

Cranfield University

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Office Waste Management within a Public Organisation

School of Applied Science

MSc (Waste and Resource Management)

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# ABSTRACT

Through air pollution from landfill, the increase in waste generation poses a local and global threat to the environment. The UK government recognises organisations' contribution to meeting raised targets for waste recycling. This research therefore, shows that organisational waste, associated with office operations is produced in large quantities and hence, very significant in contributing towards meeting national recycling targets. The paper addresses two key areas in managing organisational office waste for sustainable development within a public organisation. First, office waste recycling logistics were examined and secondly, the link between sustainable waste management practices such as recycling and the dissemination of information to participants about waste schemes and their ultimate success was investigated.

Waste policies and implementation strategies were found to be the determinants of waste management program's effectiveness. Organisational policy and strategy were identified as drivers in mainstreaming effective waste management within an organisation, especially participation in recycling schemes and waste minimisation. Simultaneously, recycling levels and levels of waste awareness within an office showed a positive relationship. The results show that continuous waste awareness promotions are key to translating high awareness levels into action among recycling participants in the organisation. Overall, an expected reduction in waste destined for landfill was reciprocated by an increase in material collected for recycling. The implications for organisational policy making to ensure staff sustainable waste management behaviour in organisations are also explored.

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## **ABBREVIATIONS**

KPIs – Key Performance Indicators

FRMs – Finance and Resource Managers

ICT – Information and Communications Technology

ESSG – Environment Strategy Steering Group

FM – Facilities Managers

RCOS – Resilience, Compliance and Operational Support

CSMs – Customer Service Managers

FMS – Facilities Management Suppliers

MPIC - Met Property Information Centre

DEFRA - Department for Food and Rural Affairs

WRAP – Waste Resource and Action Programme

WR – With Recycling

WTR – Without Recycling

LAs – Local Authorities

WEEE – Waste Electrical and Electronic Equipment

CIWM – Chartered Institute of Waste Management

EU – European Union

EC – European Commission

ISWA – International Solid Waste Association

SWMP – Site Waste Management Plans

EMS – Environmental Management System

KIP – Key Performance Indicators

# CHAPTER 1

## 1 INTRODUCTION

In recent years, corporate social responsibility and business ethics have moved up the priority list within organisations, in line with the rise of sustainability profile in the global environmental protection agenda. As stated in the International Solid Waste Association (ISWA) (2008) report, sustainable waste management is upheld as a tool for combating climate change.

The general view among practitioners is that compliance with government legislation is the likely significant factor in driving organisations to take waste management and other environmental issues increasingly seriously, especially the 2007 England Waste Strategy, higher landfill tax, and the European Union (EU) Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) (Ruddock, 2008a).

According to White *et al.* (1995), organisations are mainly concerned about the balance between employing environmentally and economically sustainable waste management practices. *Environmentally sustainable* waste management systems must reduce, as much as possible, the environmental impact of waste disposal, including energy consumption, pollution to land, air and water and loss of amenity. *Economically sustainable* waste management systems must operate at a cost acceptable to the community, which include private citizens, businesses and government. White *et al.* (1995) also argue for the need to balance the environmental quality of a waste management system and its economic cost.

There are some untapped benefits for sustainable waste management for organisations. As noted by DEFRA (2008), for every tonne of household waste produced, organisations produce another six tonnes. To this end, the

Department of Environment, Food and Rural Affairs (DEFRA, 2003a) suggests that organisations could save around 1% of turnover costs through simple, yet effective, sustainable waste management techniques.

Effective waste management techniques in organisations, as popularised by the waste hierarchy, are to minimise, reuse, recycle, recover and dispose of waste in respective order of priority. In line with the waste hierarchy, Korhonen (2002) argues that a consensus is emerging advocating that, instead of dealing with the symptoms (such as waste that has already appeared), environmental policy and management should strive towards preventative measures.

This requires strong leadership by management, dedicated participation by employees to the scheme, and involvement of contractors or recycling companies, who actually collect the recycled waste for treatment. Central to all this is provision of an internal mechanism within organisations to provide and maintain staff motivation to participate in waste programs, to monitor the performance of the programs, and to identify strong and weak points for remediation purposes.

A robust waste management strategy is, therefore, an integral part of such a system and, given that government legislation is relatively new and increasingly stringent in this area, most of the measures put in place are as yet not fully tested, hence the rationale for this research was to investigate the effectiveness of a public organisations effectiveness in implementing a sustainable waste management programme and in particular, *office waste recycling*.

## **1.1 AIMS AND OBJECTIVES**

The research was carried out at a public organisation based in London. It is a multi-site organisation, producing an average total of 18254 tonnes of waste per year. Of this waste arising, about 9289t is office waste. Office waste includes furniture, electronic and communications equipment (ICT), paper and other mixed wastes. All furniture and ICT is either reused or recycled and about 35%

of the other mixed office waste is recycled. An office waste recycling scheme is being introduced to recycle office waste apart from ICT and furniture across the organisation sites. In this regard, this research project aimed at examining the public organisation's office waste recycling scheme, the effectiveness of its waste communication programmes, and its waste strategy regarding office waste management.

It was envisioned that, to fully test the effectiveness of the organisation's waste recycling management system, the following had to be established:

1. Determine the effectiveness of the waste strategy in realising the organisation's waste goals.
2. Evaluate dissemination of waste information to employees. This is pivotal to office waste schemes' success as staff are directly involved in waste minimisation, reuse and recycling programs.
3. Assess employee willingness to participate in the scheme.
4. Obtain an actual measure of trends in waste generated over a period spanning time before and after introduction of the recycling scheme in order to determine the impact of the waste programmes.

### **1.1.1 Outline**

The study consists of three sections. Chapter one introduces the study, outlining its objectives and the methods employed in carrying out the research. Chapter two is a theoretical framework for the study, which presents meanings of key themes, words and previous research in waste management that relates to the study. Chapter three presents the findings, conclusions and recommendations of the study in a journal paper format.

## **1.2 METHODOLOGY (RESEARCH STRATEGY)**

Details of the research approach, data requirements and collection methods used to achieve the aim of the study are presented in this section. The rationale for the choices and their limitations are also outlined.

The nature and scope of the study was exploratory, hence no hypothesis was formulated.

### **1.2.1 Research Approach**

#### **1.2.1.1 Qualitative approach**

Sometimes referred to as the phenomenal approach, the qualitative approach is said to stem from the view that the world and reality are not objective and exterior, but they are socially constructed and given meaning by people (Patton, 1990). It is a flexible open-ended method of building up an in-depth picture of a situation or community. This approach has been mainly used in reviewing the literature in this study (chapter 2). The qualitative approach was also used to conceptualise staff views and awareness of the organisation's waste schemes.

#### **1.2.1.2 Quantitative approach**

The quantitative research approach is largely used to collect data that can be analysed in a numerical form. According to Easterby-Smith *et al* (1991), it relies on hypothetico-deductive methods and requires measurements to be valid or accurate and reliable. It needs commitment to a systematic rational approach to investigation, which involves turning concepts into measures, searching for causality, pursuit of findings that can be generalised and value-free judgements. The quantitative approach was used in waste arising and questionnaire response analysis.

### **1.2.2 Data Collection**

Two approaches of data collection are traditionally used to collate data for research purposes. These are primary and secondary approaches and they were used to collect data for purposes of this study.

#### **1.2.2.1 Primary data**

Primary data is relatively original and sometimes referred to as field research. According to Jankowicz (1995), it is gathered at one's own discretion and

subject to one's own interpretation and assumptions about what is important. Primary data was collected using tools such as interviews, questionnaires, meetings attendance, personal observation whilst on site visits, and participating in recycling scheme launches and waste awareness campaigns.

*Interviews* were carried out with several key staff members in the organisation. Interview questions were structured according to the nature of information required and the level of staff member(s). Data protection was ensured by not using personal names and interviewees were presented with questions using their job level title and not their names. All interview questions were written in a semi-structured way. This helped to collect all required information at one interview session. Interviews allowed the opportunity to further explain questions to interviewees as required, an advantage supported by Bowers (2001).

*Questionnaires* are structured documented questions designed to elicit information in a way that allows the researcher to make a generalisation about the topic under consideration (Bryman, 1991). Questionnaires were used to collect most of the information presented in the research. Pilot questionnaires were first designed and completed by colleagues. They were sent out and received through electronic mail. The questionnaires were divided into two sections. The first section was intended to collect data regarding employees' usage of the organisation's waste schemes and waste awareness data was collected through questions in section two. According to Bell (2005), more information can be collected with anonymity in a short time from the source through questionnaires, though they have possible limitations. Respondents could misunderstand questions, fail to understand unavoidable technical terms, and they are not likely to evaluate themselves with absolute objectivity (Frazer and Lawley, 2000). Data protection was ensured by not using respondents' names.

*Personal observation* also provided some general understanding of the organisation and its waste management programmes. The author spent about three months' working hours in the organisation. A good source of primary data, personal observation also lends itself to personal biases.

#### **1.2.2.2 Secondary data**

Secondary data is generally 'borrowed' and is commonly known as desk-top research (Patton, 1990). Secondary data used in the study was from the organisation's records. It has also been used in researching about broad definitions of words and themes used in the study, which is summarised in the second chapter. Secondary information was sourced through the examination of relevant literature such as journals, books, magazine articles, statistical abstracts from government and other organisations, and other relevant previous studies.

Secondary data provided a broader base in which general examination of waste management was carried out without doing research in other areas, which were not the focus of the study. The limitations posed by using secondary data include the fact that it is adopted with somebody else's rationale and therefore, generally limit freedom to interpret findings. Since secondary data is historical in nature, it may not be applicable or true in the current period in which it is adopted. Some statistical data used in this study were more than two years old, especially in the literature review. Findings from previous studies could also not be necessarily true in the period of this research due to political, economic and social changes that may have taken place since the studies were carried out.

#### **1.2.3 Population Sampling**

An important aspect in the collection of data is the selection of some units (sample) from the whole (population), to which the data relates. A minimum sample required for the population was determined using the *Survey System (2007-2008)*. The system determined that a minimum of 1045 (2.1%) of the population could be sampled for the study survey. Questionnaires were sent out

to 3776 employees based at the sample sites. The sample for the number of sites studied was randomly selected from the relatively few sites that had a recycling scheme at the beginning of the study and more were still being launched during the research. The same number of sites was selected from the north and south regions of the organisation (Figure 3.1.1).

Opportunity or convenience sampling was used in collecting data for this study. It is the investigation of a sample that one has the opportunity of studying because it is the most available. The staff members at the offices were the most accessible to the author. The sample method employed in the study can also be said to be positive or judgemental because the sample was selected at random, but from a limited number of sites that had a recycling scheme in place. This method was chosen because not all of the organisation's sites had recycling in place.

### **1.3 DATA ANALYSIS**

The process of data collection is not an end in itself. The culminating activities of any enquiry are the analysis, interpretation and presentation of findings (Patton, 1990). In order to achieve that end, the significant patterns from the collected data were identified and a framework for communicating the essence of the data was constructed. Both qualitative and quantitative approaches were used to analyse the data. Data that were subjective, like staff attitudes, were analysed using qualitative means and numerical data using quantitative means.

Simple content analysis was used as a technique for identifying, coding, and categorising primary patterns in the data. Data representative of questionnaire responses, interview responses, and company records were analysed and presented using this technique, for example, (Table 3.1.2/3).



# CHAPTER 2

## 2 LITERATURE REVIEW

This chapter is a review of background available information about the study. It aims to establish a conceptual framework based on previous studies and other literature in order to provide understanding of issues inherent in organisational (commercial/ industrial) waste management.

Waste management is a small part of sustainability, but a very broad area in itself. Waste is usually categorised into household waste and waste generated by organisations (industrial and commercial). Waste generated by organisations is the focus of this review. Major issues that organisations have to deal with in managing their waste are examined. These include the definition of waste, sustainability, legislative issues, waste management within organisations, and the strategies employed by organisations in managing their waste. These areas were chosen to explore further because they are directly related to and impact on organisational waste management, including the organisation of study because of its waste arising.

### 2.1 WASTE DEFINITION

Dictionaries, such as the Concise Oxford Dictionary (Soanes and Stevenson, 2004) and the Cambridge Advanced Learners Dictionary (Cambridge University, 2005), invariably define “waste” as something that is not used or lacks value due to being unwanted. The lack of value in waste is usually related to the degree to which it is mixed and sometimes being of unknown composition. Therefore, separating the waste usually increases the material value. On the other hand, waste managers tend to consider waste in its physical form, which may be classified according to its type, source, material type, or characteristics (Hicks *et al.*, 2004). Defining waste is not just of academic

interest, but organisations need to determine which types of materials are subject to the increasing amount of legislation on waste handling (White *et al.*, 1995).

According to Bell and McGillivray, (2006), the concept of waste is difficult to define because:

- There is no inherent physical characteristic that can be used to define waste.
- Determining if a substance is waste is subjective in nature. One person's waste can be another person's raw material.
- Emphasis on a particular level in the waste hierarchy, which is the generally preferred way for managing waste, may discourage attention on the other level and distort the definition of waste.

The major pointer for the definition of waste is the list of waste categories in Annex 1 of the Waste Framework Directive (75/442/EC) and the Waste Management Licensing Regulations, 1994, 1 (3). The list contains several categories of descriptors, which help in determining if something is waste or not. As Bell and McGillivray, (2006) state, the list can be confusing in determining what waste is in that it is more descriptive than determinative.

