticides	Pesticides Board	Pesticides Act 1974
Cosmetics	Ministry of Health	Control of Drugs and Cosmetics Regulations 1984
Workers' health and safety	Department of Occupational Safety and Health	Occupational Safety and Health Act 1994
Consumer chemicals	Ministry of Domestic Trade and Consumer Affairs	Consumer Protection Act 1999
Disposal		
Scheduled Wastes	Department of Environment	Environmental Quality Act 1974; Environmental Quality (Scheduled Wastes) Regulations, 2005

Initiatives and Opportunities for Integrated and Holistic Management of Chemicals in Malaysia

In this paper, various activities that promote better chemicals management in Malaysia are identified. These activities involve participation of multi-stakeholders from multi-disciplines and multi-sectors.

Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment and Development (MyNICHE)

On 16 June 2005, the Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia (UKM) and the Conservation and Environment Management Division (CEMD), Ministry of Natural Resources and Environment (NRE) jointly convened the first round table dialogue for the Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment and Development (MyNICHE) [4]. The objectives of MyNICHE are to:

- assist the Government of Malaysia through its ministries and agencies in developing cooperation networks at local, national and global levels by strengthening efforts in managing chemicals and hazardous substances, including during implementation of programmes related to the mentioned substances;
- enhance the chemical and hazardous substances management system in Malaysia through multi-stakeholder cooperation and promotion of activities in education, research, capacity building and technical aspects (the stakeholders include the ministries, government agencies, universities, research institutes, industries, business, non-governmental organization, and community-based organizations);
- identify problems and promote an integrated approach to the management of chemicals and hazardous substances within the contexts of legislation, institution, technology, social well-being and economy towards a Strategic Approach to International Chemicals Management (SAICM);
- establish a system of classification and labelling of chemicals in Malaysia following the Globally Harmonized System of Classification and Labelling of Chemicals (GHS); and
- develop databases and information system networks to facilitate the transfer of knowledge and technology at local, national and global levels.

MyNICHE is a platform for stakeholders to discuss and deliberate issues pertaining to a sound Chemical Management System (CMS). Six thematic areas were identified and incorporated into the MyNICHE logo (Fig. 1). Several potential tools for chemical governance were proposed during the series of the MyNICHE Round Table Dialogues, such as the establishment of the Malaysian National Chemical Council (MNCC) and the Malaysian Chemical Database (MyCD). One of the most significant outcomes after the establishment of MyNICHE was the establishment of the National Committee for the Management of Environmentally Hazardous Substances (NCMEHS) on 29 August 2006, chaired by NRE, which facilitates and monitors activities under various Multilateral Environmental Agreements (MEAs), particularly the Basel Convention, the Rotterdam Convention and the Stockholm Convention.

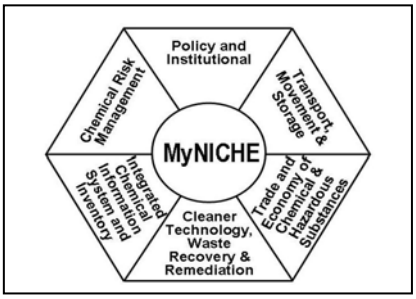

Figure 1 MyNICHE Logo
Source: [4]

Environmentally Hazardous Substances (EHS)

DOE is collaborating with DANIDA (Danish International Development Agency) through the Malaysian-Danish Environmental Cooperation Programme 2003-2006 (MDECP) on a study entitled 'Environmentally Hazardous Substances (EHS)'. Three sub-components were identified in the EHS study, namely, development of a national strategy and action plan for EHS management; pilot schemes on notification and registration of EHS and risk assessment of EHS; and capacity building in chemical management.

The strategies for the EHS were proposed by the stakeholders after a series of meetings and deliberations. The proposed EHS strategies are shown in Table 2. It is anticipated that, with the completion of the EHS study, upstream EHS management will be further strengthened and enhanced.

