



# Environmental management accounting in local government

## A case of waste management

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93

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### Abstract

**Purpose** – This study aims to explore the state of environmental management accounting practice and the motivations for its use with a view to improving waste and recycling management by local government. The focus is on practice in local governments situated in the state of New South Wales (NSW), Australia. Prior studies suggest the need for environmental management accounting as a supporting tool for waste management.

**Design/methodology/approach** – An exploratory case study method was applied in 12 NSW local government organisations. In each local government interviews were conducted with managers responsible for waste and recycling issues.

**Findings** – Contrary to prior research this study found that, in the local governments investigated, an increasing amount of environmental management accounting information is being made available. The case studies found two main motivations encouraging the development of environmental management accounting in local government: first, social structural influences, such as regulatory pressures from different environmental regulatory bodies, environmental expectations from local communities, and pressures from peer councils; second, organisational contextual influences reflecting situational needs in the organisational contexts, such as complex waste operations and service designs, changes and uncertainties in waste and recycling management, and the council's strategic position for waste management.

**Research limitations/implications** – The results imply that institutional theory and contingency theory provide different but complementary explanations for the development of environmental management accounting in waste management. Although previous environmental studies are overwhelmingly in favour of social system-based theories, such as institutional theory, to explain environmental changes in organisations, an organisation's contextual dynamics seem to be equally important.

**Originality/value** – The findings about motivations provide useful information for environmental strategists and government regulators to make policies that improve accountability and the efficiency of waste and recycling management as well as promote future development of environmental management accounting to support sustainable waste management solutions.

**Keywords** Environmental management, Accounting, Local government, Waste management, Contingency planning, Australia

**Paper type** Research paper



### 1. Introduction

Over the past 20 years, with Australia's urban population growth, there has been an increasing pressure on land, resource and waste management throughout the States and Territories (ABS, 2004). Around 22 million tonnes of waste goes to landfills

annually across the country, around one tonne per person per year, making Australia's level of waste generation per capita one of the highest in the world (ABS, 2004; SoE, 2006). The amount of municipal waste is the highest among solid wastes[1] disposed to landfill (SoE, 2006). The large quantity of waste generated each year seems to become visible, unavoidable, and presents itself to the community as an immediate "environmental crisis".

Responsible for managing more than one third of total solid waste and most landfill sites in Australia, local government has demonstrated its significance and active role in waste management (Environment Australia, 2001). As public sector organisations, local governments are often regarded as being in a better position than central and state governments to make progress on sustainable development because of their more direct relationship with the local community (Lewis, 2000). Local government has been encouraged to create appropriate management systems for supporting environmental planning and policy-making and involve all sectors of the local community to fulfil environmental objectives (United Nations, 1992; Mercer and Jotkowitz, 2000). Agenda 21, the action plan for sustainable development adopted by the United Nations in the Rio Summit, emphasizes that participation and cooperation of local governments will be a determining factor in sustainable development. Christie (2000, p. 18) indicates that if one examines Agenda 21, approximately half of the actions essential to establishing a path towards sustainable development must be taken at the local government level. Stemming from Chapter 28 of Agenda 21 "local authorities" initiatives in support of Agenda 21, Local Agenda 21 has been initiated as a mechanism for implementing sustainable development at the local level and local government has a significant role to play (Commonwealth of Australia, 1999).

Local government in Australia has been intensively involved in Agenda 21 and Local Agenda 21. It spends around A\$2 to 3 billion per annum on environmental management (ABS, 2002). Within expenditure on environmental protection, waste and recycling management accounts for a significant amount. For example, 58 per cent (A\$1.2 billion) of local governments' total *current expenditure*[2] on environmental protection during 2002-03 was on waste management (ABS, 2004). The high level of environmental expenditure on waste management reflects Australian local governments' commitment to achieving environmental objectives, despite the increase of population and waste. The progress of waste reduction in municipal waste (mainly managed by local government) is better than that achieved in other solid waste sectors such as industrial and commercial wastes (Resource NSW, 2003). Despite the efforts made the national waste reduction target, which was reducing the amount of waste disposed to landfill to 50 per cent of 1990 levels by 2000, was not met (Environment Australia, 2001).

In the concluding remarks of a recent report on waste management in Australia prepared by the Productivity Commission (2006), it is emphasised that policy makers and community attitudes need to be guided by open and rigorous analysis of costs, benefits and risks, if waste management policy is to best serve the community. For example, recycling can be effective up to a point, but returns diminish when it is taken too far. The NSW Department of Environment and Conservation (2004), which has recently changed to become the Department of Environment and Climate Change NSW, indicated that although the assessment of the true costs of waste services is a beneficial equity element to local communities in the long term, the charges used in

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current local government waste management have not fully reflected these costs. As noted in the 2001 State of the Environment Report (Environment Australia, 2001, pp. 125-127), data on waste generation in Australia is “patchy” and “the relatively inexact nature of waste accounting and the significant data gaps can make regional comparison difficult”. The lack of such accounting information has impeded accountability and efficiency of waste and recycling management. Therefore, it seems appropriate to question current practices of accounting for waste and recycling management in local government and investigate potential reasons for identifying full cost and impact information for waste management.

Previous studies have not provided much insight into this issue. Although the concepts and approaches of environmental accounting emerged in the early 1990s and have been quickly developed since then (see Gray *et al.*, 1998; Parker, 1999; Schaltegger and Burritt, 2000; Burritt, 2002; 2004), the major research interest in the past two decades has been environmental disclosure as a way of communication with external stakeholders (Mathews, 1997; 2000) and the motivations for these disclosures (Deegan, 2002; O'Donovan, 1999). Very little interest has been placed in environmental management accounting practices. In Parker's (2005) review of social and environmental accountability research published between 1988 and 2003 in six leading interdisciplinary accounting journals, it was found that of the 233 published articles, only ten focus on environmental management systems and management accounting, with the majority of these as literature/theory/commentary. It has also been noted that there is even less research in environmental management accounting in the public sector, except for a few papers (e.g. Gibson and Guthrie, 1995; Burritt and Welch, 1997; Frost, 1998; Ball, 2003a; 2005).

Bouma and van der Veen (2002) and Burritt (2004) highlight the need for more research into environmental management accounting, especially the theoretical underpinnings of current development. Burritt (2004) and Parker (2005) emphasise that social and environmental accounting research needs more direct engagement with practice in the field. This suggests the need for more studies to investigate environmental management and accounting practices in organisations.

Motivated by the problem in waste accounting, the gap in previous literature and support from the Department of Environment and Climate Change (DECC), and the Local Government Association (LGA) in New South Wales (NSW), Australia, this research used a case study method to explore current environmental management accounting practices for waste management in 12 NSW local governments. In addition, the paper also explores possible explanations and motivations for the use of environmental management accounting information for waste management. It is expected that the findings will provide useful information for environmental strategists and government regulators to make policies that improve accountability and efficiency of waste and recycling management and promote future development of environmental management accounting to support sustainable waste solutions.

The remainder of this paper proceeds as follows. Section 2 reviews the relevant literature, including the need for research into environmental management accounting in local government waste and recycling management and current studies of potential motivations for environmental management accounting from different theoretical perspectives. Section 3 presents the research method used for this study, followed by the discussion of the findings in Section 4. In Section 5, theoretical implications from

analysis of the results are discussed. The conclusions and the limitations of this research and future research opportunities are discussed in Section 6.

## 2. Literature review

The literature review contains two parts. Section 2.1 addresses the need for research into environmental management accounting in local government waste and recycling management. In section 2.2 studies of potential motivations for environmental management accounting from different theoretical perspectives are reviewed.

### *2.1 Environmental management accounting for local government waste and recycling management*

Environmental management accounting involves the identification, collection, analysis and use of a broad scope of information for internal decision-making (Schaltegger and Burritt, 2000). This information includes physical information on the use and flows of energy, water, and materials (including wastes), monetary information on environment-related costs, earnings and savings, hidden/indirect environmental information in overheads and in future periods, and external information which is transmitted outside the assumed, legitimate and "usual" boundary of an organisation (Senge, 1993; USEPA, 1998a; Bennett and James, 1997; 1998; EMARIC, 2003; IFAC, 2005). Environmental management accounting terminology often uses such words as "full", "total", "true", "comprehensive", and "life cycle" to emphasise that conventional management accounting approaches are incomplete in scope as they overlook important environmental benefits and costs (USEPA, 1998a).

Previous research suggests that environmental management accounting is a necessary foundation and support for quality environmental management because it overcomes the limitations of conventional accounting approaches and incorporates a much broader scale of environmental information into organisational management (see Schaltegger *et al.*, 1996; Bebbington *et al.*, 2001; Schaltegger and Burritt, 2000; Schaltegger *et al.*, 2003). The importance of environmental management accounting for quality waste management has been recognised in the Australian National Strategy on Ecological Sustainable Development (NSES) (Australian Ecologically Sustainable Development Steering Committee, 1992). The NSES encourages pricing and charging structures to adequately reflect the full economic and environmental costs of waste disposal. For example, Chapter 19 in *Waste Minimisation and Management* indicates that strategic objectives of waste minimisation and management in Australia should include:

- To work towards introduction of pricing and charging structures which adequately reflect the full economic and environmental costs of waste disposal.
- To provide further support for the development of whole life cycle methodologies and a methodology for full social cost pricing of landfill and waste disposal facilities.
- To develop methodologies for the evaluation and assessment of the costs and benefits of various options for waste minimisation (Australian Ecologically Sustainable Development Steering Committee, 1992, pp. 75-6).