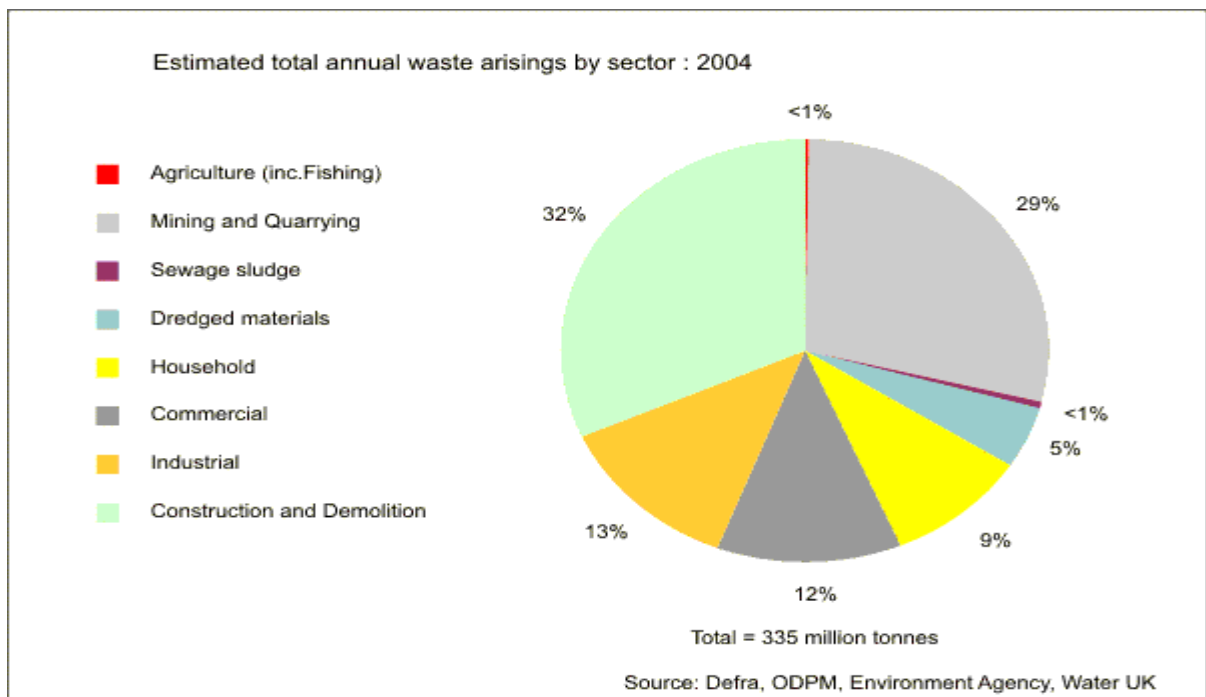
The two key tests for determining if something is waste, in line with the EU Waste Framework Directive (75/442/EC) definition is therefore, whether the substance, material or product comes within any of the categories set out in the specific definitions in Annex 1/ schedule 4 of the Directive. If the answer is affirmative, it will almost certainly be a waste. Whether the substance, material or product has been discarded by its holder or if there is an intention or requirement to discard it also determines if a substance is a waste.

The definition of the Waste Framework Directive (75/442/EC) poses problems. For example, a case where the material is stored at a waste recovery operation site does not necessarily mean it is waste (*Mayer Parry Recycling Limited v Environment Agency* (1999) Env LR 489 (Bell and McGillivray, 2006). However,

for purposes of this study, the EU Waste Framework Directive (75/442/EC) definition of waste shall be adopted.

## 2.2 WASTE ARISING

In 2004 the UK produced about 335 million tonnes of waste (DEFRA, 2008). Figure 2.1 shows the estimated proportions produced by each sector. 25 (13 + 12) per cent, excluding 32 percent of demolition and construction waste, represent industrial and commercial waste, respectively. The amount of waste produced in the UK, illustrates the enormous responsibility to manage it in sustainable ways in order to protect the environment and human health. The organisation's waste arising can be classed as commercial, industrial and construction and demolition waste. Construction and demolition waste is currently not officially reported by the organisation.



**Figure 2.1.** 2004 estimated total annual waste arising, by sector for the United Kingdom (after DEFRA, 2004a)

## **2.3 SUSTAINABILITY**

As Pati *et al*, (2008) state, sustainable development is about resource conservation, environmental protection, and social as well as economic development. Sustainable waste management is part of the environmental protection agenda in sustainable development. Reduction and reutilisation of resources and waste are key strategies in sustainable waste management (Pati *et al*, 2008).

A report by the International Solid Waste Association (ISWA) states that, the waste sector would be able to contribute about 16-27% by introducing an ambitious waste policy in the EU. The contribution would be part of the total 20% emission reduction target to be met by EU countries under the Kyoto agreement (ISWA, 2008). The report also emphasises the need to focus on diverting biodegradable waste from landfills, support recycling, allow flexibility for applying the waste hierarchy, and give more opportunities for energy recovery. Sustainable waste management is upheld as a tool for combating climate change.

## **2.4 THE “WASTE PROBLEM” AND MAJOR DRIVERS OF SUSTAINABLE WASTE MANAGEMENT**

The waste problem is created and driven by the impact waste has on human health, depletion of resources, regulation, economic and environmental impacts.

*Waste impact on human health* could be from emissions to the air, leachate from waste treatment sites to drinking water, dust and noise. A study by DEFRA (2001) indicated respiratory diseases and cancer links to exposure to waste emissions. The waste impact on human health has intensified risk assessment in waste management, aimed at assessing the source-pathway-receptor link. Awareness of the link helps to manage exposure by severing at best one link in order to minimise waste impact on human and environmental health. Human health and environmental protection are central to waste management activities and most laws and regulations are aimed at addressing potential health and

environmental problems. For example, the Landfill Directive (DEFRA, 2004b) prohibits the land filling of biodegradable waste, thereby reducing the production of methane and leachate, which are both detrimental to human and environmental health.

*The consumption of resources* such as fossil fuels, trees, water, minerals, and the emissions released to the environment when processing these, is another impact of waste, which sits at the top of the waste management priority. The impact is from human consumption of these natural resources faster than they are replenished (Houghton and Skole, 1990). Waste minimisation through reducing resource consumption is the main strategy for mitigating the impact of waste on the environment.

In order to minimise the impact of waste on human health and the environment, a plethora of regulations, such as the Landfill Directive (99/31/EC) have been introduced. The aim is to ensure sustainable waste management practices are adhered to and mainly in line with the idealised waste hierarchy. The Landfill Directive promotes the waste hierarchy by encouraging minimum waste disposal (Schmidt *et al*, 2006b)

## **2.5 SUSTAINABLE WASTE MANAGEMENT FRAMEWORK IN ORGANISATIONS**

The waste hierarchy is a useful framework that has become a cornerstone for sustainable waste management, setting out the order in which options for waste management should be considered based on environmental impact. Popularised by the EU Landfill Directive (99/31/EC), it is the major framework of waste management in the UK. The Department for Environmental and Rural Affairs (DEFRA) also promotes the framework and the Waste Strategy (2006) is centred on the waste hierarchy (DEFRA, 2008). The organisation's waste strategy is to manage all its waste arising in line with the waste hierarchy. The waste hierarchy promotes waste:

- Minimisation
- Re-use
- Recycling
- Recovery
- Disposal

The hierarchy places the most sustainable option at the top of waste treatment. Some academics do not entirely agree with that. For example, Schmidt *et al* (2006a), argue that the waste hierarchy is a sound principle for handling waste paper, but does not necessarily apply for other types of waste.

### **2.5.1 Minimisation**

The England Waste Strategy (2007) is based on the central concept of the hierarchy of preferable options for the treatment and disposal of waste. As stated by Tonglet *et al* (2004), minimisation is placed at the top of the waste hierarchy and the government seeks to encourage its uptake by organisations. According to Hicks *et al* (2004), the UK produces approximately 9 tonnes of waste for each tonne of goods made out of the production line. The government promotes waste minimisation in all sectors, whilst ensuring that a high proportion of materials are recovered and recycled (DEFRA, 2003a).

### **2.5.2 Re-use**

Waste minimisation does not achieve zero waste output. Therefore, re-use of waste material contributes towards minimising residual waste. The re-use of products or materials that would otherwise be waste can provide a range of social, economic and environmental benefits. This is an area where the voluntary and community waste sector has led the way. For example, the sector has pioneered many of the services that are widespread today, such as the re-use of furniture and white goods (DEFRA, 2003b). As stated by Korhonen (2002), one organisation's waste can be re-used by another organisation as its

raw material. An organisation can also re-use its own waste after treating it. For example, waste water is widely purified and re-used in industrial processes.

### **2.5.3 Recycling**

Recycling is the backbone of minimising waste before final disposal. The organisation emphasizes recycling and reuse of waste once it is produced. Recycling is the first step in treating waste, followed by recovery of energy from waste, after which it is finally disposed in landfill. The UK Government has set business targets that must be met by obligated companies each year to ensure that the UK meets its national targets, as set under the Packaging and Packaging Waste EU Council Directive (94/62/EC). The UK business targets are higher than EU Council Directive (94/62/EC) targets. Under the UK system, smaller businesses are excluded from the obligations. Therefore, only a proportion of all packaging is targeted, whereas the EU Council Directive (94/62/EC) targets apply to all packaging waste (DEFRA, 2003c)

The business targets, which should be used by businesses to calculate their obligations, and which are designed to enable the UK to meet the Directive targets are illustrated in Table 2.1

**Table 2.1:** UK Recycling targets for businesses (after DEFRA, 2003d)

| Waste Type  | Percentage Target (%) per year |      |      |      |      |
|---|--------------------------------|------|------|------|------|
|   | 2006                           | 2007 | 2008 | 2009 | 2010 |
| Paper   | 66.5                           | 67.0 | 67.5 | 68.5 | 69.5 |
| Glass   | 65.0                           | 69.5 | 78.0 | 80.0 | 81.0 |
| Aluminium   | 29.0                           | 31.0 | 35.0 | 38.0 | 40.0 |
| Steel   | 56.0                           | 57.5 | 68.0 | 68.5 | 69.0 |
| Plastic   | 23.0                           | 24.0 | 26.0 | 27.0 | 29.0 |
| Wood  | 19.5                           | 20.0 | 20.5 | 21.0 | 22.0 |
| Overall Recovery  | 66.0                           | 67.0 | 72.0 | 73.0 | 74.0 |
| Minimum amount of recovery to be achieved through recycling | 92.0                           | 92.0 | 92.0 | 92.0 | 92.0 |

According to DEFRA (2003c), the Directive targets to be met by 2008 for the UK are 60% overall recovery and 55% overall recycling. For recycling, the targets are 60% for paper, 60% for glass, 50% for metals, 22.5% for plastics, and 15% for wood.

#### **2.5.4 Recovery**

Recovery is the transformation of waste to a useful product. Energy is the main resource recovered from waste. Anaerobic digestion, mechanical biological treatment, plasma, combined heat and power are some of the popular technologies used to recover energy from waste (Sawicka, 2006). There are



other diverse technologies used in energy recovery from waste processes and the energy recovered from waste is seen as better than fossil fuel as it is not from finite natural resources (CIWEM, 2006). Compost is another example of a useful product recovered from biodegradable waste, though it is often classed as recycling. Though outside the sphere of direct influence, the organisation of study send some of the waste not currently recyclable to energy from waste incineration.

### ***2.5.5 Disposal***

After all waste minimisation and treatment efforts have been exhausted, there is still a portion of residual waste that has to be disposed of to landfill. Sustainable waste management requires disposing of waste in such a way that it does not negatively affect human health or the environment. Residual waste is often disposed of in landfill. The EU Landfill Directive (99/31/EU) is a major legal instrument used to achieve sustainable waste disposal in Europe. It requires that waste be treated in order to bio-stabilise it and reduce its toxicity and size, before being sent to landfill. This is aimed at minimising the toxic potency of leachate and reducing the amount of methane produced in landfill. Incineration is sometimes used for waste disposal and the residual ash is sent to landfill.

## **2.6 LEGISLATION**

The major formation objective of the European Union (EC) was trade. EC laws are therefore, intended to avoid competition distortion by member states applying different rules and standards. Bell and McGillivray (2006) point out that the EU environmental law is based on the principles of polluter pays, environmental damage should be rectified at the source, precautionary principle, and prevention should be preferred to remedial measures. The EC environmental law is contained in Treaties, Regulations and Directives, international treaties to which the EU is party, and the judgements and principles of the European Court of Justice (Bell and McGillivray, 2006)

The UK statutory legislation is enacted through acts of parliament. Environmental protection legislation in the UK is also based mainly on the duty of care and producer pays principles (Coates and Rahimifard, 2007). For example, the Landfill Regulations (2002) and the Waste Management Licence Act (2008) (new pollution prevention control (PPC) + licence to operate). Environmental regulatory authorities in the UK are responsible for enforcing the regulations and they include local authorities, the Department for Environmental and Rural Affairs (DEFRA), Waste and Resource Action Programme (WRAP) and the Environment Agency (EA). The Scottish Environmental Protection Agency (SEPA) only regulates in Scotland. As Bell and McGillivray (2006) state, where there is a conflict between the UK and EU legislation, the EU legislation prevails.

In order to minimise the impact of waste on human health, regulations have been introduced by the EU and the UK government. Given the MPS waste arising, the organisation has to comply with the following regulations:

### ***2.6.1 Landfill Directive***

The EU Landfill Directive (99/31/EC) was introduced in 1999 and implemented in the UK since July 2001 (CIWM, 2008). The Landfill Directive (99/31/EC) aims to reduce the pollution potential from landfill waste that can adversely impact on human health, pollute groundwater, soil, air, and also contribute to climate change. In England and Wales, the Directive is applied under the Landfill (England and Wales) Regulations (2002).