Table 2 Proposed EHS strategies

Proposed Strategy	Proposed Activities
Strategy 1 *Strengthening the Institutional Framework for EHS Management*	• Establishment of a National Committee for the Management of Environmentally Hazardous Substances (NCMEHS) on 29th August 2006 which encompasses the three national committees, i.e. committees for Basel Convention, Rotterdam Convention and Stockholm Convention, respectively; • Identifying roles and responsibilities of various government agencies; and • Coordination among government agencies to promote cooperation and synergism.
Strategy 2 *Governance: Strengthening of institutions, law and policy*	• Drawing up of specific laws to ensure proper and effective management of EHS; • Strengthening of enforcement; • Sound management of EHS throughout their life cycle (from cradle to grave); and • Promoting relevant codes of conduct relating to corporate environmental and social responsibility.
Strategy 3 *Enhancing capacity building*	• Enhancement of capacity of individuals and institutions in EHS management; • Involving all relevant stakeholders in the capacity building programme; and • Providing training to relevant stakeholders in EHS management and emergency response to EHS disasters.
Strategy 4 *To promote partnership*	• Promoting partnerships among government agencies, private sector, academia and NGOs; • Encouraging the implementation of responsible care programme; • Making available data and information on health and environment effects of EHS; • Protecting confidential commercial and industrial information and knowledge; • Reviewing and strengthening current voluntary industry initiatives to address challenges; and • Encouraging industry to generate new scientific knowledge, building on existing initiatives.
Strategy 5	• Improving education, training and awareness-raising activities;

Knowledge and Information Sharing	• Generation and dissemination of data on hazards of commonly used EHS; • Establishing the required infrastructure (hardware, software and human resource) and communications network; and • Setting up a National Information Centre on chemicals
Strategy 6 *Risk Reduction*	• Minimizing risks to human health, including that of workers, and to the environment throughout the life cycle of chemicals; • Prioritizing prevention of pollution; • Promoting environmentally sound recovery and recycling of hazardous materials and waste; and • Accelerating the use and development of safe alternatives for all EHS of concern.
Strategy 7 *Awareness, Training and Education*	• Developing different dissemination packages for different target groups to create awareness; • Establishing good infrastructure for communication on EHS; • Educating all levels of society all over the country about EHS; • Developing guidelines, training notes, manuals and standard operating procedures for safe handling of chemicals at the workplace; and • Collaborating with relevant stakeholders (e.g. industry) to provide training in chemical management.

Source: [5]

Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

As far as GHS is concerned, implementation of GHS will affect various sectors, particularly the four key sectors, i.e. industrial workplace, agriculture, transport and consumer products. Since the GHS implementation involves various sectors and cross sectoral issues, the formation of a National Coordinating Committee on the Implementation of GHS (NCCGHS) is essential in order to facilitate activities related to the GHS implementation in Malaysia [6]. On 17th January 2006, a meeting on the proposal for the establishment of NCCGHS chaired by Ministry of International Trade and Industry (MITI) was held. During the meeting, members of the meeting nominated MITI as the coordinator (i.e. MITI to serve as national focal point for the GHS implementation) and also the secretariat for the NCCGHS. Accordingly, MITI hosted the First NCCGHS on 3rd August 2006 and the lead agencies for the key sectors were identified (Table 3). In addition, the Terms of Reference (TOR) for the NCCGHS were finalized at the first NCCGHS meeting.

Table 3. Lead agencies for the key sectors under the GHS implementation in Malaysia

Key sectors	Lead agency
Industrial workplace	Department of Occupational Safety and Health (DOSH), Ministry of Human Resource (MOHR)
Agriculture	Pesticides Board (PB), Department of Agriculture, Ministry of Agriculture and Agro-based Industry
Transport	Ministry of Transport (MOT)
Consumer Products	Ministry of Domestic Trade and Consumer Affairs (MDTCA)

Source: [6]

The Department of Occupational Safety and Health (DOSH) has prepared the Draft Occupational Safety and Health (Chemicals Classification, Labelling and Safety Data Sheet) (CLASS) Regulations 20xx which incorporates GHS elements. The CLASS regulations are expected to be gazetted by 2010 and will then be implemented in stages. A grace period of one year (for substances) and three years (for mixtures) was proposed. Together with the CLASS regulations, a list of hazardous chemicals (about 200 substances) will be published and the list will be updated from time to time.

Meanwhile, the Malaysian Standards on GHS has been finalized by the Malaysian Standards Committee and is now awaiting approval. This standard has been developed based on the second revised edition of the GHS document (also known as purple book). In addition, translation of the second revised edition of the purple book into the Malay language has been completed. DOSH is preparing GHS modules for the public and classifiers. These modules include Awareness-raising on GHS, GHS Basic training, GHS Intermediate 1 training (for single substances) and GHS Intermediate 2 training (for mixtures).