Sustainable waste management and solutions need timely and reliable accounting information, especially to justify both environmental and economic efficiency of waste

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prevention programs (Wright, 2002). The US Environment Protection Authority (USEPA, 1997) indicates that cost-effective and informed decisions require an awareness of full costs of waste management and a broader spectrum of information than available in conventional accounting systems.

Based on conventional accounting practices, only operational costs in waste management are likely to be taken into account when local government officials make waste management decisions (Hirschfeld *et al.*, 1992). Compared with other alternatives such as resource recovery and material recycling, relatively low operational costs of landfill disposal have made this an attractive and competitive option. However, landfill has become a serious concern in recent years for its adverse impacts on the environment (such as groundwater or stream contamination, leakage of toxic and hazardous air/water-borne pollution, adverse effects on flora and fauna) and unquenchable thirst for land space (Gandy, 1994; Hershkowitz, 1998). The clear message is that if full costs associated with resource usage and impacts to the environment in landfill practices continue to be neglected, sustainability of waste management cannot be guaranteed in the long term. Even environmentally sound options, such as recycling, which have been viewed as conserving resources and reducing environmental problems, have to be closely examined in terms of economic viability and environmental achievability (Productivity Commission, 2006). The NSW Department of Environment and Conservation (2003) indicates that one of the sustainability principles for resource and environmental management is improving valuation, pricing and incentive mechanisms, which requires improved accountability of environmental costs and impacts, and using environmental information to facilitate pricing decisions and incentive policies.

Researchers in this area have developed a variety of frameworks and approaches to incorporate environmental accounting information into waste and recycling management. Studies in the early 1990s are concerned about the adequacy of direct operational cost and material flow information in waste collection and waste program designs (see Shapek, 1993; Levenson, 1993). Since the late 1990s, full cost accounting approaches (see Bagby, 1999; Gauthier, 1998; Glad, 1996; USEPA, 1997; 1998b; 1998c) and the life cycle assessment methods (see Artz *et al.*, 2002; Ayalon *et al.*, 2000) have been developed to incorporate “true costs”, “full costs” or “life-cycle costs”, including external costs such as environmental degradation costs and resource depletion, into waste and recycling management. However, little research has examined how local government has applied these approaches or methods to manage waste and material recycling.

### *2.2 Motivations from different theoretical perspectives*

There is no commonly used theoretical perspective on managerial motivations for environmental management accounting in organisations. Numerous researchers have applied legitimacy theory to explain environmental and social reporting practices (O'Donovan, 2002; Deegan, 2002). Legitimacy theory, at its simplest, emphasises that an organisation's activities need to be, or appear to be, congruent with social values in a broader social system (Dowling and Pfeffer, 1975; Deegan, 2002). If society perceives that an organisation operates within the bounds of a value system acceptable to society, the organisation is considered legitimate and can survive and grow (Dowling and Pfeffer, 1975). In order to show that the organisation has fulfilled or attempts to

fulfil demands from society, the organisation may disclose information, such as environmental information, to the public, either showing that it conforms to social expectations, or is trying to influence or alter the perceptions, which the public has of the organisation (Lindblom, 1994).

Some studies favour stakeholder theory to explain environmental reporting and environmental audits (Gray *et al.*, 1996; Deegan and Blomquist, 2006; Darnall *et al.*, 2009). Stakeholder theory highlights the interplay and communication between an organisation and its stakeholders (Freeman, 1984). Stakeholders are identified by reference to the extent to which the organisation believes the interplay with each group needs to be managed in order to further the interests of the organisation (Gray *et al.*, 1996, p. 45). The implication of stakeholder theory is that organisations should put additional emphasis on the opportunity dimension of stakeholder analysis because the interests of the organisation can be nurtured by an interactive and symmetrical two-way communication with its stakeholders (Madsen and Ulhoi, 2001, p. 79).

Both legitimacy theory and stakeholder theory take an open systems view of organisations and regard a two-way open dialogue between organisations and their stakeholders as an important communication and management tool. According to Deegan (2002, p. 295), legitimacy theory discusses the expectations of society in general, but stakeholder theory provides a more refined resolution by referring to different stakeholder groups within society. Therefore, stakeholder theory, while implied within legitimacy theory, is more explicitly focused upon the issue of stakeholder power and how a stakeholder's relative power impacts their ability to "coerce" the organisation into complying with the stakeholder's expectations (Deegan and Blomquist, 2006, p. 350).

Institutional theory is another theory that views the organisation as part of the larger social system in which it operates. Different from legitimacy theory and stakeholder theory, institutional theory is an organisational theory developed within the management literature (see the seminal studies of Meyer and Rowan (1977) and, DiMaggio and Powell (1983)). While the essence is achieving legitimacy, institutional theory has a broader view of the social system surrounding organisations. Institutional theory explores different means/mechanisms through which information about legitimate and socially accepted organisational behaviour can be transmitted and such behaviour institutionalised in organisations (Meyer and Rowan, 1977). These mechanisms are broader in range than proposed in legitimacy theory and stakeholder theory. For example, there are coercive pressures from powerful stakeholders such as government authorities, as well as mimetic behaviour where organisations take culturally supported norms and practices for granted (Scott, 1995, p. 35).

Perhaps it is the focus on how particular organisational forms might be adopted through institutionalisation processes that makes institutional theory stand out in explaining environmental management and environmental management accounting in organisations. For example, Boons and Strannegard (2000) argue that organisations are the "carrier" of the institutionalised social norms and values. When the natural environment is in crisis, ecological pressures from the socially constructed image of the natural environment will lead to various environmental management changes, such as new conceptual models, new ways of acting, alternative processes of strategic decision-making, or new values on which organisational members base their actions.

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Despite the lack of research into environmental management accounting, Bouma and van der Veen (2002) suggest that institutional theory could be useful for explaining motivations for adopting environmental management accounting. Their study (Bouma and van der Veen, 2002, p. 286) implies that an organisational field that creates a concept for capturing environmental costs in the mindset of management will prompt the development of environmental management accounting in individual organisations through a mimetic process. Gradually, this mimetic process will make the concepts and approaches of environmental management accounting the central issues in the organisational field, and finally these concepts and approaches will be institutionalised.

Few studies to date have explored environmental management accounting in local government. Ball's (2003a, b; 2005) case studies provide the most comprehensive view on institutional influences on environmental management accounting and change in local government. Based on Ball's observations, social institutions, in particular the environmental movement in society, has played a significant role in promoting environmental accounting developments in local government. She found that when society has been galvanised by a wider sense of environmental protection, as in Canadian local governments, the environmental agenda and accounting developments are pressed into use to meet with such change in society. In United Kingdom local governments she examined, although a tax on landfill is introduced placing immediate financial pressures on the local council, environmental problems are defined at a micro-local level, there being little evidence of a wider environmental movement in society with which the local government has to engage. In these circumstances, environmental accounting is ignored or marginalised by the UK local government. Hence, the variation in the degree of connectedness between local government and its institutional environments leads to differences in environmental accounting practices. Putting this into the context of waste management, environmental management accounting in local government is likely to be motivated or pressed into use when a society and community are enlightened and involved in environmental changes and expect high achievement in waste reduction and recycling management.

It has been noted that Bouma and van der Veen (2002) also mention another competing theory for environmental management accounting: contingency theory, an organisational theory occasionally appearing in corporate environmental management studies. Bouma and van der Veen (2002) contend that organisations may be pressed to change their accounting systems by their institutional environments, but their own strategic priorities could influence the level of environmental management accounting. They indicate that an organisation will adopt advanced methods for environmental cost allocation if its strategic priority is to achieve low costs. This implies that environmental management accounting may be driven by a conservative, cost leadership orientated business strategy.

It was Parker (1997) who first adopted a contingency theory perspective to examine accounting for corporate environmental strategy. In contrast to Bouma and van der Veen (2002), Parker (1997) suggests that accounting systems are expected to innovate and diversify to support diversified environmental strategies. Where organisations develop proactive, future-orientated and preventative environmental strategies, innovative and broader scope accounting systems such as environmental accounting will be used to support and facilitate the implementation of those strategies. According

to Parker (1997), the corporation's general external environment and the degree to which it is characterised by uncertainty (i.e. dynamic, heterogeneous (see Duncan, 1972)), also influence environmental accounting practices. If organisational environments relating to ecological issues are uncertain and dynamic, changing demand for green products and markets, the organisation is likely to account for these environmental impacts on its business wealth in order to facilitate the securing of new and existing markets for its products or services. Maximising wealth or securing markets may not be pursued by the public sector, such as local government. However, since the introduction of New Public Management in Australia in the early 1990s, public sector organisations have been restructured to improve efficiency and accountability for managing outcomes (Guthrie, 1993). In this regard, it is likely that local government may use environmental accounting information to support their proactive environmental strategies or to cope with uncertain ecological environments challenging waste management, and thereby improving managerial values and achieving efficiency.