Article 5(1) and (2), as laid down in Landfill Directive 1999/31/EC on the landfill of waste, requires Member States to establish a national strategy for the reduction of biodegradable municipal waste (BMW) going to landfill. The strategy must ensure that targets for the reduction of BMW are met. Member states that sent more than 80% of their collected municipal waste to landfill in 1995, such as the UK, are required to reduce the amount of biodegradable

waste they send to landfill to the following percentages of their 1995 figures; 75% by 2010, 50% by 2013, and 35% by 2020.

### ***2.6.2 Waste Framework Directive (75/442/EC)***

All waste is regulated under the Waste Framework Directive (75/442/EC) legislation, and it is characterised as the original waste directive and a foundation for sustainable waste management. It introduces the system of coordinated management of waste within communities and defines the impact of recovery and disposal operations in the annex. The Directive also defines waste and introduces the principles of the waste hierarchy, proximity and self sufficiency (CIWM, 2008).

### ***2.6.3 Waste classification and legislation***

In an effort to meet the targets set in the Landfill Directive and to meet other sustainability requirements in managing waste, a number of legal instruments controlling particular waste streams have been introduced by the European Union and member states. For compliance purposes, proper waste classification in organisations is important. The waste streams arising from the organisation of this study, with the legislation affecting each stream, are reviewed below. The particular waste streams include, waste electrical and electronic equipment (WEEE), construction and demolition waste, end-of-life vehicles, clinical waste, packaging and packaging waste material, animal-by-product waste, hazardous waste, and food waste.

| <b>WASTE CLASSIFICATION</b>                              | <b>LEGISLATION</b>   |
|--|--|
| <b>1. Waste Electric and Electronic Equipment (WEEE)</b> | <p>Waste Electric and Electronic Equipment Waste (WEEE) is the fastest growing waste stream in developed countries, at about five times faster than other waste (Fedrigo, 2008). The WEEE industry in Europe is regulated under the WEEE Directive (2002/96/EC). The legislation is aimed at reducing the level of WEEE sent to landfill through recycling and re-use. The Directive sets out measures for the collection, treatment, recovery and recycling of all electrical and electronic products (Barba-Gutiérrez et al., 2008). Another legislation regulating WEEE, the Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC), introduces the control of substances used in the manufacture of electronic and electrical equipment. The legislation requires that hazardous substances posing less health and environmental risks during recycling and disposal be used in the manufacture of electrical and electronic equipment. Referred to as Information and Communication Technology (ICT), the organisation uses large quantities of computers and other information technology equipment.</p>  |
| <b>2. Construction waste</b>                             | <p>Construction waste is defined as solid contaminated waste resulting from the construction or demolition of buildings and other structures, including, but not limited to wood, plaster, metals, bricks, block and unsegregated concrete (Lund, 1993). The UK Government's Waste Strategy for England (2007) identifies the potential to increase resource efficiency in construction and reduce re-use and recycle waste. The UK Government's Waste Strategy for England (2007) identifies the potential to increase resource efficiency in construction and reduce, re-use and recycle waste. The construction industry is a major source of waste in England, using the highest tonnage of solid material resources than any other sector. The construction sector is also the largest generator of hazardous waste, yet by comparison, the sector only accounts for 9–10% of Gross Domestic Product (GDP) (DEFRA, 2003). Although the organisation undertakes building projects, waste is removed by contractors and, until now, is not included in reported waste arising. Site Waste Management Plans (SWMP) are being introduced in the organisation in order to comply with the SWMP Regulations (2008).</p> |

|  |  |
|--|--|
| <p><b>3. End-of-Life Vehicle</b></p>           | <p>The principle of extended producer responsibility (EPR) has been a policy paradigm behind the development of waste policies in the European Union, including the End-of- Life Vehicle (ELV) Directive (2000/53/EC), which was introduced in October 2000 and transposed into member states law by April 2002 (DEFRA, 2003) . According to CIWM (2008), the ELV Directive (2000/53/EC) requires member states to set waste prevention as a priority, reduce the use of hazardous substances in vehicle design, and ensure that ease of dismantling, re-use, recovery and recycling of end-of life vehicles is a priority during manufacturing. It also requires increased use of recycled materials in vehicle manufacture and sets targets and deadlines to achieve these requirements. The organisation owns and manages a fleet of about 5363 operating cars per year (excluding hire vehicles) and deals with a large number of confiscated cars. Disposal of waste oils, batteries and scrap vehicles are major waste issues. Vehicles in good condition are sold at auction.</p> |
| <p><b>4. Clinical Waste</b></p>                | <p>According to Mason (2008), clinical wastes include all waste that, unless made safe, could be hazardous to anyone who comes into contact with it. Such wastes consist wholly or partly of human or animal tissue, blood or other body fluids, excretions, drugs or other pharmaceutical products, and any other waste from medical, nursing, dental, veterinary, pharmaceutical or similar practices.</p> <p>Mason (2008) also states that clinical waste is regulated under several legal instruments and they include; duty of care regulations, hazardous waste regulations, environmental permits, pollution prevention permits, waste management licensing, animal by-products regulations and radioactive substances and wastes regulations. Forensic and clinical examinations are carried out by the organisation and seized illicit drugs are dealt with under the legislation.</p>  |
| <p><b>5. Packaging and Packaging Waste</b></p> | <p>The EU Council Directive (94/62/EC) on packaging and packaging waste came into force on the 20th December, 1994. It is a producer responsibility legislation that lays down essential requirements as to the composition, re-use, recovery and recycling of all packaging. It also sets increased recovery and recycling targets for 2008 packaging waste (CIWM, 2008). The organisation does not produce packaging waste but would need to comply with Packaging Waste Regulations (2007) if a lot of packaged goods are imported from abroad.</p>   |

|   |   |
|---|---|
| <p><b>6. Hazardous Waste</b></p>                  | <p>Hazardous waste is regulated under the Hazardous Waste Directive (91/689/EC) (Pocklington, 1997). It introduces licensing requirements for the handling and treatment of hazardous waste and points out specific waste materials as a consequence of their hazardous nature and potential impact upon human health and the environment. On the first of January 2002, a single list of hazardous wastes was established, adding 200 more to the original UK Special Waste Regulation (1980), SI1980/1709 list (CIWM, 2008). The organisation produces waste engine oils hazardous waste.</p>   |
| <p><b>7. Biodegradable waste (Food waste)</b></p> | <p>The organisation has restaurants at most of its head quarter buildings. In total, food waste in the UK is around 18 - 20 million tonnes per year, with household food waste making the single largest contribution of 6.7 million tonnes (WRAP, 2008). Retailers are believed to generate about 1.6 million tonnes of food waste, food manufacturers about 3.5 million tonnes, with food service and restaurants producing about another 3 million tonnes. According to WRAP (2008), the remainder comes from the agricultural and horticultural sector, including commercial food waste (from hospitals, schools, restaurants in companies). Biodegradable waste, including food, is regulated under the EU Landfill Directive (99/31/EC), which is implemented as the Landfill Regulations 2002 for England and Wales. It requires that biodegradable waste be diverted from landfill.</p> |

## **2.7 WASTE MANAGEMENT IN ORGANISATIONS**

Organisations are important because they deliver core services that are of major significance to society as a whole (Ferlie *et al.*, 1996). They have a major role to play in environmental protection, in line with the overall goal of sustainable development. Waste management is part of sustainability and, hence its importance. In particular, organisations have a pivotal role in meeting the Johannesburg goals (World Summit in Sustainable Development, 2002) on sustainable consumption and production, and corporate responsibility (DEFRA, 2004c).

Large organisations are particularly more adoptive of sustainability issues because they usually have to publicise their performance on environmental mindfulness in annual reports. In order to ensure public and stakeholders' confidence, they generally adopted environmental management as part of their overall business policy. Some have done so in informal ways, whilst some have embedded sustainability within their value chain. Environmental management systems (EMS) are one method that organisations have used to mainstream environmental protection. The Hong Kong and Shanghai Banking Corporation (HSBC) Limited is a typical example of a large organisation that has embedded environmental management into its operations (Green, 2007). Usually built on a "plan, do, check, act" model, an EMS is a set of management processes and procedures that allow an organisation to analyse, control and reduce the environmental impact of its operations and services to achieve cost savings, greater efficiency and streamlined regulatory compliance (Schaltegger *et al*, 2003).

The UK government sees corporate and social responsibility (CRS) as a tool for businesses moving beyond legal compliance and offering the potential to build mutually beneficial, socially responsible behaviour within communities (Ruddock, 2008). Ruddock (2008) further elaborates on the limited action taken by the government on CSR, which has so far been through the Company's act (2006). This introduces the concept of enlightened shareholder value and through the Pensions Act Amendment (2007), which introduces the requirement to state environmental, social and ethical issues considered in investments. In January 2006, DEFRA produced a set of environmental reporting guidelines to help companies identify and address their most significant environmental impacts (DEFRA, 2006). The guidelines outline how companies should set targets or key performance indicators (KPI) to measure environmental performance (Ruddock, 2008b).

Public organisations, such as the Metropolitan Police Service are usually very large complex organisations. There are several issues inherent in such large

organisations that impact on good waste management practices. According to Sharp (2002), they include; organisational structure, leadership, resources, communication, organisational processes (value chain) and organisational culture. These are discussed below.

### **2.7.1 Organisational Culture**

Organisations have their unique culture. According to Hofstede (1991), culture is usually defined as the collective programming of the mind, which distinguishes the members of one category of people from another. Management practices, leadership style, and human resource management tend to differ according to organisational culture. Culture impacts on the central organising principle of employers and employees' understanding of work, their approach to it, and the way in which they expect to be treated (Hofstede, 1991). When management practices are inconsistent with held values, employees are likely to feel dissatisfied, distracted, uncomfortable and uncommitted. As a result, employees may be less willing to perform well. This is important for waste management in organisations because having the commitment of employees (for example, a recycling scheme) determines success. It is also worth noting that employees' values about environmental issues (recycling in particular) at home have been found to influence their behaviour at work (Tudor *et al.*, 2007).

### **2.7.2 Leadership**

Different types of leadership styles prevail in organisations and their effectiveness differ according to the situation in which they are applied. For example, an authoritative style could be effective when there are rewards and punishment for non-performance. Where activities are voluntary, a participatory style may be effective. Most environmental programmes, like waste recycling, require voluntary participation and an authoritarian management style may not achieve the desired results. Stakeholders may not participate as much if, because of a non-participatory authoritarian leadership style, they do not feel part of a waste recycling program. According to Shrinberg (2002), other factors



such as diffuse decision-making and uncoordinated efforts, could also lead to waste program failure.

### **2.7.3Resources**

For any waste management program to succeed, resources have to be employed and effectively managed. For example, White *et al.* (1995), argue that parameters to consider in a waste management strategy, apart from considering if it is the best life-cycle environmental option, include investment, operating costs per tonne, capacity per year and operating experience. Dahle and Neumayer (2001) argue that lack of resources like storage space, finances and human resources could reduce support for environmental initiatives.

### **2.7.4Communication**

Understanding the communication process, often lost among the administrative concerns of waste programmes implementation, is central to the success of any waste management program. This is because waste management often requires participation of stakeholders. According to Lund (1993), the formulation of messages, the delivery style, the choice of media, and the follow up necessary to ensure consistency, requires good communication skills. Communicating environmental policies and procedures in organisations could also be affected by the prevailing management style. An autocratic management style creates a top-down communication approach and a participatory management style allows for a consultative communications approach. Participatory management style tends to be more effective in managing programmes that need voluntary commitment from people, such as recycling because every stakeholder is involved in decision making (Holbeche, 2001).

### **2.7.5Organisational processes**

The nature of organisational processes determines the area of focus in applying the waste hierarchy. A manufacturing organisation may focus on waste minimisation and a health organisation may focus on safe waste disposal. On

the other hand, a large organisation with large office-based operations such as the organisation of study may focus on office waste minimisation, re-use and recycling.

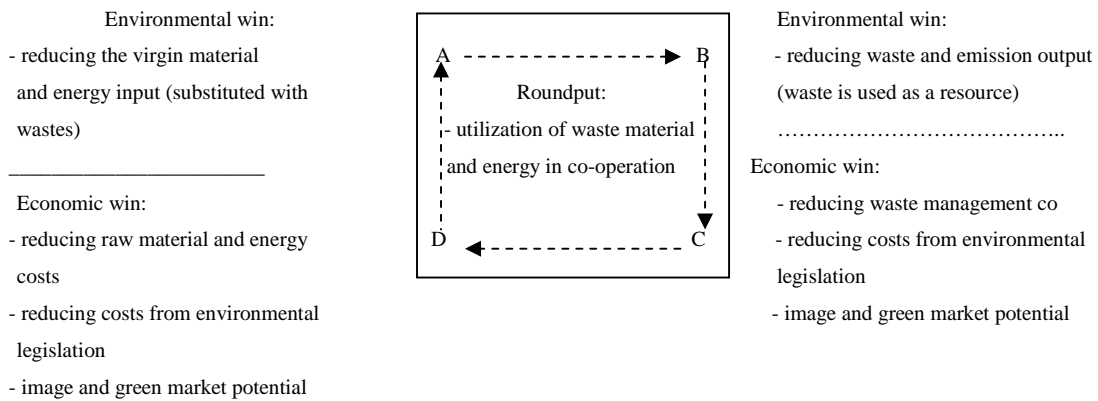
## **2.8 ORGANISATIONAL STRATEGIES FOR WASTE MANAGEMENT**

In order to manage waste effectively in organisations, an integrated approach is crucial. This is true for waste operators as well as waste producers. Organisations are increasingly more agile in managing their waste in order to contribute to environmental protection. One of the major concerns about dealing with environmental issues in organisations has been the associated costs versus gains.