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Besides the GHS, Malaysia is also concerned about the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) that was gazetted by the European Union on 18 December 2006, with its underlying principle: 'no data, no market' [7]. According to the requirements under REACH, manufacturers and importers in EU must register their products according to the timelines provided: registration for CMR (Carcinogenic, Mutagenic and Reproductive toxicity) chemicals of ≥ 1 tonne/year, or chemicals very toxic to the aquatic environment of ≥

100 tonnes/year, or chemicals ≥ 1000 tonnes/year by 30 November 2010; registration for chemicals ≥ 100 tonnes/year by 31 May 2013; and registration for chemicals ≥ 1 tonne/year by 31 May 2018 [8]. Thus, exporters in Malaysia exporting chemicals to EU will be affected by REACH, directly or indirectly.

On 16 June 2009, MITI and the Chemical Industry Council of Malaysia (CICM) jointly organized a dialogue session with industry representatives on GHS and REACH. Participants from industry were actively involved in the dialogue session and they expressed their concerns about both REACH and GHS. One of the significant outcomes from the dialogue was that MITI and CICM agreed to work together with industry in assisting them to fulfill requirements for the GHS and REACH.

Approaches for Integrated and Holistic Management of Chemicals in Malaysia

A sound Chemical Management System (CMS) for development planning, human health and environmental protection, conservation of natural and cultural heritage, plays an important part in sustainable development. Laws, rules and regulations should not be the only ways to convince leaders and communities to safeguard and care for their health and environment. Best management and environmental and care practices must be part and parcel of each and everyone's responsibility towards realizing sustainable behaviour and lifestyles, which would also include ways of generating good economic opportunities.

Social, economic and environmental policies need be addressed together with sustainability goals and objectives and should not be considered separately. Compatibility of one policy with another is not always obvious and needs to be looked at carefully, including in terms of potential benefits and costs through various assessment approaches which include financial terms and subjective qualitative comparisons.

Multi- and inter- disciplinary research and approaches must be considered and implemented at various levels by involving various relevant stakeholders utilizing integrated and holistic perspectives and approaches in managing chemicals. Economists, social scientists and environmental scientists must work together and interact with business people, the public, communities, politicians and media experts in strategic and constructive discussions and consultations.

Education is an important tool that must also be utilized in the development of a smart and sound CMS. Promoting and enhancing public awareness through the media, and formal and informal education is vital in ensuring that necessary and accurate information is presented and conveyed to people with varying levels of knowledge and from different backgrounds. Consultation between experts and professionals with the public and communities should be carried out for the development and improvement of policies, plans and programmes. Roundtable discussions and dialogues with specific stakeholders and the public on concerns, issues and challenges of CMS should be carried out from time to time. It is particularly important to create an awareness of the inter connections and inter-relationships of different disciplines and stakeholders.

In general, current initiatives and activities related to chemicals management in Malaysia are actually stimulated by external requirements and assistance. For example, the REACH requirements for exporting chemicals and articles into EU have brought the Malaysian government and industry to work even more closely together and they are now working together to address and fulfill the requirements of REACH. The GHS involves not only authorities for industrial chemicals but also authorities for consumer chemicals, but currently some of the consumer chemicals are not being properly regulated and controlled. There is also assistance from DANIDA for the preparation of EHS strategy and action plan, as well as the EHS notification and registration system. These initiatives and activities can be seen as a 'reactive approach': we are reacting in response to external requirements instead of being proactive. Nevertheless, with increasing awareness of chemicals management, we are now in the paradigm of transforming from a 'reactive approach' to a 'proactive approach'. The MyNICHE is one of the cornerstones of the proactive approach taken by Malaysians to discuss the integrated and holistic management of chemicals in Malaysia. The establishment of the Malaysian National Chemical Council (MNCC), the Chemical Act, the Malaysian Chemical Database (MyCD) and the Sustainable Development Indicator for chemicals management are also being discussed in a series of MyNICHE round table dialogues. Figure 2 shows the relationship between the 'reactive approach' and the 'proactive approach', both of which are currently applied in Malaysia.