As contingency theory focuses on efficiency and technical organisation, it has not been used by most environmental accounting researchers because it seems generally accepted that environmental activities and changes are motivated or enforced by a broader social system where organisations operate. Except for Parker (1997) and Bouma and van der Veen (2002), the contingency perspective has not been used to explain motivations for environmental management accounting. With few studies of environmental management accounting available in previous literature, plus less research investigating local government or similar public sector organisations, it is the intention of this paper to leave the question of influences on the adoption of environmental management accounting open for exploration instead of proposing hypotheses based on a particular theory from a limited pre-existing literature. The following section considers the case study method for exploring how environmental management accounting information is used for waste management in local government and the motivations for such use.

### 3. Research method

An exploratory case study method (Yin, 2009) was applied in 12 local government organisations in NSW Australia. Local government in NSW is an A\$6 billion industry (NSW Department of Local Government, 2005). In NSW, local government is required by legislation to have regard to the objectives and principles of the Australian NSESD in exercising every environmental function (NSW Department of Environment and Conservation, 2003). The NSW Department of Environment and Conservation (2003; 2004) also sets a waste reduction target for each waste management sector and encouraged local councils to improve their accountability of environmental costs and impacts of waste disposal. Encouraged by the Sustainability Programs Division of the NSW Department of Environment and Climate Change (DECC) to understand environmental management accounting applied for waste management in local government, in-depth interviews were conducted with environmental managers in 12 local governments and shires in NSW. The data selection, collection and analysis are briefly explained below.



### 3.1 Data collection

Although the local councils selected are not a random sample that fully represents all local councils in NSW, the local councils selected for the case studies were of different types and sizes to reflect the diversity of councils. According to socioeconomic characteristics, local government in Australia can be broadly categorised into urban and rural councils. In NSW, rural council areas are predominantly agricultural, whereas urban council areas include metropolitan cities and non-metropolitan towns and cities (Commonwealth of Australia, 2003). The cases selected included eight urban councils involving two metropolitan councils and six non-metropolitan councils, and four rural agricultural councils[3]. These cover very large, large, medium-sized and small councils, based on their population and population densities.

The formal interviews were conducted from late 2004 to early 2006. Informal contacts with selected local councils were undertaken prior to commencing the field-work. Through these contacts, background information was obtained, including whether the council provides waste services to local residents, and names of managers or equivalent personnel responsible for waste and recycling services[4]. Most interviewees worked in a division or department of environmental services or environmental planning where the waste management section operated. The interviewees generally held a position as manager of either environmental services or waste services. Their roles in waste management decision-making on a daily basis were confirmed in the interviews[5]. The interviewees' average length of work experience in waste management was 5.3 years, with the longest period being 14 years and the shortest being 18 months. None of the interviewees during the investigation period were working in waste management temporarily or short-term. Table I lists the number of local councils investigated and the interviewees in these councils.

Before the interviews, an invitation letter, an informed consent form and an interview question list (to facilitate the interviewees to prepare answers to the questions before the interviews were conducted), were forwarded to each interviewee. If the participants agreed, the interviews were recorded; otherwise notes were taken. Each interview took approximately one and a half hours, although the longest interview took three hours. The recorded interviews were transcribed by the authors and reviewed by two academics from the Australian National University Academic

Type	Large	Medium	Small	Total	Interviewees
Urban metropolitan	0	2	0	2	Environmental service surveyor Manager of waste and recycling services
Urban, non-metropolitan	2	2	2	6	Manager of facilities Manager of environmental service Waste minimisation officer Manager of commercial business Contract administrator for waste management Manager of waste services
Rural, agriculture	1	3	0	4	Manager of health and development Environmental and health manager Director of environment planning Manager of business services

**Table I.**  
Number of local councils  
and interviewees

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Skills and Learning Centre to check accuracy. The transcripts were also sent to each interviewee for member-checking (Creswell and Miller, 2000)

During the formal interviews, some internal documentary data relating to waste management strategy, waste management policy, and environmental action plans, were obtained either directly from the interviewees or through email or telephone communication after the interviews. These documents helped identify and explain the important issues such as technical operations and constraints in current waste management, specific waste targets or goals set for individual local councils.

### *3.2 Interview questions*

The first question of the case studies was to discover the level of environmental management accounting in local government waste management. Therefore, the first main question was designed to reveal how much environmental management accounting information was used for waste management[6] in each council. A comprehensive list of items that capture major environmental management accounting information was prepared based on previous literature such as Senge (1993), Benette and James (1997), Schaltegger and Burritt (2000) and definitions of environmental management accounting given in the EMARIC (2003), IFAC (2005), UNDSO (2001). The literature suggests that environmental management accounting procedures include physical procedures for material and energy consumption, flows and final disposal, and monetary procedures for costs, savings and revenues related to the activities or material flows that have a potential environmental impact. Environmental accounting information should also include the information hidden in overheads or in future periods, and those costs and impacts that are currently outside the boundary of the organisation (externalities) and cannot be captured by any conventional accounting system.

In the context of waste management in this research, environmental management accounting information could be direct physical and monetary information from garbage waste and recycling streams and activities, such as waste quantity information (e.g. how much garbage waste, recyclables or green waste are collected or land filled); recovery quality information (e.g. how much gets recycled following sorting at a material recovery facility or how much gets diverted back to landfill as contamination); and the cost and expenditure information associated with the physical waste flows and activities (USEPA, 1997; 1998a). The potentially hidden (i.e. indirect) information could be those involved in administrative support, legal services and fines, education costs, waste disposal costs avoided via recycling and reduction, expected or prospective costs that may or may not occur in the future, such as future costs of closing landfills, post-closure monitoring and care costs, future costs that may or may not be incurred in the future, such as site replacement costs, uncertain future remediation or compensation costs, and risk posed by future regulatory changes (Epstein, 1996; EPA NSW, 1996; USEPA, 1997; 1998b). Environmental externalities may involve air pollution, water pollution and land contaminations, the emission of greenhouse gases from waste disposal processes and disposal sites, loss of amenity, potential environmental benefits as well as adverse environmental impacts of recycling (Weitz *et al.*, 1999; ACT Government, 2001; EPA NSW, 1996; ANPCC, 2001). The information items examined in this study are available in Tables II and III.

Environmental management accounting information items	Fully available	Partially available	Total
<i>Garbage waste</i>			
<i>Physical</i>			
Quantity of garbage waste collected	11	0	11
Quantity of garbage waste incinerated <sup>a</sup>	0	0	0
Quantity of waste sent to landfill	11	0	11
<i>Monetary</i>			
Garbage waste collection costs	12	0	12
Garbage waste to energy sales revenue <sup>a</sup>	0	0	0
Garbage waste disposal costs	10	0	10
<i>Recyclables and green waste</i>			
<i>Physical in total</i>			
Quantity of total recyclables collected	9	1	10
Quantity of total recyclables recovered	7	1	8
Contamination rate of total recyclables	6	0	6
Quantity of total green waste collected	8	0	8
<i>Physical for different recyclables</i>			
Quantities of different recyclables collected	3	3	6
Quantities of different recyclables recovered	3	3	6
Contamination rates of different recyclables	0	3	3
<i>Monetary in total</i>			
Total recyclable collection costs	9	0	9
Total recyclable sorting and recovery costs	5	0	5
Total recyclable sales revenue	3	0	3
Total collection costs for green waste	5	0	5
Total processing costs for green waste	7	0	7
<i>Monetary for different recyclables</i>			
Collection costs for different recyclables	0	2	2
Sorting and recovery costs for different recyclables	0	1	1
Sales revenue for different recyclables	0	2	2
<i>Integrated in total</i>			
Cost per tonne for total recyclables	8	0	8
Cost per household for total recyclables	8	0	8
<i>Integrated for different recyclables</i>			
Costs per tonne for different recyclables	0	3	3
Cost per household for different recyclables	0	1	1

**Notes:** <sup>a</sup> During the interviews, it was found that none of the local councils used any incineration facilities for waste disposal. Therefore, they had no waste to incinerate for energy generation and so no information about the “quantity of waste incinerated” and “waste to energy sales revenue” from incineration was reported. Many interviewees stressed that the incineration option in waste management was extremely limited in Australia due to concern about its adverse environmental impacts

**Table II.**  
Physical and monetary  
accounting for waste and  
recycling activities (in  
number of local councils)

The second main question of the case studies was to discover the motivations for the use of environmental management accounting information in waste management. This question was an open-ended question. From the first two interviews conducted, it was found difficult and unrealistic for interviewees to give reasons for the use of every information item. The interviewees were more likely to use any information that was

Environmental management accounting information items	Fully available	Partially available	Total
<i>Indirect costs</i>			
Public waste education and outreach costs	5	1	6
Administrative costs for waste management	11	1	12
Waste reporting and auditing costs	6	0	6
Landfill disposal costs avoided via recycling and reduction	5	0	5
<i>Future-oriented costs</i>			
Costs associated with expected closure of landfill(s) currently being used	3	3	6
Expected costs of long-term post-closure, rehabilitation and monitoring of landfill(s) currently being used	3	2	5
Expected costs of landfill site and facility replacement	3	1	4
Anticipated costs of regulatory changes (e.g. future regulatory changes for waste minimisation, new landfill sites)	2	6	8
Anticipated remediation costs (e.g. undiscovered and/or future release of contaminants from landfill sites)	4	2	6
<i>Externalities</i>			
Environmental benefits from current recycling services (e.g. recovered resources)	2	4	6
Environmental impacts generated by current recycling services (e.g. air emissions from transporting recyclables)	0	2	2
Economic value of resources being buried as waste in landfill	2	1	3
Costs associated with reducing greenhouse effects contributed by waste streams (e.g. collecting and monitoring methane and CO <sub>2</sub> emissions)	3	3	6
Costs associated with controlling toxic and odorous landfill gas emissions	5	2	7
Costs associated with landfill leachate collection and treatment for protection of ground water	5	2	7
Costs associated with the loss of land capacity and value because of waste disposal	1	1	2
Costs associated with the loss of amenity because of waste disposal (e.g. dust, pest, litter)	0	1	1

**Table III.**  
Hidden and external cost and impact accounting (in number of local councils)

particularly interesting to them and expand the explanations provided, or group the information and provide some similar explanations for using the grouped information items. In this regard, it was considered inappropriate to restrict the interview responses to specific environmental information items. To facilitate exploration, the interviewees in the following interviews were allowed to freely respond to the question and provide any explanation they considered important for making decisions instead of explaining the motivations for each information item given.