### ***2.8.1 Strategies for managing waste amongst organisations***

Effective waste management requires the coordination of organisational functions throughout the internal and external supply chain (Hicks *et al.*, 2004). Below is a review of some of the external and internal strategies employed by organisations in managing waste.

*Industrial co-operative systems help organisations* reduce costs from waste management, emission control costs, raw material, energy, legislation, and by improving organisational image (Korhonen, 2002). Figure 1.2 illustrates how that is possible. Through co-operative waste and energy utilisation between the industrial actors A, B, C and D, the raw material and energy input, as well as the waste and emission output, of the system is reduced. The raw materials are substituted with waste.



**Figure 2.2** Example of environmental and economic wins in a vision of a successful industrial ecosystem (after Korhonen, 2002)

An example of industrial co-operation in the UK has been the launch of a material exchange programme for the East of England, developed by Norfolk County Council and referred to as the Eastex project (Howard, 2008). The Eastex scheme exploits the principle that one person's or company's waste is another's raw material. Organisations and individuals view and place adverts online about redundant stock and surplus raw material. Matches are then made, saving both party's significant time and money, not to mention the all-important factor of keeping those resources out of landfill.

**2.8.2 Strategies for managing waste within organisations.**

Organisations employ certain strategies to manage their waste arising. Environmental management systems, cost/benefit analysis, benchmarking, supply chain management, just-in-time supply management. The organisation employs environmental management systems and waste is managed under the system.

*Environmental management systems*

Environmental management systems (EMS) are major strategies employed by organisations in dealing with environmental issues. As stated earlier, an EMS is

a continual cycle of planning, implementing, reviewing, and improving the processes and actions that an organisation undertakes to meet its business and environmental goals (US EPA, 2007). According to Ruddock (2008), EMSs provide a way in which organisations deliver consistent and continuing management of environmental impacts of their activities. According to Sharp (2002), EMS include waste management system design for total quality management, which involves the integration of waste information and continuous improvement of minimum resource consumption, enabling sustainable waste management. Taking into account environmental regulations and sustainability, organisations (for example, HSBC Holdings Plc, BP Amoco and Barclays Plc and Cambridge University) do integrate waste management into their environmental management systems, as an important part of their business policy (Green, 2007).

#### *Cost /benefit analysis*

Cost /benefit analysis is one technique that attempts to set out and evaluate the social cost and benefit of an action (Worthington and Britton, 1997). The essential difference between cost/benefit analysis and ordinary investment appraisal methods used by organisations is the stress on social costs and benefits. The unit of account most commonly used is money, which means that value must be attached to environmental impact, resource usage, and in some instances, human life. According to Worthington and Britton (1997) placing a value on environmental impact allows ordinal ranking of preferences between having services and goods against maintaining the environment and reducing the use of scarce resources. For example, White (1995) argues that parameters to consider in a recycling waste management strategy, apart from considering if recycling is the best life-cycle environmental option, include investment, operating costs per tonne, capacity per year and operating experience.

#### *Benchmarking*

Benchmarking is another strategy used by organisations to support continuous improvement and gain a competitive advantage (Hull and Whalley, 1995). It is a

tool whereby, organisations compare their performance against other organisations of similar size or activities. The Financial Times Stock Exchange (FTSE) 350 and other large and private equity companies in the UK compare their performance on a range of environmental criteria, against each other in the Environmental Index (Vaux, 2008). The recent results show that organisations are showing leadership in environmental issues, particularly on waste management.

#### *Supply chain management*

Supply chain management is another strategy employed by organisations in managing waste, also referred to as “green supply chain”. Waste management is a strategic issue in the supply chain because companies seek to reduce costs by minimising all types of wastes (Hicks *et al.*, 2004). For example, the producer pays principle means that the producer of waste assumes responsibility for return logistics flow of products and packaging in a modern organisation. According to Hicks *et al* (2004), such scenarios create incentives for producers to recover the value in used goods and packaging, whilst minimising the packaging material content.

#### *Just-in-time management*

Sustainable supply chain management also encourages the adoption of just-in-time management techniques. The Japanese technique is a waste minimisation strategy. As described by the Institute of Quality Assurance (Scotchmer, 2004), only the amount of resources necessary at a particular time are ordered and supplied. It therefore requires proper supply planning and close working relationships with suppliers in order to ensure goods are delivered just in time for their use. It is an effective strategy for minimising waste when using perishable goods like food. With the huge environmental impact of food waste in generating methane from landfills just-in time management is an effective waste management strategy (WRAP, 2008).

### **2.8.3 Monitoring and control for continuous improvement**

Waste management information systems or operations need to be auditable in order to identify areas of improvement in reducing resource usage, increasing recycling and re-use, and improving waste disposal methods and compliance (White *et al.*, 1995).

Some practitioners assert that implementing environmental management systems, which waste management systems are part of, does not only make good environmental sense, but can be good for business as well as helping organisations cut costs, protect existing markets, secure new markets and help meet customer expectations of accountability and transparency (Ruddock, 2008). Therefore, these systems are not only strategies but are also meaningful tools for monitoring and control of waste management operations in organisations.

### **2.8.4 Communication**

Communication is another major tool in managing waste awareness in organisations, especially for continuous improvement. Due to the evolving nature of waste, flexibility should be a common feature for successful communication (Lund, 1993). Waste management programmes typically evolve due to changing waste streams and improvements in waste management techniques. This creates communication challenges that may severely impact participation rates. Understanding the communication process, often lost among the administrative concerns of waste programmes implementation is, therefore, central to the success of awareness programmes. According to Lund (1993), the formulation of messages, the delivery style, the choice of media, and the follow up necessary to ensure consistency, requires good communication skills. Due to office waste recycling and other waste minimisation programmes, the organisation is investing more resources into communication in order to raise waste awareness amongst staff.

## 2.9 DISCUSSION AND CONCLUSIONS

The literature shows that industrial waste is currently more regulated and the producer pays principle is more evidently applied. Waste is growing and is anticipated that the trend will continue due to population growth. The sustainability strategy is to reduce the rate at which waste grows and minimise the impact it has on human health and the environment.

The literature also shows that legislation to control industrial and commercial waste is tightening, waste disposal costs are increasing, and sustainable waste management is, therefore, being mainstreamed in organisations' value chain. The literature suggests a growing interest and commitment to sustainable waste management by organisations. Compliance with government legislation is emerging as the significant factor in driving organisations to take waste management and other environmental issues increasingly seriously.

Through environmental management systems, organisations are increasingly complying with waste legislation and positioning themselves better in the market. Organisations with large scale operations such as the organisation of study are adopting sustainable waste management practices, especially launching schemes to minimise, reuse and recycle waste. These programmes are new in organisations and yet untested.

Therefore, this research aimed at investigating the effectiveness of the strategies organisations employ to manage waste in a sustainable way. The study examined the effectiveness of office waste recycling programmes and the dissemination of information about office waste recycling in a public organisation. The aim was to provide independent insight into the organisation's office waste management programmes in order to improve the recycling schemes where possible.

1 **OFFICE WASTE MANAGEMENT WITHIN A PUBLIC SECTOR**  
2 **ORGANISATION**

3  
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27 **Key words:** office waste, recycling, waste awareness, waste strategy.

28

29 **Abstract**

30 Through air pollution from landfill, the increase in waste generation poses a local and  
31 global threat to the environment. The UK government recognises organisations'  
32 contribution to meeting raised targets for waste recycling. This research therefore,  
33 shows that organisational waste, associated with office operations is produced in  
34 large quantities and hence, very significant in contributing towards meeting national  
35 recycling targets. The paper addresses two key areas in managing organisational  
36 office waste for sustainable development within a public organisation. First, office  
37 waste recycling logistics were examined and secondly, the link between sustainable  
38 waste management practices such as recycling and the dissemination of information  
39 to participants about waste schemes and their ultimate success was investigated.  
40 Waste policies and implementation strategies were found to be the determinants of  
41 waste management program's effectiveness. Organisational policy and strategy were  
42 identified as drivers in mainstreaming effective waste management within an  
43 organisation, especially participation in recycling schemes and waste minimisation.  
44 Simultaneously, recycling levels and levels of waste awareness within an office  
45 showed a positive relationship. The results show that continuous waste awareness  
46 promotions are key to translating high awareness levels into action among recycling  
47 participants in the organisation. Overall, an expected reduction in waste destined for  
48 landfill was reciprocated by an increase in material collected for recycling. The  
49 implications for organisational policy making to ensure staff sustainable waste  
50 management behaviour in organisations are also explored.

51

52

53

### 54 **3.1 INTRODUCTION**

55

56 As recent as the 1980s, there was virtually no debate over the relationship between  
57 environmental practices and corporate performance (Tinsely and Pillai, 2006).  
58 According to Tinsely and Pillai (2006), the pursuit of environmental goals was seen  
59 as a violation of the acceptable duty of managers to shareholders. Lately,  
60 organisations bear an increasing responsibility, under immense social pressure and  
61 tightening government legislation, to become more sustainable in all aspects of their  
62 operations (Sheldon and Yoxon, 2002). Public organisations, such as local  
63 authorities also bear the responsibility to implement government legislation, which  
64 they pass on to local organisations and households. The focus is not only on  
65 traditionally polluting industries such as heavy industrial plants burning coal to  
66 produce energy, but on all organisation activities – large and small, commercial or  
67 industrial, private or public, and service or otherwise. Emissions from company  
68 installations, energy use in company operations, material usage and disposal are  
69 some of the major environmental challenges modern organisations are faced with. In  
70 recent years, corporate social responsibility and business ethics have moved up the  
71 priority list within organisations, in line with the rise of the profile of sustainability in  
72 the global environmental protection agenda.

73

74 This has created a need for organisations to put in place effective environmental  
75 management systems, within the framework of government legislation to ensure that  
76 their operations are sustainable. A robust waste management strategy is an integral  
77 part of such a system and, given that government legislation is relatively new and  
78 increasingly stringent in this area, most of the measures put in place are as yet not  
79 fully tested. Thorough investigation of the implementation and effectiveness of these  
80 measures in real organisations is vital to determine if the desired goal of  
81 sustainability is being achieved. In this regard, this research project aimed to:

- 82 1. Examine the office waste management strategy of a public organisation based  
83 in London, with a focus on recycling.

84 2. Assess employee awareness and buy-in of the strategy through an analysis of  
85 the dissemination procedures of waste issues to employees within the  
86 organisation.

87

### 88 **3.1.1 The public organisation**

89

90 The organisation studied here is a public non-profit making organisation set up by the  
91 UK government. An employer of 51 058 people, the organisation owns a large multi-  
92 site portfolio of 760 buildings spread over 32 boroughs. Building properties include  
93 multi-storey offices fitted with large cafeterias, car pounds and stables for horses.  
94 Waste from the organisation thus, includes:

95 - construction and demolition waste from building sites;

96 - clinical waste;

97 - animal by-product waste from horses;

98 - scrap vehicles;

99 - textile from uniforms;

100 - food waste from on-site restaurants;

101 - information and communications technology (ICT) from office and operations  
102 information technology;

103 - hazardous waste from car engines and clinical examinations;

104 - office waste paper and furniture;

105 - scrap metals; and

106 - general mixed waste from all sites.

107

108 Sitting under the Resource Directorate, Property Services incorporate the  
109 Environment and Sustainability Team. Within the Environment and Sustainability  
110 section, a dedicated team oversees office waste management in the organisation.

111 The organisation's environmental vision is to embed environmental issues within the  
112 decision making process. Within this environmental vision are three waste strategic  
113 objectives; *"to reduce the amount of paper consumed"*, *"to provide waste recycling*  
114 *facilities across the organisation and promote their use"*, and *"to minimise the*  
115 *generation of waste"*.

116

117 **3.1.2 Scope of the study**

118 This study's objectives were achieved through examining three key areas (waste  
119 hierarchy, strategic objectives and waste arising) within a public organisation. Each  
120 of these are discussed below.

121

122 *Waste hierarchy focus* - Waste management has been classified according to the  
123 best option of managing waste. According to the order of most preferred option, the  
124 classification is; prevent, minimise, re-use, recycle, recover and dispose. Based on  
125 the waste hierarchy, the study focused on recycling because a new untested scheme  
126 was being launched across the whole organisation. A recycling scheme has been  
127 launched in the organisation and its implementation and impact was examined. The  
128 research also focused on recycling based on the organisation's recycling key  
129 performance indicators (KPIs) (Table 1.1.1).

130

131 *Strategic objective focus* - The study focused on the first strategic objective within the  
132 organisation's environmental vision of providing waste recycling facilities across the  
133 estate and promoting the facilities use.

134

135 *Waste arising focus* - Given the organisation's varied waste arising, the study  
136 examined the organisation's office waste. ICT and furniture were excluded from the  
137 research in order to focus on waste with daily staff participation in recycling. This was  
138 also to enable the assessment of waste awareness among staff.

139 **3.2 METHODS AND PROCESSES**

140

141 **3.2.1 Methods**

142

143 The approach taken in carrying out the research was to investigate the office waste  
144 arising<sup>1</sup> across the sample sites over a period of five months prior to the launch of the  
145 recycling scheme. The data was collected from contractors' official records. These  
146 were then contrasted with waste data covering five months after the office waste  
147 recycling schemes were introduced. This was done to observe trends in waste  
148 arising, recycling rates, and waste sent to landfill in order to determine the overall  
149 impact of the recycling scheme.

150

151 Waste awareness at the selected sample sites with and those without recycling was  
152 determined through questionnaires. Two questionnaires were sent to sites with and  
153 without recycling in order to determine staff attitudes towards recycling and their  
154 general awareness of the scheme and overall waste issues.