In order to strengthen collaboration among the stakeholders, all stakeholders must be aware of their roles and responsibilities in the establishment of a sound CMS in Malaysia. Obviously, each group of stakeholders has their own mandate and jurisdiction and their individual responsibilities will not be discussed here. However, the stakeholders, in general, can be grouped into different categories with each category sharing the same responsibilities. The 'common responsibilities' for each category of the stakeholders are explained in the following sections:

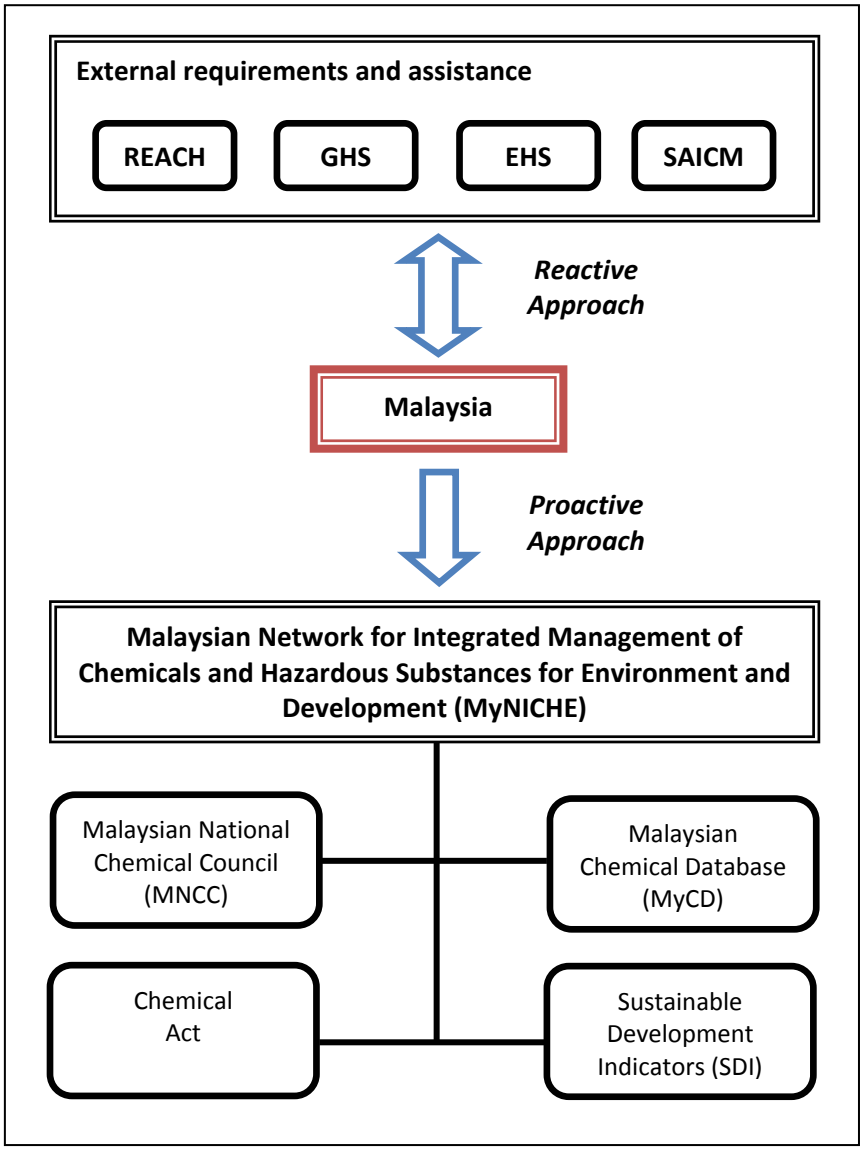

Figure 2. Relationship between 'reactive approach' and 'proactive approach', both currently applied in Malaysia

Government

Government officers often attend international and regional meetings that are related to chemicals management, such as the International Conference on Chemicals Management (ICCM) and the Asia Pacific Economic Cooperation (APEC) Chemical Dialogue. Once these officers return to Malaysia, they should convey the meeting outcomes not only to their respective ministry or department, but also to the key stakeholders. In this regard, the meeting outcomes could be either incorporated into their news letter (if applicable), or presented at the appropriate platform, such as MyNICHE.

Government agencies should take the lead in convening meetings with key stakeholders before making any decision that might potentially affect key stakeholders. For example, stakeholder consultation is an integral component before the gazetting or amendment of any act or regulation. This can reduce or prevent any negative consequences or ambivalence that might arise after a decision is made. The government should also provide financial and technical assistance, through appropriate agencies such as Small and Medium Industries Development Corporation (SMIDEC) to the Small and Medium Industries (SMIs) as SMIs are seen as the backbone of the manufacturing sector in Malaysia.