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### 3.3 *Techniques for data analysis*

After data collation, content analysis was used to analyse the responses. Content analysis is a technique that makes inferences by objectively and systematically identifying specified characteristics of text messages (Holsti, 1969, p. 14). This systematic and replicable technique helps to compress many words of text into fewer and specific content categories based on explicit rules of coding (Krippendorff, 1980). To help identify as many meanings and factors as possible, both manifest and latent coding (Neuman, 2000) were used to analyse the responses to the open-ended questions in the case studies.

Manifest analysis was adopted to identify explicit themes from textual data. Manifest analysis involved two procedures:

- (1) taking notes of the apparent presence of concepts and factors in each interview transcript; and
- (2) counting the frequency with which the concepts and themes appear.

Given that the number of the case studies is small and their nature is exploratory, a theme or factor that appeared more than once in the interview responses was considered a potentially relevant factor for this investigation. This relaxed selection criterion may to reduce researcher subjectivity when judging the relevance or importance of the factors.

However, the manifest coding may ignore the connotations of the phrase or the word, or miss the rich meaning of the textural information (Neuman, 2000). Therefore, latent analysis was used as a supplement to add underlying and implicit themes in the content of the text. Through the exploration of underlying meanings of the interview data, codes of semantic cue of overall sentences or paragraphs in the texts were generated and categorised. It has to be admitted that because of its subjectivity, results from the latent analysis may be less reliable compared with direct manifest analysis[7]. After all data were coded and categorised through both methods of content analysis, the factors or components generated in the coding process were transferred to a master table for analysis. For example, the greater number of the recurrence of a particular factor or code, the more influential that code or factor was assumed to be.

## 4. Findings

The research findings are presented in two parts. First, the levels of environmental management accounting in local government waste and recycling management are reported. Then motivations for the use of environmental management accounting information in waste management are discussed.

### 4.1 *Levels of environmental management accounting in local government waste and recycling management*

Through analysis of the interviews, it was found that, although local government may not be fully aware of the concept of environmental management accounting, relevant information is being collected and used in local government waste management, similar to private sector environmental management accounting practices (Wilmshurst and Frost, 2001). However, considerable dispersion is observed between environmental management accounting practices in the cases examined. For example, one local government identified 95 per cent of the listed environmental information in its waste

management services, while three local governments only identified 5 per cent to 22 per cent of the listed items of information. The majority of the councils examined identified between 30 per cent and 60 per cent of the listed environmental information items.

During the interviews, one issue that arose was that obtaining an absolute “yes” or “no” answer to every environmental management accounting information item was not practical. Some information was partially, rather than completely, available or identified. For example, in three of local councils studied, recycling collection and processing work were outsourced to single or multiple private contractors. Although the local councils required each of their contractors to track and report detailed information about waste collection or recovery processes for the purpose of management control, some contractors in remote or small council areas did not have the capability to capture and record full information, e.g. all of the information for each type of recyclable. In these circumstances, information was considered partially available, e.g. they did not identify all of the information for each type of recyclable. Another example was the effect of *ad hoc* waste management projects on the availability of particular types of environmental information. Four of the twelve councils indicated that they identified certain types of information because some waste management projects that they recently implemented required some or all of that information. In this regard, some information was only partially available to meet the needs of particular projects. It was, therefore, considered necessary to differentiate the extent to which (fully or partially) local councils identified each environmental information item.

Tables II–III summarise the state of environmental management accounting in local government waste management. Table II reports the state of physical and monetary accounting for waste and recycling activities, and Table III reports the state of hidden and external cost and impact accounting.

The results in Table II show that the level of accounting for garbage waste activities was generally lower than that of accounting for recyclables in both physical and monetary terms. Information on garbage waste collection and disposal was identified by 11 of the 12 local councils, but only between six to nine councils identified quantity and cost information of total recyclables and green waste, and less than three councils identified quantity and cost information for each type of recyclable. Within the local councils that measured the contamination rates for different recyclables and collection, sorting and recovery costs for different recyclables, none has information fully available, i.e. none of them identified information for each type of recyclable. However, most of these councils did have partial information, that is, they have taken some of the recyclables into account.

Analysis of the interviews revealed that two councils outsourced most of their recycling collection services. These councils required contractors to report the collection, recovery and contamination information on a monthly basis and this information was input into the councils’ waste inventory information systems, which were accessible at any time for analysis. However, the interviewees from these two councils admitted that, although the waste inventory database helped them identify physical information about each recyclable material from different sources and activities, cost information was only partially available in their inventory systems.

There are eight councils that identified integrated quantity and cost data for recycling performance evaluation. These mainly include cost per tonne for recyclables

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and cost per household for recyclables. Nevertheless, when the interviewees were asked if cost per tonne or per household was used to account for different types of recyclables, most answered “no”. Only three councils identified cost per tonne for some of their recyclables and cost per household for different recyclables was only partially available in one council.

Table III shows that for indirect costs, i.e. information potentially hidden in overheads, such as education costs, reporting and auditing costs, and avoided costs, the level of full information identified was high. These indirect costs are not difficult to quantify, but can easily be overlooked because of their indirect benefits. For instance, one interviewee indicated that his council used to ignore the disposal costs avoided via recycling. When the council took this indirect factor into account in its waste management plan a year previously, it was surprising to find that their waste program was actually “profitable”. Instead of costing the council A\$70 or A\$80 a tonne to recycle, the council actually saved approximately A\$10 or A\$15 a tonne by recycling. The interviews also revealed that most councils regarded waste and recycling education as an increasingly important mechanism to improve recycling quality. Three of the 12 councils studied established waste education centres and recruited specific education officers to design, launch and report waste education programs. However, only six of the 12 councils identified and incorporated waste education costs for waste management.

With regard to accounting for information embedded in future periods, the practices in local government varied. One council identified almost all of this type of information. In contrast, two councils completely ignored all information hidden in future periods. Table III reveals that in comparison with the indirect accounting information in overheads, future-orientated information generally drew less attention. Most local councils investigated only identified part of the future expected or anticipated information, especially for closure and post-closure costs and anticipated costs of regulatory changes. Accounting for expected costs of landfill sites and facility replacement was most likely to be overlooked. Only one third of the councils measured this information. There was one outstanding local council that included full replacement costs in the expected costs of landfill post-closure for one of the three landfills owned. The environmental manager in the council indicated that a small part of these replacement costs had been converted to waste service charges over the past three years and the council was planning to adopt a new pricing strategy to take account of future expected costs for two landfills in order to extend their useful lives.

In Table III, the level of accounting for external environmental costs and impacts from waste flows is the lowest, compared with the levels of direct physical and monetary accounting and hidden cost and impact accounting. The externalities that were most likely to be considered were costs associated with gas and leachate control and treatment. Seven local councils indicated that they measured full or partial adverse impacts and the corresponding monitoring costs of gas emission and potential groundwater contamination. Six local councils accounted for recycling benefits and greenhouse effects while the other six ignored them. Among the local councils that examined these recycling costs and impacts, more than half indicated that they might have captured only part of the information instead of full information. To most local councils, recycling was seen as an environmentally friendly approach to solving waste problems and to saving landfill space and disposal costs. But this view was also used

by some councils to justify why it was unnecessary to make a full evaluation of environmental benefits of recycling options. This seemed to be the same in accounting for potential impacts of recycling options. Table III shows that the lowest levels of accounting for environmental impacts were from recycling, economic value of resources buried as waste in landfill, costs associated with loss of land capacity and costs of amenity loss. Nine councils studied overlooked all or most of these externalities. Only one council identified some of these externalities.

From Tables II–III, it appears that when the scope of environmental management accounting information becomes broader, the accounting levels in local government waste management become lower. Local government is more likely to capture internal direct physical and monetary flow information for waste management than indirect or hidden information. In most cases, accounting for externalities in local government waste management has drawn the least attention.

#### 4.2 Motivations for environmental management accounting in waste management

Based on the analysis of the responses to the second interview question, developed to explore the factors explaining environmental management accounting practices in local government waste management, a wide range of social structural influences and organisation’s contextual influences were found. Findings are summarised in the following two sections.