155

156 The sample for the survey was randomly selected from two of the organisation's  
157 regions, North and South (Figure 2.1.1). Six sites were chosen from each region,  
158 three with and three without a recycling scheme. In order to achieve a confidence  
159 interval of 3 and a 95% confidence level, a minimum sample of 1045 (2.1%) (out of  
160 the entire population of 51091) was required, according to calculations performed  
161 using the Survey System software (2007, 2008). Questionnaires were sent by email  
162 to 3772 (7.4%) staff members based at the sample sites.

163

164 Contractors' managers and two customer service managers (CSMs) from each  
165 facilities management suppliers (waste contractors) were interviewed about the  
166 recycling scheme and their roles in promoting waste awareness within the  
167 organisation. The organisation's director of resilience, compliance and operational  
168 support (RCOS) and the head of environment and sustainability were also  
169 interviewed because they are ultimately responsible for the implementation of the  
170 waste strategy. Informal interviews were also conducted with staff members when

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<sup>1</sup> Waste measures are presented in tonnes.

171 visiting sites for personal observation because they are the ultimate recyclers of the  
172 office waste. The organisation's waste management strategy was also analysed in  
173 order to examine the effectiveness of its implementation.

174

### 175 **3.2.2 Waste Flow within the organisation**

176

#### 177 ***Organisational and Waste Management Structure***

178 The local authority provides strategic direction, including setting environmental  
179 targets for organisations under its auspices. The organisation in this study reports to  
180 the local authority. The Director of Resources, who is also the organisation's  
181 Environmental Champion, chairs the Environmental Strategy Steering Group (ESSG)  
182 and owns the Environmental Strategy at the organisation's Management Board level.  
183 This management structure is necessary to understand the nature of the  
184 organisation's senior level source of environmental management, management  
185 strategies and reporting obligations leadership.

186 The organisation's resource directorate also heads the facilities management  
187 department. Under the facilities management are the health and safety/ compliance  
188 department, energy management department, the operations department, and the  
189 environment and sustainability department. The management of waste is under the  
190 environment and sustainability team. Responsibility for waste management is shared  
191 between facilities management and the environment and sustainability team.  
192 Facilities managers (FMs) are based in the each of the 32 boroughs and each have  
193 waste management responsibilities for their borough.

194

195 With an average of 9022 tonnes per year, office waste management operations are  
196 contracted out to two facilities management suppliers (FMS). The organisation's  
197 estate is divided into two, referred to as North and South. Each FMS deals with  
198 waste in the whole of each region. Both suppliers have similar terms and mandates  
199 in the waste management contracts. For example, they both have to achieve the  
200 organisation's recycling rate of 45% by 2010. Customer Service Managers (CSMs)  
201 manage the contract for the contractors and report to their Contract managers. The  
202 CSMs also ensure that waste is collected and managed properly by sub-contractors.

203 The FMS also provide cleaning services to the estate. Cleaners<sup>2</sup> are responsible for  
204 taking the recycled and mixed waste to outside bins for collection. The FMS are  
205 responsible for waste collection, treatment and disposal. Another consultant  
206 contractor audits the FMS waste activities on behalf of the organisation. The audit  
207 results are then presented to the organisation. Some of the office cleaning, waste  
208 collection, treatment and disposal are contracted out by the two FMS to other  
209 companies. The organisation's staff report contractor's waste management service  
210 failures to the organisation's property information centre (MPIC), who then contact  
211 the contractor for remedial action to be taken. For example, if bins were not emptied  
212 or waste was not collected at a particular site. The organisation's FMS waste  
213 management contracts structure therefore, has two aspects (Figure 3.1.1).

214

215 Office waste in the organisation is recycled by the employees who have facilities in  
216 place in their offices. Before the recycling scheme launch at a site, both the  
217 organisation and the contractor undertake waste awareness campaigns. First, the  
218 contractor conducts a site audit in order to determine bin location areas and the total  
219 number of bins needed for the site. Waste recycling promotion leaflets are then sent  
220 out to staff at the site via e-mail about one month before the recycling scheme launch  
221 date. The leaflets contain information about what waste to put in the recycling bins  
222 and the general waste bins, when the scheme will launch, where the bins will be  
223 placed, and that the small bins will be removed on the day. A blue recycling bin with  
224 clear plastic lining is for paper, steel and aluminium cans and plastic bottles.  
225 Cardboard is also recycled by flattening and putting next to the mixed waste bin in  
226 the office. Confidential paper is recycled by putting into special paper bags to be  
227 taken away separately for secure shredding. Glass recycling bins are put in  
228 restaurant areas and staff have to take their bottles to the restaurant for recycling.  
229 The mixed waste grey bin is for all other wastes. Two bins, with posters explaining  
230 what waste to recycle, are placed at strategic points in office areas and at no more  
231 than twenty steps away from work stations or working desks. The small under-desk  
232 bins are removed the same day when the recycling scheme is launched. Cleaners  
233 remove the bins in the evening of the launch day when they come into the offices to

---

<sup>2</sup> Cleaners are employed by the facilities management suppliers (waste contractors).

234 do their routine cleaning work. Cleaners empty the mixed waste bins everyday and  
235 the recycling bins as required.

236

237 Employees are also given desk tidys to put on their desks to keep paper for re-use in  
238 order to minimise waste paper. Unlike the recycling bins, the desk tidys are optional  
239 and are emptied into the recycling bins by staff.

240

241 The organisation's office waste is generally composed of paper, plastic bottles,  
242 aluminium cans, bottles, kitchen paper, pencils, pens, food wraps, ICT, furniture,  
243 cartridges, toners, food, polystyrene cups, and other small amounts of mixed wastes.  
244 Food, ICT and furniture are excluded from this study.

245

246

## 247 **3.3 RESULTS AND DISCUSSION**

248

### 249 **3.3.1 Analysis**

250

251 Table 3.1.1 summarises the responses from the questionnaire sent out to staff with  
252 the total number of respondents to each question expressed as a percentage. The  
253 same method was, likewise, applied to the questionnaire results from sites without a  
254 recycling scheme. These results are summarised in Table 3.1.2. A summary of the  
255 results discussed is presented in Figure 3.1.2.

256

#### 257 **3.3.1.1 Level of waste awareness**

258 The results from the study show that the level of waste awareness was high from all  
259 sites. Table 3.1.1 and Figure 3.1.2 show that 70.9% of staff recycle all the time and  
260 23.9% recycle sometimes. 84.2% expressed awareness of environmental issues. On  
261 the other hand, staff from sites without recycling also showed high levels of waste  
262 awareness. As much as 99.1% of staff indicated that they would like to recycle while  
263 87.3% had awareness of environmental issues (Table 3.1.3). This means that level of  
264 waste awareness is high across the organisation, including sites without a recycling  
265 scheme. Waste promotion campaigns in the organisation could be tailored to the  
266 needs of people who are already aware of issues surrounding waste.

267



268 The results are in line with a recent environment attitudes survey carried out at the  
269 organisation's environment open day to determine staff attitudes to waste and other  
270 environmental issues. The survey results showed that 80.7% of staff have high levels  
271 of waste awareness and they are concerned about how waste is managed  
272 (Environment Advisor, *pers. comm*). A study by Barr *et al* (2004) also found that  
273 recycling was the most adopted environmental behaviour by people in their homes,  
274 which could explain the high levels of recycling awareness in the organisation. The  
275 implications of these results derive from research that has associated attitudes with  
276 recycling schemes success. Tonglet *et al* (2004) suggest that recycling attitudes are  
277 the major determinants of recycling behaviour. They also suggest that recycling  
278 behaviour is influenced by having appropriate opportunities, facilities and knowledge  
279 to recycle. Therefore, recycling success depends on both logistics and attitudes. An  
280 organisation could have a good logistics system for waste management in place, but  
281 it would not do much to achieve recycling targets without changing attitudes and vice  
282 versa.

283

#### 284 **3.3.1.2 Recycling actions and awareness**

285 The results also demonstrate that, not only are employees aware of waste, but they  
286 want to turn that into action. It can be seen in Table 3.1.2 that 91.82% of employees  
287 view recycling as *very important* and 99.1% would actually like to recycle at work.  
288 More would like to recycle, including those who view recycling as *quite important*.  
289 This is significant in that the results are from sites without recycling. This means that  
290 the launch of a recycling scheme would be welcome and staff participation would, at  
291 least, be in line with these results. The indicated 99.1% interest in participation rate  
292 would be ideal for any recycling scheme.

293

294 On the other hand, according to a recent waste and resource action programme  
295 (WRAP) research, a high level of waste awareness does not necessarily translate  
296 into action (WRAP, 2008). The research found four main barriers that stop people  
297 recycling, and more significant barriers that prevented them recycling as much as  
298 they could.

299 Significantly, for current recyclers (94% of the sample), the study found that the  
300 barriers are:

301 1. Situational barriers – 52% of current recyclers said they would recycle more  
302 if they had collections of a wider range of materials.

303 2. Behavioural barriers – 48% of current recyclers still binned things because  
304 they were not sure they could be recycled.

305 3. Knowledge and understanding – less than half the sample (48%)  
306 understood ‘very well’ what they were supposed to use their recycling  
307 containers for.

308 4. Attitudes – 86% of recyclers would be encouraged to recycle more by  
309 seeing the practical impact of their recycling in their local area.

310 WRAP (2008) found that very different messages and actions are needed by local  
311 authorities to overcome these barriers. These include: improving recycling collection  
312 services, providing better information and practical advice on how to use the service,  
313 and showing why taking part is worthwhile. Only by addressing these barriers would  
314 people recycle more things more often. The research emphasizes the link between  
315 good communication about recycling service and reliable recycling logistics, which  
316 would help local authorities boost their own recycling rates and build on their existing  
317 successes

318

319 The research findings are significant in answering the question of how to turn waste  
320 awareness to action and they show that waste awareness does not necessarily  
321 translate to proportionate action. This organisation and other organisations could  
322 utilise the findings to manage and increase their office waste recycling rates.

323

### 324 **3.3.1.3 Organisation’s contribution to awareness**

325 The research results also show that not all the staff awareness can be attributed to  
326 the organisation’s waste awareness campaigns. The results show that 87.3 % of  
327 staff from sites without direct waste promotions or a recycling scheme are already  
328 aware of waste and other environmental issues (Table 3.1.2). The reason for this is

329 evident, as 90% of them have received promotional material from their local  
330 authority.

331

332 On the other hand, 35.9% of those from sites with recycling stated that the work  
333 recycling scheme and its promotion has contributed to their waste awareness. This  
334 figure is significant in that it suggests that the organisation's waste promotions  
335 contribute reasonably significantly towards staff waste awareness, considering that  
336 87.3% of staff are already aware of waste issues.

337

338 The implications could be that the organisation and other organisations should tap  
339 into the staff awareness and maximise benefits. Organisations could do that by  
340 providing recycling facilities and keeping up promotions in order to translate the  
341 waste awareness into recycling action at work.

342

#### 343 **3.3.1.4 Overall waste arising, recycling, landfill relationships**

344 The research shows that waste arising has been steadily falling and waste recycling  
345 rates increasing in the organisation. The data presented in Figure 3.1.3 show these  
346 trends over the past four years. Waste arising shows a sharp decrease from  
347 2006/2007 when the office waste recycling scheme was launched. This suggests that  
348 waste minimisation became more effective with the introduction of the recycling  
349 scheme. This is also because waste awareness campaigns were launched with the  
350 recycling scheme to minimise and re-use office resources.

351

352 This result is significant in that it shows evidence of the benefits that could be  
353 realised with introducing a recycling scheme in an organisation. A reduction in waste  
354 arising and increase in recycling rates lead to waste diversion from landfill and  
355 therefore, reduced landfill costs.

356

357 The results also show that a sharp decrease in landfill waste attended the  
358 introduction of recycling (Figure 3.1.4). The observed 50% reduction of landfill waste  
359 at a specific site is significant in that it shows evidence of the benefits that could  
360 accrue with introducing a recycling scheme in an organisation. Diversion of waste

361 from landfill leads to reduced landfill costs and, with the added benefit of income from  
362 recyclables, is meaningful for sustainable waste management. However, there was  
363 no observed significant reduction in total waste arising in response to recycling within  
364 the period investigated. This differs from the overall trend (Figure 3.1.3) because it  
365 excludes furniture and ICT, which is reused in large quantities in the organisation.  
366 This demonstrates that less and less waste will be sent to landfill when resource  
367 minimisation and re-use are significantly mainstreamed in the organisation. The  
368 results also demonstrate the possible value of organisational waste management in  
369 line with the waste hierarchy. Figure 3.1.4 could also assist in determining each site  
370 performance over time for targeted waste awareness promotion efforts.

371

### 372 **3.3.1.5 Contract management and recycling**

373 The results from the research also show that waste contract management is  
374 important in achieving and maintaining good levels of waste recycling. The results  
375 show that the organisation's employees are concerned about how the waste  
376 recycling scheme is managed. Table 3.1.2 shows that 56% of staff are happy with  
377 how the recycling scheme is managed. Since employees notice how the scheme is  
378 managed, this suggests that the recycling scheme management has an impact in  
379 motivating them to recycle or not. The office waste contractors therefore, are in a  
380 crucial position to enhance recycling action amongst staff.

381

382 Contractors also have more frequent contact with employees because their staff  
383 clean offices on a daily basis, and they empty the recycling bins to the outside bins to  
384 be collected. For example, some employees expressed concern because they have  
385 seen cleaners putting recycled waste in mixed waste bags and taking them outside  
386 for collection. Though this is seemingly not prevalent (0 – 10% recycled waste  
387 contamination rates), such occurrences could make staff decide that there is little  
388 point in recycling because the waste ends up as mixed waste anyway.