Industry

Companies should carry out detailed studies before they introduce any new chemicals into the market. The cost for the detailed study (e.g. toxicity test) might be expensive but they should always bear in mind that prevention is better than cure. The money that they spend today may protect consumers from any

untoward consequences, or may even protect the company against liability claims . Chemical risk assessment is one of the important step that should be taken before the manufacturer puts any chemical product into the market. Chemical risk assessment refers to the investigation into possible chemical hazards as well as the safe level of exposure to the chemical that will not pose any adverse effects to the user. Both acute and chronic toxicity are important aspects of chemical risk assessment.

Companies should prioritize the promotion of human health and environmental protection, such as by participating in the Responsible Care Programme. They should also reveal all the chemical properties in the Safety Data Sheet (SDS) without classifying any of the properties as confidential. People have the right to know what hazards are associated with the chemicals they are using.

Civil Society

NGOs such as the Consumer Association of Penang (CAP) should promote awareness among consumers of the hazards of chemical use, and encourage the use of less hazardous consumer chemicals. Awareness of the importance of personal protective equipment such as gloves when using pesticides also needs to be enhanced.

Academic and research institutes

Academic and research institutes should emphasize research and development (R&D), including inventing safer alternatives to replace more hazardous chemicals. They should also provide technical support for other stakeholders based on their knowledge and expertise. In addition, testing of chemicals should be carried out in accredited laboratories, such as the GLP (Good Laboratory Practice) and the SAMM (National Laboratory Accreditation Scheme).

Conclusion

Chemical and hazardous substances management is a task that has to be addressed by all stakeholders. It requires an integrated and holistic approach with multi- and trans-disciplinary approaches. This task involves many aspects such as impact, pollution and contamination of the life-supporting resources, biological resources and human well-being, in both the economic and social senses. Proper classification and labelling of chemicals and hazardous substances is crucial and the GHS system is certainly recommended. Accountability and responsibility is very important and this will require efforts to raise awareness and understanding among the business sector, industry and the public. All stakeholders should meet on a regular basis to deliberate on how best to frame and develop a national sound CMS. Definitely, R&D is much needed to support decision-making processes and also to find better alternatives of reducing and re-using hazardous wastes. Availability and accessibility to information is pertinent for wise decision-making, and a custodian needs be appointed for the integrated database and information system. Smart partnerships among government ministries/agencies, industrial sectors and other relevant parties are necessary in developing and strengthening regulatory and voluntary processes, raising awareness, and measuring performance using sets of indicators. A sound CMS must be developed for Malaysia by Malaysians with support from international expertise and institutions, to ensure good control over activities, personnel, public and environmental protection from hazards of chemicals. A good CMS will definitely ensure good compliance all round, and it should consist of inventory tracking and control of chemicals, classification and labelling of chemicals, analyses of chemical risks, management of change, emergency planning and response, throughout the life cycle of chemicals.

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References:

1. UNEP. (1994) *Code of Ethics on the International Trade in Chemicals*. United Nations Environment Programme, Nairobi.
2. IPCS. (1999) *Public health and chemical incidents: Guidance for national and regional policy makers in the public/environment health roles*.
3. Ministry of International Trade and Industry. (2007) *Malaysia International Trade and Industry Report 2006.*
4. Mokhtar, M.B, Mohamed, A.F, Othman, N.W & Goh, C.T. (Eds). (2006) *Malaysian Network for Integrated Management of Chemicals and Hazardous Substances for Environment and Development (MyNICHE)*. LESTARI Round Table Dialogue No. 12. LESTARI: Bangi.
5. Lian, K.F. (2008) Strategy on EHS management in Malaysia. In Mokhtar, M.B, Goh, C.T. & Zaharuddin, N.R.B. (Eds). *Managing chemicals for better quality of life: Improving our performance (MyNICHE-3).* LESTARI: Bangi.
6. Mokhtar, M.B. & Goh, C.T. (2007) Globally Harmonised System of Classification and Labelling of Chemicals (GHS): A Tool Towards a Sound Chemical Management System. *Berita Institut Kimia Malaysia (IKM):* Issue 87.
7. EU. (2006) *Regulation EC No 1907/2006 of the European Parliament and the Council*. Official Journal of the European Union.
8. European Communities. (2007) *REACH: The new EU chemicals legislation.*