4.2.1 *Social structural influences.* The case studies revealed that the first broad strand of motivations falls into the social structural category. Evidence indicates that social structural influences can be categorised into regulatory pressures, community expectations and pressures from peer councils. Table IV summarises different aspects

Social structural influences	No. of local councils
<i>Regulatory pressures</i>	
Achieve resource NSW’s waste reduction target	4
Tightening of the NSW EPA’s landfill licensing	4
State Government’s environmental reporting requirements	3
Environmental legislation/requirements of the NSW EPA	3
Avoid prosecutions/fines from the State Government	2
Provided data to the NSW Department of Local Government	2
Justification for increasing waste levies imposed	2
<i>Community expectations and interests</i>	
Community interest in environmental improvement	3
Community expectation on financial improvement of waste management	2
Community request for recycling performance information	2
Community concern about payment for environmental improvement	1
Community interest in local government performance reports	1
Increasing awareness of environmental impacts in the community	1
<i>Pressures from peer councils (in the organisational field)</i>	
Good performance of neighbouring councils	3
Joint need of member councils in regional local government associations	2
Good performance of peer councils	2
Assist regional tenders in recycling services	1

**Table IV.**  
Summary of social structural influences on environmental management accounting in local government waste management



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of social structural explanations and the number of councils that indicated the importance of these explanations.

(1) *Regulatory pressures.* A frequently recurring motivation for environmental management accounting in waste and recycling management appeared to be related to various pressures from regulatory authorities, such as the Environmental Protection Agency's (EPA) environmental and license requirements, state government and the NSW Department of Local Government's reporting requirements. These regulatory pressures are almost exclusively from State regulatory bodies.

Australia has a three-tiered system of government, comprising the federal government, State and Territory governments, and local government (Halligan and Wettenhall, 1989). The federal government is the most powerful authority for imposing regulatory pressures. Its influence is mainly in providing national leadership and help to local government in the long term. For example, the National Strategy on Ecological Sustainable Development and the national waste reduction target set by the federal government have provided a strong incentive for local government to make progress in waste management since the mid-1990s (Environment Australia, 2001). However, the federal government has no direct control over waste issues at the local level.

Local government is regarded as a direct legal subordinate to the respective State and Territory governments (Halligan and Wettenhall, 1989). Each State enacts legislation to establish local government within its jurisdiction and to regulate its rights and responsibilities[8]. In NSW, the EPA is the major governmental agency responsible for setting environmental protection regulations, including waste management related legislation. For example, the NSW EPA requires that any new site used for landfill must be fully evaluated for its economic, social and environmental effects before a licence is issued, and existing landfill sites must be inspected regularly to reduce the risk of environmental damage (EPA NSW, 1996). The *Protection of the Environment Operations Act 1997*, section 45, which is administered by the EPA, also requires existing and new landfill occupiers to develop landfill environmental management policies and effective post-closure plans (EPA NSW, 1997). These plans must include many direct and indirect costs and impacts in waste management to meet licence requirements, such as the nature and quantity of waste collected, recycled and disposed of, the remaining landfill capacity, and the leachate control record. Reporting on these plans to the EPA is compulsory (EPA NSW, 1997).

The case studies indicated that such stringent environmental regulatory requirements have pervasive effects on environmental management accounting practices in local government waste management. For example,

We have to comply with environmental requirements and prepare for possible legislative changes from the EPA, and that's as we move further into the future, we will find environmental legislation becomes tougher, the cost of providing waste services becomes higher, and landfill becomes more expensive than other more sustainable options. So we have to do something right now to get this prepared (Interviewee No. 2)[9].

Getting an EPA licence is certainly tightening up. Each time we go for a licence, there is always another condition in place. I suppose we have to spend to comply with our licence and the landfill environmental management plan, to comply with those particular requirements or documents (Interviewee No. 6).

For our new regional landfill, it has got greater environmental controls than any other landfills in the area. We've considered all these life-cycle costs of the new landfill to get licence approval ... But we have reasonably less environmental control for the current landfill because they [EPA] didn't require this when they first issued the licence years ago (Interviewee No. 12).

In addition to the environmental requirements of the EPA, the NSW government commenced a specific waste regulation in 1995 – the *Waste Minimisation and Management Act 1995* (WMMA) (Resource NSW, 2001). Along with the establishment of Resource NSW to oversee the WMMA, a waste levy was introduced, aiming to incorporate in the gate price some measures of the environmental effects of landfill operations and less potential resources (Wright, 2002). The waste levy has increased a dollar per tonne per annum in major developed metropolitan areas, and the level of the NSW waste levy is greater than exists in other States and Territories (Wright, 2002). When the levy increases, the gap between the cost of providing resource recovery services and the relative cost of landfill disposal narrows, and over time this gap closes. In the case studies, two local councils noted that the recent waste levy increase had a significant impact on their waste service charges. They argued that ongoing as well as measurable future costs of waste disposal need to be clearly identified to justify the increasing waste levy and eventually these costs should be built into waste service charges as required.

In 2003, a new target for waste minimisation was established by the NSW Government when it released the first Waste Avoidance and Resource Recovery Strategy (WARRS). In terms of municipal waste, the target was to hold the level of total waste generated in the years 2003 to 2008, and to increase the recovery and utilisation rate of materials from 26 per cent in 2003 to 66 per cent in 2014 (Resource NSW, 2003). This ambitious target was incorporated into many individual local councils' waste management targets. In the case studies, four interviewees particularly noted that every possible effort was made to achieve the WARRS waste reduction target and environmental management accounting information was needed to monitor their performance against the target. For example, Interviewee No. 1 indicated that:

We have a waste reduction target, the same as the State target in the Waste Avoidance and Resource Recovery Strategy, that's to increase material recovery to 66% by 2014. I think it is achievable, but we need commitment, as well as an information system to monitor the progress. We must know exactly what's costing us for garbage collection and disposal; what's costing us for recycling and for garden organics disposal; what's costing us for kerbside clean-ups ... So we are able to keep monitoring them (Interviewee No. 1).

Another regulatory pressure that stood out was the reporting requirements that involve waste accounting data, such as the annual State of the Environment (SoE) report and the financial report to the Department of Local Government. A number of councils clearly indicated the influence of these reporting requirements on them. For example:

It is a State legal requirement that all local councils in New South Wales produce a comprehensive environmental report every four years and supplementary reports in the intervening years. These reports look at land use, water quality, air quality, heritage, waste management and other areas. It is a challenge to collect all these data, but we can use these results to monitor environmental activities and to develop actions that will improve the local and regional environment (Interviewee No. 6).

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The NSW EPA released the basic environmental guidelines for the SoE in 1995, and in 2000 comprehensive guidelines involving a list of core environmental indicators were released to encourage local government to provide greater accuracy, timely and accessible information about the condition of and prospects for the natural environment, and to prepare a management plan for environmental stewardship in the local area (NSW Department of Local Government, 2000). The NSW Department of Local Government mandated annual SoE reporting at the local government level and required local government to use 25 key performance indicators to monitor environmental performance and submit an annual performance report, including waste management and recycling performance (NSW Department of Local Government, 2005). It seems that these reporting requirements put direct pressure on local government to collect and report environmental management accounting information. Sometimes this information is also used for internal environmental management purposes.

(2) *Community expectations.* In addition to regulatory pressure, environmental issues in waste management have been under increasing community scrutiny. Although no particular factor frequently recurs, there were six relevant social factors regarding community expectations and influences: community interest in environmental improvement; community expectation on financial improvement of waste management; community request for recycling performance information; community concern about payment for environmental improvement; community interest in local government performance reports; and the increasing awareness of environmental impacts in the community.

Waste collection and recycling is one of the essential services paid for by the community via local government rates and levies. Local communities like to see improvements in the environmental performance of waste management. The increase in community environmental expectations can place significant pressures on local government waste management. Ball (2003b) indicates that environmental accounting in local government is a response to the increasing value that social communities have placed on better waste management practices, reflecting the influence of the wider social movement and strength of community approval or opposition to local waste management. In the case studies, the community's high expectation of, and interest in, environmental improvement was indicated as one of the incentives for environmental management accounting. For example, one of the regional councils noted that:

We are in the coastal area. People appreciate the natural environment that's around here. There are some people who are interested in how we are maintaining current performance and how we are going to improve it further. A lot of people who move down to this area are from metropolitan areas such as Canberra and Sydney. So their expectation is that we should be meeting the same standard they get in urban areas or in metropolitan areas. They write in and email in. They are concerned about environmental performance and they want to make sure the right actions being taken ... The council should, and is willing to, meet the community's expectations regarding environmental improvement as well as financial improvement, and this must be accountable to the community (Interviewee No. 5).

In NSW, the Department of Local Government (2000) has encouraged all councils to involve members of the community to monitor environmental changes over time when preparing local SoE reports, and publish their local SoE reports on their web sites to make environmental information available to the local community. In the case studies,

many councils indicated that the local community showed a great interest in and requested information about waste management, particularly the performance and impact of recycling.