389

390 These results suggest that contractors have a big indirect influence on staff  
391 perception and motivation to recycle, and the organisation should ensure that they  
392 handle that responsibility with diligence. The contractors could therefore, train their

393 cleaning staff to properly carry out their office waste responsibilities. Waste aware  
394 cleaning staff will also contribute towards minimal recycled waste contamination  
395 levels through ensuring recycled and segregated waste is not mixed.

396

### 397 **3.3.1.6 Media preferences**

398 The results from both regions show that employees have preferences for the  
399 communication media used to relay messages about waste. Tables 3.1.1 and 3.1.2  
400 show that most of the staff prefer wall posters and e-mails to the intranet and  
401 magazines. The results also reveal that 66.8% and 51.4% of staff from sites with  
402 recycling scheme prefer posters and emails, respectively. The preference for the  
403 same media from sites without recycling is 63.3% and 74.6%.

404

405 The implication of these results is that the organisation should be aware of media  
406 preferences and use the most preferred media more intensively in order to achieve  
407 maximum results when promoting waste issues. Other preferences such as pictures  
408 in promotion material could be considered because 85.8% and 80% of staff  
409 expressed preference for a mixture words and pictures (Tables 3.1.2 and 3.1.3). The  
410 results in Table 3.1.2 also show that 40.9% of staff from recycling sites know where  
411 to find information about waste and most of them are from the two sites with recycling  
412 or waste representatives. This suggests that a nominated waste representative at a  
413 site could have major positive impact in keeping staff awareness high. The  
414 organisation could introduce waste representative nomination at sites as standard  
415 procedure. These results suggest that employees are more likely to notice messages  
416 if the preferred media is used and the impact of the intended message may be  
417 greater than if the least preferred medium were used.

418

419

### 420 **3.3.1.7 Waste strategy and its effectiveness**

421 The research also examined the organisation's waste strategy in order to determine  
422 the effectiveness of its implementation. The organisation has adopted a typical  
423 Environmental Management System (EMS) approach in phasing in its sustainable  
424 waste management programmes. The staggered "plan, do, review, implement" cycle

425 is an EMS approach, which evidently works well in implementing a sustainable  
426 system of waste management, especially in a large multi-site organisation. The  
427 introduction of a waste management system integral to the organisation's core  
428 activities seems to be an effective way of managing and minimising environmental  
429 risk, minimising resource use, and allocating responsibility for achieving results. This  
430 approach is used in implementing EMS (Tinsley and Pillai, 2006). A Waste  
431 Management System (WMS) could be the term for the approach. The system is  
432 designed to allow for the measurement of waste management performance and to  
433 make sustainable waste management part of daily operational activities. The  
434 organisation's environmental and waste strategy is illustrated in four key stages of  
435 the achievement of environmental or waste objectives (Figure 3.1.5).

436

437 Figure 3.1.5 outlines the organisation's strategy for environmental management,  
438 including waste management and also illustrates the staggered approach. The  
439 timescales are not restricted and the stages overlap and are sometimes run  
440 concurrently. The strategy is similar to the "involve, agree, implement" approach in  
441 that it involves stakeholders in implementation and decision-making. It therefore,  
442 needs much less selling and implementation meets less resistance (Walker, 2006).  
443 The organisation has adopted this approach in realising the four stages of  
444 embedding sustainable waste management practices across the estate. Figure 3.1.6  
445 provides an example of how responsibility for achieving results is allocated and  
446 followed through for continuous improvement.

447

448 Under the system, sustainable waste programmes aimed at reducing, reusing and  
449 recycling waste are introduced at the same time, but the intensity is staggered. The  
450 staggered intensity approach allows for the effective mainstreaming and efficient use  
451 of resources. The organisation has introduced waste resource minimisation, re-use,  
452 waste awareness and waste recycling at the same time. More resources are initially  
453 being targeted at recycling until the recycling scheme has been launched across the  
454 largest sites of the whole estate. This is estimated to take about one year. After that,  
455 more resources will be focused at promoting awareness of waste recycling, reuse  
456 and minimisation.

457

458 The strategy was found to be effective, especially for the long term because it  
459 ensures that the waste hierarchy preferred sustainable waste management is  
460 eventually adopted in its order of priority. The dedicated team approach employed by  
461 the organisation was also found to be effective in ensuring that waste and other  
462 environmental strategic goals are realised and mainstreamed within the organisation  
463 because it provides dedicated and focused effort.

464

465 In summary, the main findings from the study show that; waste awareness is quite  
466 high across all sample sites, employees are eager to turn their waste awareness into  
467 action, and not all the awareness levels can be directly attributed to the  
468 organisation's activities. Staff also indicated preferences for media types and that  
469 could affect the effectiveness of waste promotion programs. Recycling currently has  
470 an inverse relationship with waste sent to landfill in the organisation and the  
471 organisation's waste strategy is currently effective in achieving recycling goals and  
472 objectives. The results also show that waste contract management is important to  
473 staff perception of the recycling scheme and could affect their recycling actions.

474

475 Therefore, public and private organisations can draw from this public organisation's  
476 recycling and waste awareness successes and challenges and make their office  
477 waste management more effective. The waste and associated costs reduction  
478 benefits are evident (Figure 3.1.3/ 4) and the waste awareness challenges can be  
479 managed. According to Hicks et al (2003), companies in which environmental and  
480 waste management pervade all functions are most likely to be effective at minimising  
481 waste and maximising their competitive position. Awareness has been found to be  
482 critical in managing programs such as recycling because it directly impacts on  
483 recycling rates, waste contamination levels, and the success of other waste hierarchy  
484 management programs. As Oepen and Hamacher (2000) state, waste promotion  
485 programmes should also elaborate how environmental change can be positive and  
486 beneficial for the people today, as well as for the future<sup>3</sup>.

487

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<sup>3</sup> The organisation's waste promotion leaflets already state what happens to waste and what is made from the recycled waste.

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### **3.3.2 Limitations of the study**

The study had the following potential limitations;

- The sample sites were chosen from the North and South regions, which are managed by different contractors with different recycling rates, but the waste management contracts are similar.
- Since the organisation is very large, the sample size may restrict the extent to which the findings can be generalised throughout the organisation or the whole sector. More surveys could be done to determine the extent to which the results are representative
- The extent to which levels of awareness on issues of nationwide multi-source promotions like waste can be attributed to one source is not clear. Ninety percent of staff from sites without recycling have already received information about recycling from their local authority and therefore will already be waste aware by the time the organisation promotes and launch the recycling scheme.
- The way the questions were presented in the questionnaires could have biased the responses received from staff as they could have suggested certain responses. This was mitigated by providing an option for any other response not in the list of optional answers presented.



509 **3.4 CONCLUSIONS AND FUTURE CONSIDERATIONS**

510

511 **3.4.1 Conclusion**

512

513 The aim of the study was to review a public sector organisation's office waste  
514 recycling strategy and to assess the level of waste awareness in the organisation.

515 The results show that office waste management is better approached with a long-  
516 term view, as opposed to short-term solutions. The organisation's staggered  
517 approach in intensity of office waste management programs seems to be a good  
518 approach. First, ensure a well-promoted effective recycling scheme is in place in  
519 order to manage current waste arising in a sustainable way. Thereafter, invest more  
520 resources in waste minimisation and awareness. This would ensure effective use of  
521 limited resources in organisations.

522

523 As a large organisation, it has adopted and is embedding sustainable waste  
524 management practices (recycling, minimisation and re-use) into its systems. A big  
525 positive impact on the environment would be realised if organisations (public or  
526 private) could do their part in adopting sustainable waste management practices.

527

528 With the aim of analysing the delivery of the waste strategy, regarding recycling and  
529 waste awareness dissemination, the key conclusions of the research are;

530 - The organisation produced 9022.66 tonnes of office waste (excluding ICT and  
531 furniture) in the last financial year and 35.82% of it was recycled. This is an  
532 improved rate on the previous year where 27% of office waste was recycled.  
533 The target is to reach 45% by 2010 and is currently on course to meet the  
534 target.

535 - Through the staggered approach to waste strategy implementation, the  
536 organisation will intensify waste awareness when the recycling scheme is fully  
537 launched in the big sites across the estate in order to minimise waste and  
538 increase recycling rates and in line with its environment strategy  
539 (Figure 3.1.5). Waste minimisation is evidently the best option in ultimately  
540 reducing costs and use of natural resources, as recycling has associated  
541 management and treatment costs. The 'reduce, re-use and recycle' waste  
542 hierarchy order is being increasingly realised through the full implementation

543 of the waste strategy. The dedicated waste and environmental team approach  
544 was found to be also effective in realising the organisation's waste strategy  
545 and other organisations could adopt the approach.

546 - Waste management is both a logistics and attitudes issue. These are  
547 interdependent and essential for effective waste management. The results  
548 support this in that 91% of staff are aware of recycling and would like to  
549 recycle more. This is in line with the 99% who always recycle at work. Without  
550 staff positive attitudes towards recycling, the facilities would not be utilised.

551 - Tailored effective communication strategies are necessary for the success of  
552 waste programs, such as recycling. The results show that staff have specific  
553 preferences for modes of communication. The waste awareness team's main  
554 mode of communicating (the intranet) is not the option most favoured by staff.  
555 An estimated increase from 10.9% to 40% (4 times) of staff knowledge of  
556 where to find waste information was observed. A communication media  
557 preference exists among staff and increased use of the favoured media could  
558 improve on the current waste information knowledge levels.

559

### 560 **3.4.2 Recommendations and future work**

561

562 The results show that communication is an essential element of a successful waste  
563 management and recycling scheme. Therefore, the following recommendations are  
564 suggested;

#### 565 ***Waste management***

566 - Although the facilities managers are responsible for waste issues in each  
567 borough, the questionnaire results reveal that people prefer to have someone  
568 visible on site responsible for waste issues. The organisation should therefore  
569 nominate a designated person responsible for waste in each building or site,  
570 possibly nominated by employees in that building.

571 - Contractors could be encouraged to use more refuse collection vehicles that  
572 weigh waste bins when emptying them in order to provide more precise figures  
573 of the amount of collected waste per site. Some of the vehicles do not have  
574 facilities to weigh bins as they empty them and therefore do not record precise

575 amount of waste collected. This would give precise figures for waste arising  
576 and recycling rates per site so that waste promotions are targeted and  
577 tailored.

578 - Printers and photocopiers should be permanently set at double side printing  
579 and photocopying default in order to minimise waste paper<sup>4</sup>.

580 - Figure 3.1.4 could be adopted as model for determining each site's recycling  
581 performance over specific periods of time in order to target waste awareness  
582 promotion resources.

### 583 **Communication**

584 - Clear responsibilities should be set to decide who is ultimately responsible for  
585 each aspect of the awareness campaigns, especially after the scheme has  
586 been launched. Currently, both the organisation and the contractors do the  
587 campaigns without specific formal roles. Improved communication between  
588 the organisation and the contractors is necessary in order to better co-ordinate  
589 awareness campaigns and to present a united front to stakeholders

590 - Cleaners (who are employed by contractors) should be trained about waste  
591 issues in order to minimise recycled waste contamination. Anecdotal evidence  
592 shows that staff have seen cleaners mixing recycled waste with mixed waste  
593 at some sites. This could discourage staff from recycling.

594 - In addition to current posters and other promotions, communication could be  
595 enhanced through posters on boards and leaflets at congregating areas such  
596 as restaurants and other sitting lounges.

597 - Leaflets could be made more comprehensive to include non-standard wastes  
598 such as mobile phones, batteries, cartridges, toners, glass and textile. Staff  
599 showed a lack of awareness of the availability of recycling facilities of these  
600 wastes when asked what other waste they would like to be able to recycle at  
601 work.

602 - Continuous waste awareness campaigns could be introduced even at sites  
603 where the recycling scheme has already launched in order to increase  
604 recycling rates and minimize contamination levels. Currently, waste

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<sup>4</sup> The intranet is currently used to give guidance on how to print both sides and it is the organisation's policy to buy new equipment that print/photocopy both sides of paper.

605 awareness campaigns are carried out on sites only on or prior to recycling  
606 launch and yearly environment open days.

607 - 90% of staff from sites without recycling have already received information  
608 about recycling from their local authority, 93% already recycle at home, and  
609 99% of them would like to recycle at work as well. Organisations could tap into  
610 that awareness and launch successful office waste recycling schemes and  
611 hence contribute to environmentally sustainable activities in their operations.

612

613 - Further research could be carried out to determine the extent to which staff  
614 recycle certain wastes more than others (capture rate) versus the high levels  
615 of waste awareness and recycling found in this study. How much recyclables  
616 end up in mixed waste bins would indicate the capture rate.

