SOLID WASTE MANAGEMENT AND CLEANING SERVICES AND ITS IMPACT TO THE ENVIRONMENT

1. Background And Audit Planning

1.1. Introduction

The waste generation rate in Malaysia is continuously rising every year due to rapid increase in population, accelerated urbanisation and industrialisation process. The alarming amount of solid waste has put pressure on government and local authorities to continually seek new management strategies to deal with these wastes issues. By definition, solid waste is a useless and unwanted product in the solid state derived from the activities and discarded by society. The composition of solid waste generally comprises of garbage, plastics, bottles, papers, metals, fabrics and miscellaneous.

In accordance with the instruction from the Ministry of Housing and Local Government, solid waste management for the entire administrative area of the local authority in Peninsular Malaysia was privatised except in Sabah and Sarawak. The objective of privatization is to increase the efficiency of the cleansing and disposal of solid waste. The services provided include collecting and disposing of solid waste, road cleanup, cleanup public market, cleansing of illegal landfills and maintenance. The allocation of provisions for the cleansing services and solid waste management for the eight states in Malaysia for three years are shown in **Table 1.**

Table 1
Provisions for the Cleaning Services and Solid Waste Management for the Period 2007 to 2009

State	Provision		Total
	Cleaning Services Million (RM)	Solid Waste Management Million (RM)	Million (RM)
Melaka	-	68.61	68.61
Negeri Sembilan	-	22.50	22.50
Selangor	-	115.79	115.79
Kedah	-	6.3	6.3
Pulau Pinang	48.89	60.64	109.53
Perlis	12.00	0.37	12.37
Sabah	-	14.97	14.97
Sarawak	10.72	163.2	173.92
Total	**71.61**	**452.38**	**523.99**

The Solid Waste and Public Cleansing Management Act 2007 [Act 672] which was imposed in 2008 gave the executive power to the Department of National Solid Waste Management to manage solid waste instead of the local authorities. The Department outsourced the services to the Solid Waste and Public Cleansing Management Corporation.

1.2 Importance of the Audit Topic

This audit topic was chosen due to the following reasons:

i. The amount of waste generated continues to increase whilst only less than 5% of the waste is being recycled. Currently, over 23,000 tonnes of waste is produced each day in Malaysia. However, this amount is expected to rise to 30,000 tonnes by the year 2020.

ii. In accordance with Malaysia's vision 2020, the Malaysian Government through the Department of Environment will increase its efforts to ensure that invaluable natural resources are not wasted through conservation and preservation, prevention and control of pollution, protection and promotion of wise use of natural resources towards sustainable development for present and future generations.

iii. Prior to privatization of solid waste and public cleansing management, the service was under the responsibility of local authorities. Through privatisation, it is hoped that it will improve the efficiency of solid waste and public cleansing management in the country.

iv. The United Nation's Agenda 21 calls upon all nations to develop measures on every aspect relating to human impacts on the environment. Malaysia is serious in confronting environmental issues and continuously taking concrete actions to support this agenda.

1.3 Audit Objective

The audit objective was to assess whether the management of solid waste management has been implemented efficiently and effectively in accordance to the determined goals with consideration to the environmental impacts.

1.4 Audit Scope

The audit focused on management of solid waste collection services and landfill management conducted at the local authorities in eight states in Malaysia i.e Melaka, Negeri Sembilan, Selangor, Kedah, Pulau Pinang, Perlis, Sabah and Sarawak from 2007 to 2009.

2. Methodology

2.1. Audit Methodology

Files, records and relevant documents were scrutinised and reviewed. Observations, site visits, interviews and distribution of questionnaires were also utilised to collect the information to assess the quality and effectiveness of solid waste management. In addition, expert advices were solicited from the Department of Environment and the Department of Chemistry.

The audit was conducted based on the Environmental Audit Guideline and the Performance Audit Guideline which include preliminary study on the subject matter, preparation of Audit Planning Memorandum, conducting entrance and exit conference and submission of final audit reports to the auditee.

3. Findings and Recommendations

3.1. Solid Waste Collection

The appointed contractor was responsible for performing the work as required in the terms of the contract. The frequency of collection of solid waste was specified in the contract which is between two or three times a week in a residential area and on a daily basis for commercial and industrial solid waste. Contractors were also required to ensure that solid waste was not scattered during the collection run. Sufficient and proper bins were provided. The trucks which were used to collect solid waste from garbage to a landfill compactor should be of a suitable carrier and cover.

Audit findings indicated that frequency schedule was not complied, inadequate solid waste bins, solid waste was scattered, trucks were not covered, leachate spills on the roads and solid waste was dumped in unallowable place. Illegal dumping of solid waste will affect human health and the environment as well as impose significant costs to the community. Stern enforcement actions are taken such as imposing fines or legal actions against those activities.