We regularly conduct surveys on how the community perceives our services. The garbage and recycling services and management always come to the top of the list. They are really happy with what has been done and there is a strong support for our waste strategy . . . The community are always interested in what the government is doing. A financial report on how much we are spending on waste management has to go out to our community every year. We also provide a report on what programs we are implementing and how much waste we manage to divert each year (Interviewee No. 2).

We do need to know this information, first of all to justify that we are actually diverting waste from the waste stream. Also, we need that to give feedback to the public about how we are going. I mean most people want to know what happens to the materials they put into their recycling bins, and what they are doing is actually have some impact. In our 2004 survey on regional waste minimisation opportunities, a number of residents commented that they wanted to be informed on “who buys the various recyclable materials, what they use them for and how much council earns – maybe an annual summary placed in the annual report”. There were some other suggestions, such as “a fee structure should relate to a strategy whereby any fees collected could go towards a more eco-friendly program”. That’s why we need these figures to show we are actually improving recycling performance, and the money is going to the right place (Interviewee No. 4).

However, while people in local communities have an increasing awareness of and concerns about the waste issue, they are also concerned about paying for improvements in waste minimisation. This gives local government extra pressure to increase efficiency, for which fully-accounted cost information plays a role:

We get increasing complaints about recycling services not being available. But every time we try to do something, we get equivalent complaints about the extra cost of it. They expect more, and they would like to see more, particularly in recycling. We get more and more inquiries about why we don’t recycle. But it comes down to the fact that they are still unwilling to pay for it . . . But a very positive fact is that we are getting increasing demand for recycling. So we are now planning to have a full cost assessment on waste alternatives and expect to find the most cost-effective way to recycle (Interviewee No. 11).

The above analysis of community influences seemed to suggest that local communities are becoming more enlightened and involved in local government waste management, which puts pressure on, as well as provide incentives to, waste management decision makers to improve environmental performance and increase the accountability of environmental performance to the community.

(3) *Pressures from peer councils (in the organisational field)*. Another emerging social structural factor was the potential effect of “what your neighbours, your competitors, and your collaborators are doing” (Interviewee No. 4). Although not often highlighted as a direct motivation for identifying environmental management accounting information, issues like perception of good performance achieved by neighbouring councils, a joint need of member councils in the regional local government association, and assisting regional tenders for recycling services, appeared several times in the interviews. Voluntary local and regional initiatives and cooperation between regional councils may potentially create working rules for exchanges between participating local councils and make these councils feel

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compliance pressure from their peers. If undertaking some environmental management accounting practices is viewed as a “rule” in their organisational field, local government is likely to comply with this “rule”.

One of reforms in the *Waste Minimisation and Management Act 1995* was the establishment of a number of regional waste planning and management boards to develop and implement integrated waste management plans in a cooperative way. An increasing number of voluntary local government groups or associations have been established to make improvements in recycling logistics, diversion rates, and quality and management control (Wright, 2002). When voluntary local or regional initiatives and agreements indicate a need to give more consideration to environmental impacts and costs in waste management, every local government member is pressed to meet the need to keep its membership valid. A few interviewees indicated that:

What we are doing at the moment is that: there are five councils trying to get together to put in a regional tender for the disposal and/or processing of garbage recyclables and garden organics. It is going to be a massive tender, because somebody will build a facility in this regional area, a very large facility. The more tonnes that we can give them, the more worthwhile it becomes for them to tender. So we have to define some objective ways to assess the costs and benefits of current garbage services, compare these with tendering on a regional basis. We've made a detailed assessment report and now need to come up with an agreement between the five councils on what's the most important cost and benefit: is it environmental, financial, or social? (Interviewee No. 8).

Councils can cooperate through the way of a joint need. The councils in the South West Region Waste Management Group (SWRWMG), comprising Yass, Harden, Boorowa, Cootamundra, Gundagai, Tumut, Young and Tumbarumba councils, are currently in the process of negotiating access to a proposed regional landfill at the Bald Hill Quarry site near Jugiong. True cost, or life cycle cost, whatever you call it, has to be measured and reported to the EPA to get a licence. As [the name of the Council interviewed] initiated this regional cooperation, we are responsible for preparing the report that can satisfy every council involved (Interviewee No. 12).

To overcome deficiencies in waste service provision in individual councils and to improve regional waste management performance in the long run, local councils in the same or nearby regions have enhanced cooperation for mutual benefits (Wright, 2002). Previous studies (DiMaggio and Powell, 1983; Covaleski and Dirsmith, 1988) suggested that organisations are more likely to interact with, and imitate the behaviour of, organisations that are closely tied to them, such as those in the same industry or geographical location. The interviewees implied that the values and rules recognised and diffused in the neighbouring councils did have a positive effect on the focal council's environmental activities, including environmental management accounting practices for waste management. This can be seen from the following comment:

We are interested in what our neighbours are up to, which are broadly in the same situation as we are. The ACT [Australian Capital Territory] is one of the leaders in waste management. We recycle exactly the same way as the ACT, which is so close to us . . . Now the ACT has its zero-waste target by 2010. I think they are very great and we have to support what they are doing, because what they do over there directly impacts on what's happening here. I can tell you if they (the ACT) do achieve the goal and there is no waste by 2010, we will be achieving no waste by 2010 too. The ACT has done some studies, taking extra factors into account over direct costs. Yes, they are trying to reflect the real costs, starting to make people realise how

much it costs. If the ACT Government includes all these environmental costs, social costs in their waste system, I suppose we have to include them too (Interviewee No. 4).

Sometimes, pressures were not from other councils that are closely tied to the focal council. Those councils that are perceived to have similar positions (e.g. similar size or type) to the focal council can impose potential pressures. For example:

We are one of the biggest local councils in NSW. We are committed to minimise environmental and social costs and risk of waste ... We look at where the best services are and where the best performance is. Landfill charges should be increased to reflect the full environmental costs and encourage maximum resource recovery. According to the information published by the Department of Local Government and one of our commissioned studies, landfill prices in other major cities are higher and more closely represent the actual cost of waste disposal ... So, we have adjusted our costing and pricing system and raised landfill charges since early last year. This has also provided an incentive for recycling (Interviewee No. 2).

Regardless of the sources of pressures and the purposes of actions, factors categorised in Table IV reflect the power of society and different players in influencing environmental management accounting practices for local government waste management. Table V, which is discussed next, seems to present a different picture.

*4.2.2 Organisational contextual influences.* Motivations categorised into the second group were considered as organisational contextual influences. These included complexity of local councils' waste operation and service designs, changes and uncertainties facing waste and recycling management and local councils' strategic positions for waste management. Table V summarised different aspects of organisational contextual explanations as well as the number of councils that indicated these explanations.

	No. of local councils
<b>Organisational contextual influences</b>	
<i>Complex waste operation and service designs</i>	
Support kerbside collection service	7
Support different recycling and garbage collection designs	6
Support upgrade of landfill approaching closure	3
Support material sorting and recovery facility management	2
Support landfill closeup	1
<i>Changes and uncertainties in waste and recycling management</i>	
Less available land for new landfill sites	6
Rapidly diminishing space in current landfills	5
Limited and fluctuating recycling market	3
Increasing cost of providing waste services	3
Changing disposal costs in various sites	3
<i>Strategic positions for waste management</i>	
Achieve the leadership in sustainable waste management	3
Achieve the council's waste reduction target	2
Become a role model of recycling service providers	1
Support balanced and sustainable development of the Council	1
Required by Council's action plan to develop effective waste solutions	1

**Table V.**  
Summary of organisational contextual influences on environmental management accounting in local government waste management

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(1) *Complex waste operation and service designs.* As a major concern of almost every waste manager in local government, complex waste operations and service designs were significant organisational drivers for environmental management accounting. Interviewees' statements revealed that as much environmental information as possible was sought by local councils to support and justify waste and landfill operations and services. Since the 1990s, local councils in NSW introduced or improved waste services and recycling facilities to achieve a high level of waste management performance (NSW Department of Environment and Conservation, 2003). Challenges from kerbside collection services, various recycling and garbage collection designs, managing upgrade of landfills approaching closure or dealing with landfills in the process of closing down, and managing material sorting and recovery, all provide immediate incentives for waste managers to seek information to ensure the efficiency and sustainability of waste management operations. Potentially, the more complex and difficult these operations or services, the more environmental information is needed and identified. For example, if the council attempts to provide residents with the highest recycling convenience, increase the volume of recyclables and reduce the volume of garbage waste, it has to opt for more complex services and operations such as frequent collection, kerbside recycling, and sorting facilities to designate the collection of special materials such as car batteries, tyres and scrap metal. These complex operations encourage local councils to seek more relevant information to monitor their services and operations and to ensure the efficiency and effectiveness of the complex services provided, as one of the interviewees indicated:

We have to provide kerbside collection services, we have to increase collection frequency, offer residents smaller garbage bins and bigger recycling bins, we have to separate paper and cardboard from other materials, such as plastic, glass bottles, we have to manage recycling facilities, sorting and recovering materials collected, we have to run education programs . . . all sorts of things, to ensure the quality of our waste management services. We need information to support these operations, definitely, as you've mentioned here – quantity of waste and recyclables, waste collection cost, education cost and disposal cost (Interviewee No. 6).