617

618

619

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## TABLES

**Table 3.1.1 Waste Key Performance Indicators (KPIs)**

| Objectives 05 - 10  | Actions/Targets 08/09   | KPI's   |
|---|---|---|
| Provide waste recycling facilities across the organisation and promote their use. | Increase recycling levels to 40% for office wastes (all general waste and confidential waste) across the MPS estate.                            | 40% recycling level achieved for office wastes across the organisation.                                       |
|   | Increase recycling levels to 35% for general waste (excluding confidential waste and hazardous waste) across the North of the estate.           | 35% recycling level achieved for general waste in the North.  |
|   | Increase recycling levels to 45% for general waste (excluding confidential waste and hazardous waste) across the South of the estate.           | 45% recycling level achieved for general waste in the South.  |
|   | Work with the Facilities Management Suppliers to publish a Sustainable Waste Management Plan (SWMP) for both the North and South of the estate. | SWMP published for the North and South of the estate.   |
|   | Complete a feasibility study to identify the most sustainable waste disposal option arising from the decommissioning of radio sites.            | Feasibility study complete and most sustainable option identified.  |
|   | Monitor the levels of recycling, reuse and resale of ICT hardware.  | Reported percentage of ICT hardware recycled and reused.  |
|   | Implement a disposal route for obsolete telephony equipment.  | Telephony disposal route implemented and communicated across the MPS. Levels of recycling and reuse reported. |

**Table 3.1.2 – Questionnaire percentage responses from sites with recycling**

| Question theme  | Responses % |       |       |       |
|---|-------------|-------|-------|-------|
|   | A / yes     | B/ no | C     | D     |
| 1. Usage of work recycling facilities                   | 70.85       | 23.89 | 3.64  | 0.81  |
| 2. Scheme adequate                                      | 66.80       | 31.98 |       |       |
| 3. More wastes to recycle                               | 44.53       | 53.04 |       |       |
| 4. Scheme well managed                                  | 56.28       | 38.87 |       |       |
| 5. If not well managed, why                             | 11.74       | 16.19 | 3.24  | 11.34 |
| 6. Importance of recycling                              | 83.40       | 14.17 | 1.21  |       |
| 7. How to increase recycling levels                     | 55.87       | 41.30 | 24.29 |       |
| 1. Aware of what and how to recycle at work             | 93.93       | 4.86  |       |       |
| 2. Did you receive Information before scheme launch     | 75.30       | 19.03 |       |       |
| 3. If yes, was information clear and easy to understand | 68.83       | 6.88  |       |       |
| 4. If not clear, why                                    | 1.62        | 2.43  |       |       |
| 5. Do you know where to find information about waste    | 40.49       | 57.89 |       |       |
| 6. If yes, where would you look for it                  |             |       |       |       |
| 7. Which info would you like to receive                 | 37.65       | 10.53 | 9.31  | 36.44 |
| 8. Type of training preferred                           | 6.88        | 5.67  |       |       |
| 9. Preferred communicating methods                      | 66.80       | 38.87 | 6.88  | 51.42 |
| 10. Clearer message image                               | 3.64        | 9.7   | 85.83 |       |
| 11. Has work scheme contributed to your waste awareness | 11.34       | 20.24 | 84.21 | 10.93 |
|   |             |       |       |       |

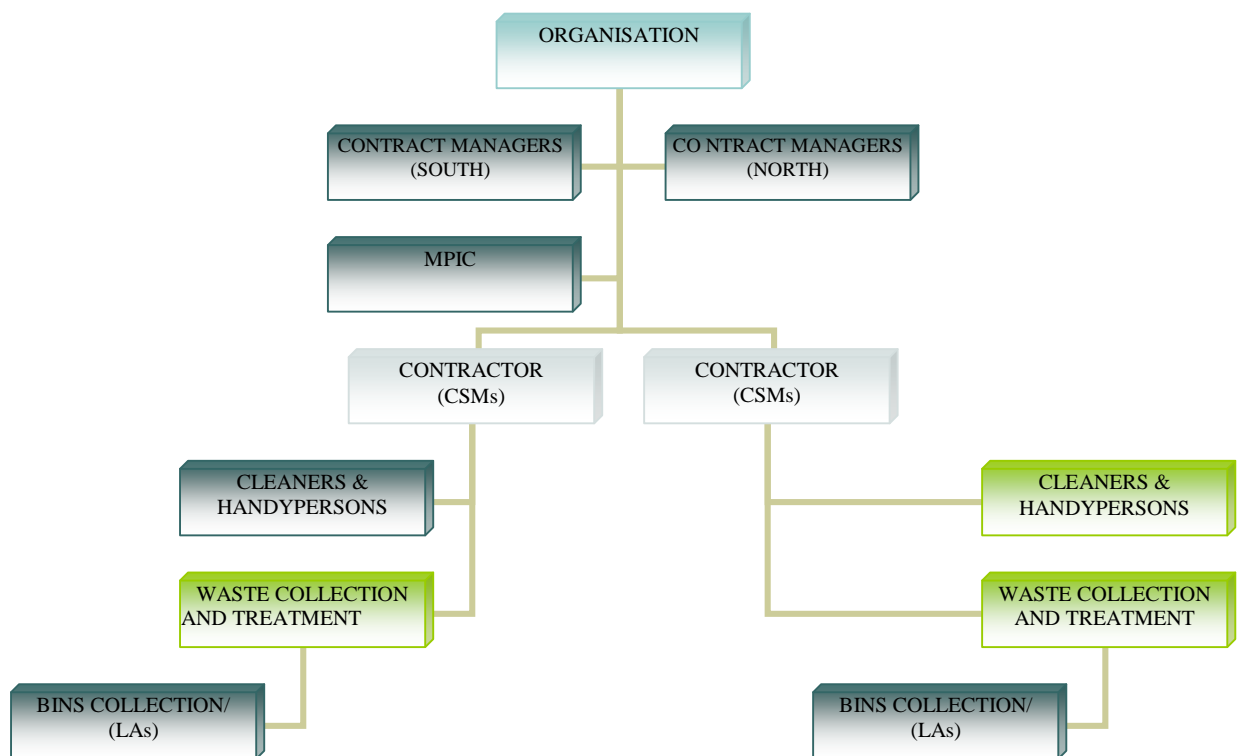
**Table 3.1.3** – Questionnaire percentage responses from sites without recycling

| Question theme                                       | Responses % |       |       |       |
|--|-------------|-------|-------|-------|
|  | A / yes     | B/ no | C     | D     |
| 1. Would like to recycle                             | 99.09       | 1.81  |       |       |
| 2. Any specific waste                                | 90.91       | 8.18  |       |       |
| 3. If recycling, what is important                   | 68.18       | 20.91 | 23.64 | 50.91 |
| 4. Importance of recycling                           | 91.82       | 8.18  | 0.91  |       |
| 5. Recycling could be made effective by              | 39.10       | 36.36 | 32.73 |       |
| 1. Recycle at home                                   | 98.18       | 1.82  |       |       |
| 2. Any information from local council                | 90          | 10    |       |       |
| 3. Information clear and easy to understand          | 84.55       | 5.45  |       |       |
| 4. If not, why                                       | 2.73        | 1.82  | 1.82  |       |
| 5. Do you know where to find information about waste | 10.90       | 89.09 |       |       |
| 6. If Y, where would you look for it                 |             |       |       |       |
| 7. Which info would you like to receive              | 62.73       | 27.27 | 8.18  |       |
| 8. Preferred training method                         | 11.82       | 23.64 | 0.91  |       |
| 9. Two preferred communication methods               | 63.64       | 37.27 | 5.45  | 74.55 |
| 10. Clearer message and symbol                       | 8.18        | 14.55 | 80    |       |
| 11. Awareness of other environmental issues          | 87.27       | 11.82 |       |       |
|  |             |       |       |       |

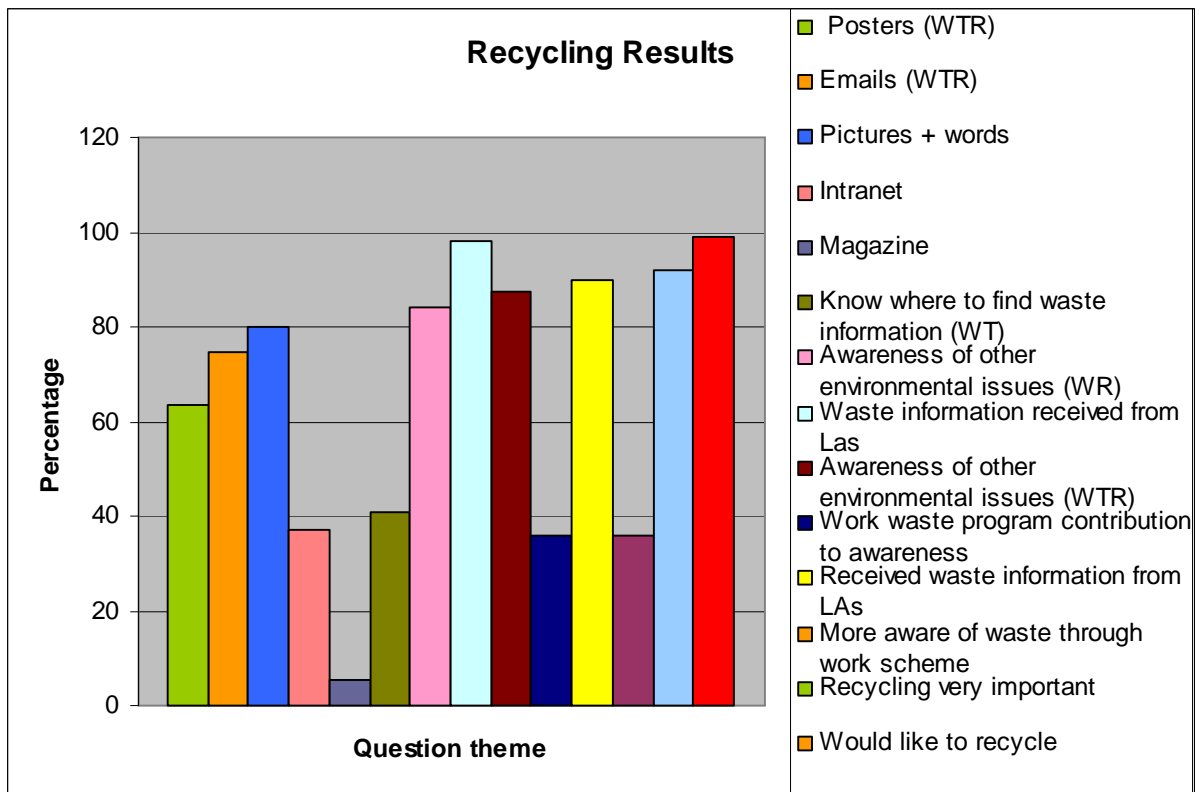


## FIGURES

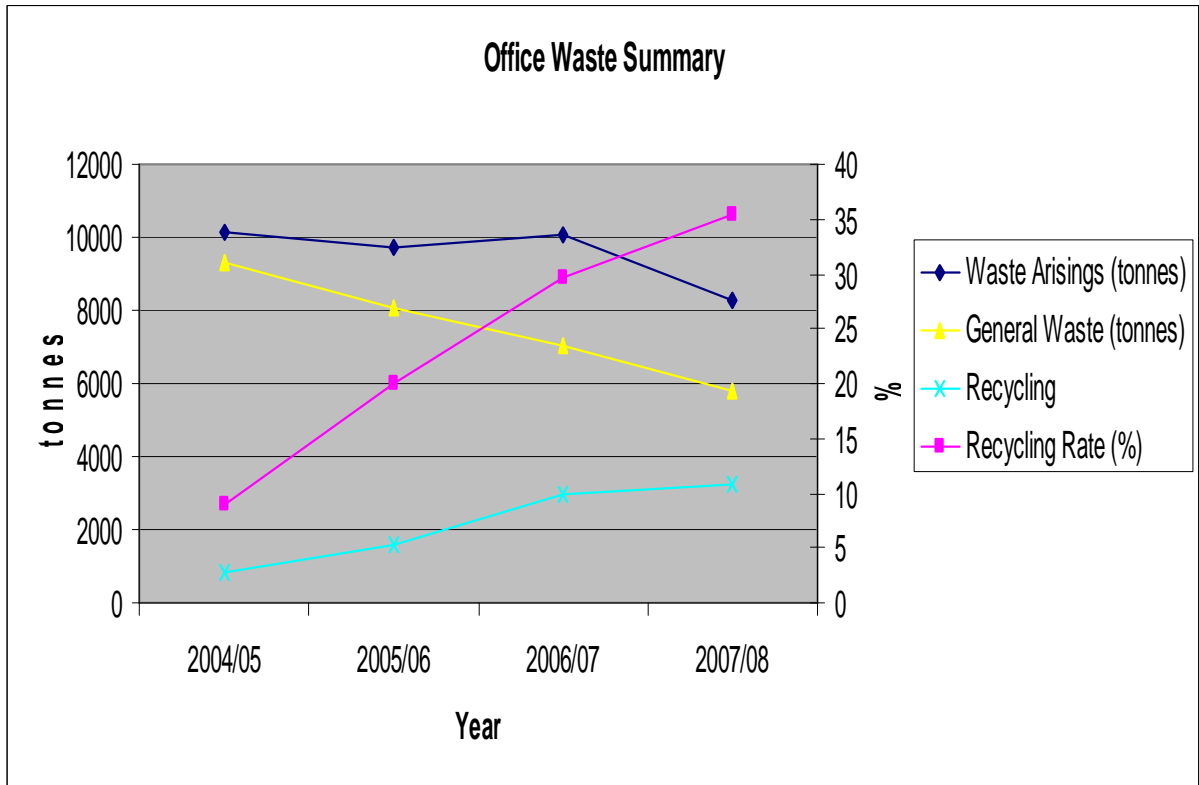
### Structure of Waste Management Contracts