3.2. Solid Waste Disposal

Solid waste generated will be recycled or sent to landfills for disposal. A study on Environmental Impact Assessment (EIA) as laid out in the Environmental Quality Act 1974 should be conducted before a landfill can be used. EIA is a planning tool to avoid environmental problems and prevent high costs in project implementation. Apart from that, location of solid waste disposal sites should not be in a flood prone area or watershed. Landfills must also be around

the area where it is easy to get the supply of sand to cover the waste and the availability of the entry and exit roads. The buffer zone should be at least 100 meters from the river or the water supply, within 300 meters of public facilities such as roads, water supply lines and electrical conduit and within 400 meters of residential areas, schools and other public buildings.

Audit findings indicated that except Pulau Pinang Municipal Council, all local authorities did not initiate the EIA on the solid waste disposal sites due to financial constraints or the disposal area has been long operated. It was also observed that in Perlis, the housing area was near the landfill.

4. Impact to the Environment

4.1. Water Pollution

Water pollution occurs when water quality is changing and affecting the ecosystem in the water as a result of an increase in pollutants entering the river. This pollution is caused by emissions of leachates without prior treatment. According to the National Water Quality Index (NWQI), water quality is calculated based on 6 parameters which are suspended solids, pH, ammoniac nitrogen, chemical oxygen demand, biochemical oxygen demand and dissolved oxygen. Test on samples of water quality on discharge of leachate Regulations 2009 stated that suspended solids should equal to or less than the standard 50%, pH 6-9%, nitrogen ammonia 5%, biochemical oxygen demand 20%, plumbum 0.1%, oil and grease 5% (Environmental Quality Act 1974 and Regulations Environmental Quality - Control of Pollution From Solid Waste Transfer Station and Landfill). To reduce the environmental impact, approval from the government must be obtained to ensure recycling and composting plant will be utilized to separate solid waste and process the composts to fertilizer.

4.2. Air Pollution

Air pollution is associated with the production and release of methane gas from landfills. It interferes with the environment, ecosystem and human health. Treatment of leachate and solid waste needs to be done to prevent odour pollution. Spraying micro organism (EM) is a biological method to treat leachate and solid waste. EM consists of 3 major general microbial phototropic bacteria, lactic acid bacteria and yeast. Phototropic or bacteria photosynthesis is a group of bacteria that convert ammonia and hydrogen sulphide to odourless gases.

4.3. Social impact

Improper waste management invites rats, flies, cockroaches and mosquitoes. Among the diseases caused by these animals are lectospirasis, acute gastroenteritis (diarrhoea), typhoid, cholera, dysentery, dengue and chikungunya. Statistics from the Ministry of Health showed that cases of dengue fever and malaria are very high. Disease control and prevention measures are taken in accordance with the type of disease for example fogging operation was conducted to control dengue fever. Other measures include enforcement, education health, investigations and follow-up investigations. In addition, the Public Health Laboratory facilities are used for the diagnosis of disease specimens.

5. Impact and Results

An effective solid waste management system is crucial to avoid environmental and health related impacts which invariably will lead to undesirable consequences for the country's citizenry and the general ecosystem. Malaysian population will be increasing and this has a corresponding increase of waste generation which makes the solid waste management a very pertinent issue. The environmental impact will be reduced if more waste is avoided, reduced, re-used or recycled rather than disposed. Eefficient solid waste management can ensure sustainable development.

6. Challenges and Barriers

Challenges faced by audit team were as follows:

6.1. Auditor's safety

Safety aspect of the auditor while exploring the landfill, for example, the emissions of leachates without prior treatment.

6.2. Documentation and records

Poor documentation and records in respect of solid waste management and cleansing services limit the audits.

7. Lessons Learnt

7.1. Recyclable components

The waste recycling industry in Malaysia needs to be enhanced. Agenda 21 of the outlined the need for environmentally sound technologies to protect the environment, as well as recycling of the waste and handling of residual waste in a more acceptable manner.

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7.2. Lack of awareness

The lack of awareness and knowledge among Malaysian community about solid waste management (SWM) issues, and being ignorant about the effect that improper SWM has to us has definitely worsened the problem. Improper management of the solid waste will lead to the emission of greenhouse gases (GHG). The manufacturing, distribution and use of products, including waste generation result in emission of GHG which affect the Earth's climate.

7.3. Planning and management of solid waste

Economic growth has brought prosperity however it imposes costs of industrial pollution and degradation of urban environment. The Government or local authorities should focus more on developing effective means of waste minimisation and sustainable development strategies.