Likewise, disposal services and operation in landfills need the support provided by environmental management accounting information. In Ball's (2003b) study, it was found that if a local council has to undertake complicated procedures and operations for landfill management (e.g. to deal with landfill sites being closed down or to be closed down in the near future), the local government environmental manager is more willing to search for new solutions within which environmental management accounting information is necessary. For example:

The [name of site] landfill has been in operation since 1986 and has an anticipated life of five to six years at the current rate of usage. This site has undergone a major upgrade since February 2004 to maximise its life. This includes the rehabilitation of old landfill cells, installation of a leachate collection system, lining of the current leachate dam and excavation of a new landfill cell. The costs are gonna be huge. The examination of these costs and impacts is under way. This is the first time we estimate the greenhouse effects for the new landfill cell. We have also estimated the expected costs of closing the landfill. But we do not want to close it. Reducing waste going there is significant for us. That is why we examined all these waste collection and recycling costs to maximise waste reduction and recycling opportunities (Interviewee No. 12).

However, if the local council has been experiencing simple or less complicated landfill operations (e.g. if the landfill owned or operated by the council does not have to comply with the license requirements[10], if the local council does not own or operate landfill, or if the current landfill owned has a long life expectancy), many environmental management accounting information items were considered unnecessary by the interviewees:

We don't have a local landfill. That makes things a lot easier. Our last landfill closed in April 1988. Since then, we have been using the landfill in [the name of another local council]. We are just another commercial customer to them. We can only deal with the actual costs that we have (or we have paid). It is impossible to charge more to better reflect the environmental impacts, I mean, you cannot go that far (Interviewee No. 4).

Therefore, without operational demands, environmental management accounting was not viewed as necessary. The effect of increasing complexity in waste service delivery and designs in recent years increases the need for environmental management accounting information to support various waste services and operations.

(2) *Changes and uncertainties facing waste and recycling management.* In organisational contextual factors, changes and uncertainties in recycling and landfill management stand out as another incentive for collecting environmental management accounting information. It can be seen from the changes and uncertainties, such as the increasing difficulty in locating new landfill sites, rapidly diminishing space in existing landfills, a limited and volatile recycling market, and changing costs of waste services and disposal, waste management environments have become challenging.

The continuing generation of large volumes of waste accelerates the consumption of existing land space, which raises the issue of rising disposal costs. In addition, the adverse environmental impacts of disposal in landfill have made approval and construction of new disposal sites in developed regions more difficult. Even if the waste can be delivered to remote disposal areas, various transportation costs, energy usage and labour costs will increase the uncertainties of these alternatives. For example:

There is less available land space to convert to landfill now. We are experiencing a lot of urban development, which means land that may have been suitable 10 years ago is now being developed for residential areas. 85 per cent of the council area is state forest, so it's not land that is readily available for landfilling. If we located a new landfill outside our shire area, it will cost us a fortune, our community a fortune, because we've got a mountain in the way in terms of transport. So we wouldn't want to do it. One of the direct benefits of identifying this information about waste generation, resource recovery and its environmental benefit, the environmental impact of landfills and the closure costs, is that we know how much pressure we've got on our landfills, and how much progress we've made to reduce the pressure on landfills and subsequently delay further expansion of landfills or commissioning new landfills (Interviewee No. 5).

The following comment provides an indication of how changing land consumption and waste disposal costs have an impact on the need for environmental management accounting information in individual local councils:

Those days of free tipping have all gone. The costs for waste disposal, landfilling, and providing waste services have changed dramatically. It is essential that the fees and charges



are reviewed annually. Once you start to bring in environmental control, better management, better security, that's where the cost comes in (Interviewee No. 12).

Even though local councils can recycle waste, a highly volatile recycling market presents another challenge. For example, the manager of waste services in one local council noted that:

We are very limited in terms of who we go to, who disposes of our recyclables for us. There aren't many companies being involved in it at all, wanting your recyclables. There is only a limited market out there. It's a very volatile, fluctuating market. We have to have better control over this, I mean, information is absolutely important for this kind of control, (to) provide quality recyclables, greater separation and less contamination, especially for paper recyclables (Interviewee No. 8).

The failure of recyclable prices could make expenditure for recycling services exceed the revenue from sales of recyclable materials, especially when long-term environmental benefits of recycling are not accounted for or monetised. The uncertain and unpredictable recycling market has provided economic and environmental challenges to local government. However, this uncertainty also provides an incentive for local government to improve environmental management accounting systems because information that can be used to examine these effects, as well as to determine sustainable solutions for waste management, is needed as a coping mechanism.

(3) *Strategic positions for waste management.* Words like “leadership”, “role model” and “strategy” in the interviews seemed interrelated. A number of local councils indicated that environmental management accounting information was used to support their State leadership strategy on sustainable waste management, or to support the council to become a leader and role model of recycling service providers, to support balanced and sustainable development of the council or to assist in achieving councils own waste reduction targets. It appeared that many councils viewed environmental management accounting information as being important to support their waste strategy and target, especially when they have a high strategic position for their waste management.

A number of interviewees demonstrated that their councils were aiming to establish or maintain their leading roles in sustainable waste management or recycling services in their regions or across the State. Such strategic orientation was regarded as one of the fundamental motivations for environmental management accounting information in these councils.

In the regional area, we are a leader, a role model of the recycling service provider. We initiate many waste minimisation programs. We have conducted several cost and benefit assessments for our programs, which I think, include most information listed here, and these have actually been followed by our neighbours and other councils (Interviewee No. 1).

If [the name of the council] is to maintain its national leadership position, more efforts are needed. We are developing a waste inventory and identifying the full costs of each type of waste. This information enables priorities to be set and assessments to be made of the full costs and impacts of each waste type depending upon space consumed, treatment required, and the environmental consequences of the material being disposed of at landfill. This also allows for the measurement of performance towards our waste reduction target (Interviewee No. 2).

Although not specifically demonstrating a leadership strategy, two councils established their own waste reduction targets and left the State's waste target far behind. Based on its "beyond compliance" and sustainability-driven target, one of these councils became active in accounting for its waste management and identified 87.5 per cent of the information items listed. The Waste Minimisation Officer in the council indicated that:

The council is well aware of all these environmental and financial impacts and benefits of waste management. We are committed to reducing the waste going to landfill by 90 per cent during the period July 2001 to July 2011 and subsequently achieving zero waste to landfill by the year 2015 ... We are aiming beyond State policies in terms of waste reduction. Documentation of solid waste disposal and its impacts, recycling materials quantities and types, has to be maintained in order to support and verify progress towards waste reduction targets (Interviewee No. 5).

A similar strategy was mentioned by another council from a rural agriculture area. The Manager of Business Services, who was responsible for waste management in that council, emphasised the importance of achieving both environmental and financial excellence for waste management. He presented the council's action plans for achieving its strategic goal. The action plan clearly required cost and benefit information about waste reduction and landfill management to be available and updated for every 12-month period. The Manager confirmed that such information helped them develop effective waste solutions and ensure their operations were environmentally and financially sustainable.

Although results may not be generalisable based on the limited number of cases in this study, the commonalities discovered are suggestive. The two categories of motivations seem distinguishable: one focused on pressures from the members of society, such as regulatory authorities, communities and peer local councils, and the other is related to councils' situational needs, such as the council's waste operations and service designs, the changes and uncertainties in waste management and operation, and the council's own strategic position for waste management. These motivations appeared together and both seem to influence the development of environmental management accounting in local government waste management.

## 5. Discussion

From the results, there is no doubt that local government, as a member of society, is influenced by the expectations of other members in society and its environmental management accounting practices in waste management need to conform to required or anticipated behaviour in the wider social structure. Social system based theories such as legitimacy theory, stakeholder theory and institutional theory, seem relevant. Institutional theory, in particular, best reflects in the findings of this study. As Deegan (2002) contended, legitimacy theory views the expectations of society in general without any specific focus on members in society and stakeholder theory focuses on stakeholder power and impacts of such power. Partly overlapping, institutional theory explores different roles of, and mechanisms used by, various members in society to influence internal management activities and behaviour in organisations so that these activities and behaviours are consistent with the rules and norms institutionalised by members in society (DiMaggio and Powell, 1983; Scott, 1995). For example, coercive mechanisms provide organisations with a force for compliance, the mimetic approach

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makes organisations find “the way we do things around here” first before imitating others, and the normative pillar reflects how organisations pursue appropriateness and fulfil their social obligation (Scott, 1995, p. 35).

The findings of this study cover a wide range of explanatory factors relating to social influences. These factors reflect different, as well as mixed, social institutional influences on the development of environmental management accounting in local government waste management. State government’s data requirements and environmental regulator’s rules and targets suggest a coercive pressure for compliance. Non-compliance may be legally sanctioned. Joint needs of regional local council associations and neighbours or other peers seem to point towards the imitation of collectively accepted and internalised behaviour in the organisational field. There are no legal sanctions if the council is not compliant with the commonly accepted rules of the organisational field, but any member in such a field would not want to be seen as an outsider. As for the local community’s environmental expectations and interests, they can influence local government through a normative process, morally governing changes of environmental management accounting in local government waste management, or may influence local government through a coercive process, as non-compliance with community expectations may lead to a loss of power or position.