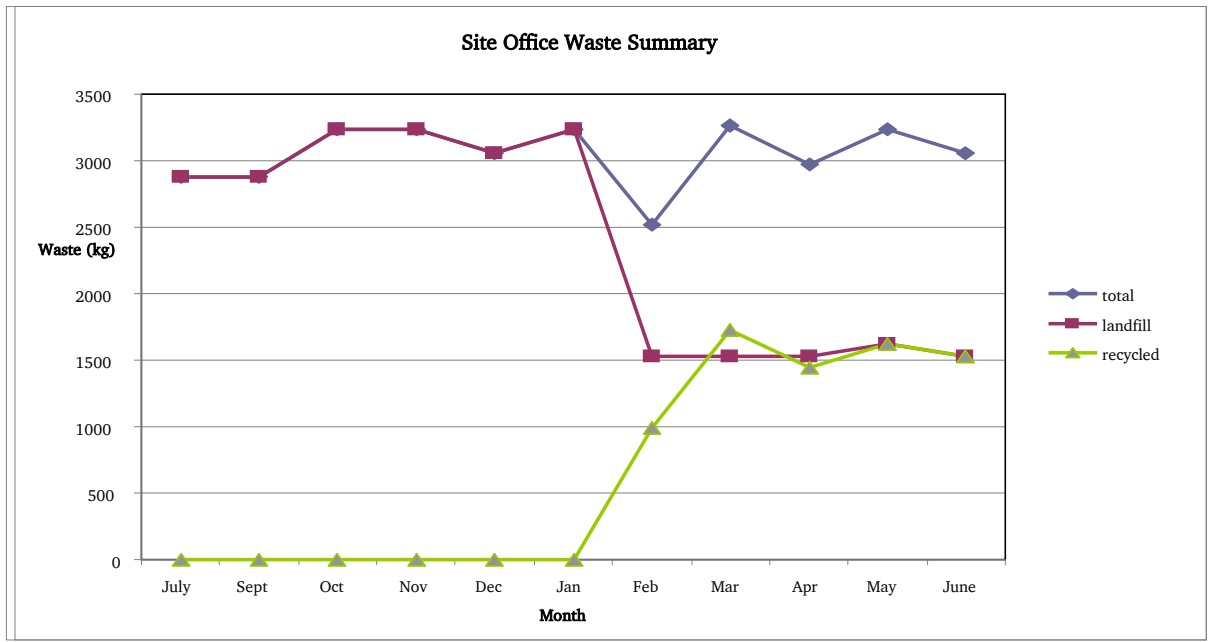
**Figure 3.1.1** Schematic diagram showing MPS Regional waste management structure



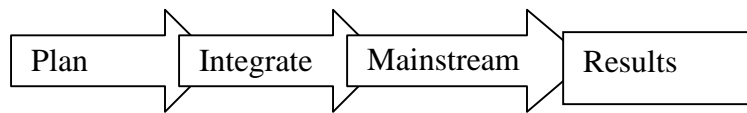
**Figure 3.1.2** Percentage questionnaire responses



**Figure 3.1.3** Total office waste summary (2004 – 2008)



**Figure 3.1.4** Office waste trends before and after recycling



**Figure 3.1.5** Illustration of MPS environmental and waste strategy  
**Source:** Environmental and waste strategy, (2005 – 2010)

*D5.1 Implement a waste-recycling scheme at Site 1.*

*D5.2 Develop a waste management and recycling plan for site 2.*

*D5.3 Achieve a 15% recycling level across the estate.*

*D5.4 Investigate a system of recycling cooking oil for use as bio diesel from catering units.*

*D5.5 Trial recycling system at catering units.*

### **Progress Update**

*Pilot recycling at a catering unit. The Recycling Officer is leading on this work with Catering Services to implement a recycling scheme at a headquarters-catering unit. The scheme is due to be implemented in July 2007.*

*In addition a waste audit has been completed at the one Training Facility, which includes recommendations for the implementation of catering waste recycling schemes at the site. This target has been carried over to 2007/08 as a food waste recycling feasibility study must be undertaken first.*

**Figure 3.1.6** Examples of waste and progress update

**Source:** Environment Report (06/07)

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# APPENDIX 1a

## SECTION I - RECYCLING QUESTIONNAIRE

### (SITES WITH A RECYCLING SCHEME)

Please fill in section II and I; highlighting your answers or filling in the gaps as appropriate.

Please state the name of the building that you work at:

\_\_\_\_\_

1. Do you use the work recycling facilities;

- a) all the time
- b) most of the time
- c) sometimes
- d) never

2. Do you think;

- a) more could still be done to recycle at work
- b) the existing scheme is adequate

3. Are there any additional waste item/s that you would like to be able to recycle at work?

- a) yes
- b) no

If yes, please specify the items you would like to recycle:

.....

4. Do you think your recycling scheme is well managed? Y/N

5. If you have answered no, why do you think this? (please highlight all relevant answers)

- a) waste bins are not emptied frequently enough
- b) waste bins are too far from my desk
- c) waste bins are the wrong size for our office
- d) waste bins are not labelled clearly
- e) other \_\_\_\_\_

6. Do you think recycling is;
- a) very important
  - b) quite important
  - c) not important
7. Which of the following do you think is the best way to increase recycling levels?
- a) offer facilities to recycle more types of waste
  - b) increase participation through better education
  - c) make recycling compulsory
  - d) other \_\_\_\_\_

## **SECTION II - AWARENESS QUESTIONNAIRE**

**Please highlight your answers or fill in the gaps as appropriate**

1. Are you aware of what and how to recycle at work? Y/N
2. Did you receive an information leaflet via email before the launch of your recycling scheme? Y/N
3. Was the information in the leaflet clear and easy to understand? Y/N
4. If not, why? (please highlight any answers that apply)
  - a) there was too much information
  - b) there was not enough information
  - c) the level of detail was too complicated
  - d) other \_\_\_\_\_
5. Do you know where to find further information about waste at work? Y/N
6. If yes, where would you look for this information?  
Please state: \_\_\_\_\_
7. Which of the following would you like to receive?
  - a) further information about how to use the scheme via email
  - b) a staff training workshop
  - c) a web based online training course
  - d) no further information
  - e) other \_\_\_\_\_

8. If you highlighted a 'staff training workshop', which method of training would you prefer?

- a) large group training
- b) small group training
- c) individual/ one-to-one training

9. Which two methods of communicating recycling messages are the most convenient to you? (please highlight your top two answers)

- a) wall posters
- b) intranet advertisements
- c) magazines (i.e. The Job)
- d) emails
- e) other(s) \_\_\_\_\_

10. Which of the following conveys the recycling message most clearly?

1. **RECYCLE**

2. 

3. **RECYCLE/** 

Please write 1, 2 or 3: \_\_\_\_\_

11. Are you aware of other environmental issues apart from waste? Y/N

THANK-YOU VERY MUCH FOR YOUR TIME AND PARTICIPATION



## APPENDIX 1b

### SECTION I - RECYCLING QUESTIONNAIRE

#### (SITES WITH NO RECYCLING SCHEME)

Please fill in section II and I; highlighting your answers or filling in the gaps as appropriate.

Please state the name of the building you work at: \_\_\_\_\_

1. Would you like to recycle at work? Y/N
2. If yes, are there specific waste item/s you would like to be able to recycle at work?
  - c) yes
  - d) no

If yes, please specify the items you would like to recycle:

.....

3. If a recycling scheme is introduced at work, which of the things below would be most important?
  - f) waste bins emptied frequently
  - g) waste bins not too far from my desk
  - h) waste bins should be the right size for my office
  - i) waste bins should be clearly labelled
  - j) other \_\_\_\_\_

4. Do you think recycling is;
  - d) very important
  - e) quite important
  - f) not important

5. If a recycling scheme was introduced and it was not working properly, which of the following do you think would be the best way to increase recycling levels?: (please highlight one answer only)

- e) offer facilities to recycle more types of waste
- f) increase participation through better education

- g) make recycling compulsory
- h) other \_\_\_\_\_

## **SECTION II - AWARENESS QUESTIONNAIRE**

**Please highlight your answers and fill the gaps as appropriate**

1. Do you recycle at home? Y/N

If yes, what waste(s) \_\_\_\_\_

2. Have you received any information about recycling at home from your local council? Y/N

3. Was the information clear and easy to understand? Y/N

4. If not, why? (please highlight any answers that apply)

- e) there was too much information
- f) there was not enough information
- g) the level of detail was too complicated
- h) other \_\_\_\_\_

5. Do you know where to find information about waste and recycling at work?  
Y/N

6. If yes, where would you look for this information?

Please state: \_\_\_\_\_

7. Which of the following do you think is the best way to receive information about recycling?

- f) via email
- g) a staff training workshop
- h) a web based online training course
- i) other \_\_\_\_\_

8. If you highlighted a 'staff training workshop', which method of training would you prefer?

- a) large group training
- b) small group training
- c) individual/ one-to-one

9. Which two methods of communicating messages are the most convenient to you? (please highlight your top two answers)

- a) wall posters
- b) intranet advertisements
- c) magazines (i.e. The Job)
- d) emails
- e) other(s) \_\_\_\_\_

10. Which of the following conveys the recycling message most clearly?

1. **RECYCLE**

2. 

3. **RECYCLE/** 

Please state (1, 2 or 3): \_\_\_\_\_

11. Are you aware of other environmental issues apart from waste? Y/N

THANK-YOU VERY MUCH FOR YOUR TIME AND PARTICIPATION

## Appendix 2

### WASTE MANAGEMENT

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International Journal of Integrated Waste Management,  
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## **Guide                                for                                Authors**

### **Submission                                of                                Papers**

Submission to this journal proceeds totally online. Use the following guidelines to prepare your article. Via the EES page of this journal (<http://ees.elsevier.com/WM>) you will be guided stepwise through the creation and uploading of the various files. The system automatically converts source files to a single Adobe Acrobat PDF version of the article, which is used in the peer-review process. Please note that even though manuscript source files are converted to PDF at submission for the review process, these source files are needed for further processing after acceptance. All correspondence, including notification of the Editor's decision and requests for revision, takes place by e-mail and via the Author's homepage, removing the need for a hard-copy paper trail.

The above represents a very brief outline of this form of submission. It can be advantageous to print this "Guide for Authors" section from the site for reference in the subsequent stages of article preparation.

Submission of a paper implies that it has not been published previously, that it is not under consideration for publication elsewhere and that if accepted it will not be published elsewhere in the same form, in English or in any other language, without the written consent of the publisher.

Upon submissions authors need to make clear why their paper is innovative and why it should be published in Waste Management.

All papers will be peer reviewed. Authors are asked to submit full contact details, including e-mail addresses, for three potential referees. Referees should be experts in the field of your paper, and not associated with the

institution with which you are affiliated. The Editors typically will utilize one or two of these referees and one or two other independent referees during the peer review process.

## **Preparation of Manuscripts**

**Language:** Manuscripts should be in English. Authors whose native language is not English are urged to seek advice from, or have their manuscript proofread by, a native English speaker.

**General Format:** Manuscripts must be typewritten with a font size of 12 or 10 pt, double-spaced with wide margins, and numbered consecutively. The manuscript should contain the following in this order: Title Page, Abstract and Keywords, Text, Acknowledgements (optional), Appendix (optional), References, Tables, and Figures. Do not import the Tables or Figures into the text. Authors should consult a recent issue of the journal for style if possible. The Editors reserve the right to adjust style to certain standards of uniformity.

**Units:** Authors are to use SI (metric) units and international quantities and abbreviations. Equivalent values in other systems may be used provided their metric equivalents are included in every case.

**Title Page:** The title page should be devoted to the title (in caps), the initials and name(s) of the author(s), and the full postal addresses for all co-authors. The desired maximum length of the title is 10 words. The corresponding author should be identified with an asterisk, and a footnote should contain an e-mail address, telephone number and fax number for the corresponding author.

**Abstract:** The second page should consist of an abstract of 100-200 words that summarizes the major findings, and 4-6 keywords.

**Text:** The text should start on the third page. It should clearly convey the purpose of the study, the approach, and the key findings. A conclusion should be included that indicates the significant contribution of the manuscript with its applications. Footnotes should be identified with superscript Arabic numbers. In the text refer to the author's name (without initials) and year of publication (e.g. "Since Peterson (1993) has shown that" or "This is the agreement with results obtained later

(Kramer, 1994)".

**References:** References should start on a separate page. All publications cited in the text should be presented in a list of references following the text of the manuscript. The list of references should be arranged alphabetically by authors' names. References should be given in the following form:

World Health Organization, Regional Office for Europe, 1991. Urban Solid Waste Management Edited by Institute for the Promotions of International Health Action (IRIS), Copenhagen, Denmark.

Diaz, L.F., Savage, G.M., Golueke, C.G., 1992. Resource Recovery from Municipal Solid Wastes, vol. 1, Primary Processing. CRC Publishers Inc., Boca Raton, Florida, USA.

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Pohland, F.G., 1986. Sanitary Landfill Stabilization with Leachate Recycle and Residual Treatment. EPA-600/2-75-043. U.S. Environmental Protection Agency, Municipal Environmental Research Laboratory, Cincinnati, Ohio.

**Tables:** Tables should be placed after the references, with each table placed on a separate page, numbered consecutively in the order to which they are referred and given a suitable caption. Footnotes to tables should be typed below the table and should be referred to by superscript lowercase letters. No vertical rules should be used. Tables should not duplicate results presented elsewhere in the manuscript, (e.g. in graphs).

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### *General points*

- Make sure you use uniform lettering and sizing of your original artwork.
- Save text in illustrations as "graphics" or enclose the font.
- Only use the following fonts in your illustrations: Arial, Courier, Helvetica, Times, Symbol.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork

files.

- Provide all illustrations as separate files and as hardcopy printouts on separate sheets.
- Provide captions to illustrations separately.
- Produce images near to the desired size of the printed version.

A detailed guide on electronic artwork is available on our website: <http://www.elsevier.com/artworkinstructions>

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*Formats:* Regardless of the application used, when your electronic artwork is finalised, please "save as" or convert the images to one of the following formats (Note the resolution requirements for line drawings, halftones, and line/halftone combinations given below.):

EPS: Vector drawings. Embed the font or save the text as "graphics".

TIFF: Colour or greyscale photographs (halftones): always use a minimum of 300 dpi.

TIFF: Bitmapped line drawings: use a minimum of 1000 dpi.

TIFF: Combinations bitmapped line/half-tone (colour or greyscale): a minimum of 500 dpi is required.

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