Although not popular in environmental management accounting studies, contingency theory seems relevant to this study. Contingency theory is a strategic management-based organisational theory which views that organisations are driven by task performance (Powell, 1991). The adoption of any specific organisational structure or behaviour to cope with changing and complex contextual environments of organisations is seen as a necessary and strategic means for organisations to achieve effective and efficient control of the work process (Scott and Meyer, 1983). Contingency theory is often used to explain variation and diversity of management accounting approaches (see Hayes, 1977; Otley, 1980; Chenhall, 2003). The primary finding in this literature is that the design and effectiveness of management accounting, or management control systems, is contingent upon contextual situations within which an organisation operates, such as organisational environments, working process and technology, organisational structure and strategies. The better the management accounting approach fits with these contingency factors relating to the organisation’s day-to-day operations, the higher the performance the organisation is likely to achieve.

Parker (1997) suggested that uncertain organisational environments and an organisation’s strategic priority are contingency factors supporting the development of environmental management accounting. Bouma and van der Veen (2002) also suggested business strategy as a contingency factor for environmental management accounting. This case study revealed a series of motivations relating to organisational contexts. Various uncertainties and changes in waste and recycling management implied that environmental management accounting would be considered more useful in the circumstances of uncertain and changing waste environments. Local governments that perceived the challenges from such uncertainties and changes are more willing to use environmental accounting information to cope with the challenges. The level of environmental management accounting is also dependent upon different strategic positions for waste management. For example, local councils that set “leader” or “role model” as their strategic priorities or targets have considered the use of environmental management accounting necessary to help achieve their targets.

Although not discussed in previous contingency-based environmental accounting studies, complex working processes, such as various collection services and recycling operation designs, appeared to be another contingency because the complexity of the services and operations in waste management increased the demand for environmental accounting information, which was perceived to ensure the effective control of the waste operating process.

The results of this research suggest that both institutional theory and contingency theory provide insights into the motivations for environmental management accounting in local government waste management. Although social system based explanations form part of the reasons for environmental management accounting, an organisation's contextual dynamics seem equally important. These organisational contextual factors may force the organisation to make different environmental changes despite exposure to the same social institutional pressures. Institutional theory and contingency theory, in the case of environmental management accounting for waste management, are considered offering different but complementary explanations.

## 6. Conclusions

This research explored the practices of environmental management accounting and the motivations for these practices in the context of local government waste management. It has long been acknowledged that sustainable waste management solutions require an awareness of its real cost and a broader spectrum of information than that available in conventional accounting systems (USEPA, 1997). However, there is little research investigating how far environmental management accounting has changed in this area. This study was designed to meet the need of such research in local government waste and recycling management.

Based on the case studies of 12 local councils in NSW, it was found that a moderate level of environmental management accounting information is being used for waste management. Most of the councils investigated reported that between 30 per cent and 60 per cent of the environmental management accounting information items are provided. The level of direct physical and monetary accounting for waste and recycling activities in the case councils was higher than those of indirect and external cost and impact accounting for waste management. Local government was more likely to account for total figures, such as total costs or quantities of garbage waste and recyclables, than disaggregated figures such as cost and quantity information in relation to collection, sorting and recovery activities for different recyclables. The indirect costs such as costs and impacts hidden in the future periods, and the external costs such as environmental impacts of recycling and costs associated with loss of land capacity, were difficult to quantify and most likely overlooked. It appears that when the scope of environmental management accounting information becomes broader, from direct to indirect and from internal to external, the levels of environmental management accounting become lower. However, there was one local council that reported that 95 per cent of the listed environmental management accounting information items were being supplied and used. These include most indirect and external costs and impacts in waste management. These results imply that, although environmental management accounting is still far from fully applied in local government waste management, when compared with the negative findings in the reports of the SoE (Environment Australia, 2001; SoE, 2006), this study reveals that an

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increasing amount of environmental management accounting information is being made available in local government waste management.

A wide range of motivations were found in exploring the reasons for the development of environmental management accounting for waste management. These motivations were categorised and distinguished into two groups: social structural factors and organisational contextual factors. Social structural factors reflect the influences from members in society, such as regulatory pressures from different environmental regulatory bodies in the state of NSW, environmental expectations and interests from local communities, and pressures from peer councils such as neighbour councils and other councils in the regional council associations. Organisational contextual factors reflect those situational needs in the organisational contexts, such as the need of the council's waste operations and service designs, changes and uncertainties in waste and recycling management facing the council, and the council's strategic position for waste management. These two categories of motivations seemed to drive the development of environmental management accounting in local government waste management. They offer different but complementary explanations. Although previous environmental studies (e.g. Boons and Strannegard, 2000; Ball, 2005) are overwhelmingly in favour of social system based theories such as institutional theory to explain environmental movements in organisations, this study found that strategic management-based organisational theories such as contingency theory provide useful insights too. This is because how organisations respond to environmental pressures and environmentally induced social institutional pressures may depend on the particular circumstances of the situation in individual organisations.

For local government, a public sector organisation that provides various services to the public, it may not be difficult to understand its social obligations and why it is more likely than private sector organisations to make changes required or encouraged by governmental regulations and policies, and reject those prohibited (DiMaggio and Powell, 1983). However, Australian local government underwent significant reforms through the 1990s and 2000s, and a managerialist philosophy that focuses on efficiency of agencies, cost savings and streamlining of operations was promoted (Ryan *et al.*, 2002). These reforms have changed local government management from bureaucratic and professionally dominated "administration" to more flexible, performance and accountability-oriented service provision and management (Ryan *et al.*, 2002). The results of this study suggest that in addition to complying with legislation and regulations, local governments aim at improving waste service delivery and at the same time reduce costs, that is, to focus on improving output performance of waste management instead of focusing on input spending and compliance. If environmental management accounting information is viewed as a useful tool to cope with various challenges facing local government and thereby help to achieve or maintain efficiency and output performance, it is more likely to be adopted by local governments.

Nevertheless, the study is not without limitations. Prudence should be exercised when considering possible application of the results of this research to a larger, more diverse population of local councils in Australia as the generation of primary data for this research was undertaken in the State of NSW only. Factors that contribute to differences between States and Territories in Australia have not been taken into consideration. In addition there may be some subjectivity in choosing categories and

factors in the data analysis process. In terms of methodology, empirical research could be used to examine a larger population to overcome the limitation of small sample size and enable generalisability of the research results to other States and Territories and waste management industries. Although local government plays a pivotal role in managing domestic waste, future research is needed to explore environmental management accounting practice in waste management industries. To solve waste problems, every upstream and downstream player in the waste and recycling chain has to be environmentally responsible and accountable. Even though a few local councils have identified and internalised many environmental management accounting information items, they also questioned who should absorb these environmental costs and impacts. Future research should investigate how to establish a larger environmental management accounting system that upstream players such as waste generators and consumers, and downstream players such as remanufacturers and private landfill operators, all have a role to play for improving waste and recycling management.

#### Notes

1. Solid wastes primarily comprise three categories: municipal waste, commercial and industrial waste, and construction and demolition waste (ABS, 1998).
2. Current expenditure is expenditure on goods and services consumed within a financial year. It cannot be capitalised and amortised over multiple years.
3. As noted in the Australian Classification of Local Governments (ACLG) (Commonwealth of Australia, 2003), metropolitan cities are urban, developed centres with a population greater than 1,000,000 or a population density of more than 600 per square kilometre (sq km). Non-metropolitan areas include regional towns and cities that have a population less than 1,000,000 but are predominantly urban in nature, and fringe local government areas that are located on the margin of developed or regional cities.
4. Personnel responsible for waste and recycling services in local governments during the investigation time were interviewed. During initial investigations, it was discovered that waste management strategies, budgets and performance evaluation were conducted by waste managers or equivalent as their positions were generally at a senior level. According to Parker (2000) and the Association of Chartered Certified Accountants (ACCA) (2003), although accountants are competent in appreciating and tracking conventionally recognized cost items, environmental managers and specialists are more competent in managing environmental impacts, control systems and regulations. Environmental managers have been regarded as the prime-movers in rethinking accounting systems so they may better serve the organisations' long-term environmental management objectives.
5. Two councils had their waste issues managed in the division of business development or operations. In these two councils, the person responsible for waste management was called the manager of commercial business or business services. One manager explained that since the waste management centre was a valuable asset for the community and the council was endeavouring to make waste management viable, the council regarded waste services as one of its central businesses. The other manager indicated that waste management in their council was located in the division of engineering services, where waste management was considered related to engineering work and facility construction issues rather than to environmental matters.
6. This question was initially designed as an open-ended question. This meant that the interviewees were initially asked to indicate what environmental accounting information

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was used for waste management decision making. After a few interviews, it was found that such an open-ended question was inappropriate and often confused the interviewees.

7. The final results from both coding methods were checked by an academic skill advisor at the Academic Skills and Learning Centre at The Australian National University.
8. The Northern Territory has a system of local and community governments. The Australian Capital Territory (ACT) does not have a system of local government but, nonetheless, is governed locally.
9. For ethical reasons, names of the interviewees are not provided in this paper. In the remainder of this paper, these interviewees are referred to as Interviewee No. 1 to No. 12.
10. Landfills outside the Extended Regulated Area in NSW are not required to be licensed if they accept less than 5,000 tonnes of waste per year (Aquatech Environment Economics and Information, 1999).

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