

# **ENVIRONMENTAL MANAGEMENT ACCOUNTING WITHIN UNIVERSITIES: CURRENT STATE AND FUTURE POTENTIAL**

*A Thesis Submitted  
in Fulfilment of the Requirements for the Degree of  
Doctor of Philosophy*

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## **DECLARATION**

I, Huei-Chun Chang, certify that the work completed is mine alone, that this work has not been submitted previously to quality for an academic award, that the content of this thesis is the result of work which has been carried out since the official commencement date of the approved research program, that any editorial work undertaken by a third party is acknowledged, and relevant ethics procedures and guidelines have been followed.

Huei-Chun Chang

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## SUMMARY

Environmental management accounting (EMA) is attracting increased recognition as a management tool that assists in improving financial and environmental performance through enhanced environmental accountability. Various industries have been included in EMA-related research and study, but universities have typically failed to be the focus of the attention. This research studied the experiences of key managers from five universities to explore potential factors influencing the decision to adopt, or not to adopt, EMA within the higher education sector. For the purpose of this study, EMA is defined as the generation, analysis, and use of monetary (or financial) and physical (or non-financial) environment-related information in order to improve organisational financial and environmental performance.

The two objectives of this study were to understand current accounting practices for managing major environmental costs, and to identify factors influencing EMA adoption within universities. For the purpose of this study, the major environmental costs referred to are limited to the costs pertaining to the consumption of electricity, water and paper, and the generation of wastes. A case study methodology was followed using semi-structured interviews of key personnel with four different management functions (i.e. environmental management, management accounting, senior management, and heads of academic schools) within each university, and performing content analysis on the transcribed interview data. Specifically for achieving the second research objective, a theoretical framework that considers four theories was embraced to guide the data collection and focus the study. The four theories are contingency theory, institutional theory, legitimacy theory, and stakeholder theory.

The findings of the first research objective revealed that there was a general lack of EMA utilisation within the case universities. This was in part due to a perceived lack of appreciation by key personnel of the extent of environmental costs being incurred, but arguably mainly because of the absence of relevant environmental cost information being brought to the attention of senior management. Although environmental sustainability was promoted as important from an environmental management perspective, efforts to improve internal environmental accountability, in particular from an accounting perspective, were still absent.

In relation to the second research objective, it was found that five key barriers contributed to this lack of EMA utilisation within the five case universities, and they were *attitudinal, financial, informational, institutional, and management* barriers. Among the factors that provide further explanations about how each barrier influences EMA adoption, *resistance to change, resource constraints, (a lack of) legitimacy considerations, and a lack of environmental responsibility & accountability* were found to be strong factors, as they were supported in all of the five cases.

Apart from the theoretical extension to this area of research, the results and findings of this study supported the uses and applications of EMA by the higher education sector. Much more can, and should, be done by universities in relation to how they account for the environment. This can provide benefits not only for the sector itself, but also for the environment in which we live.

# CHAPTER ONE

## INTRODUCTION

*The good news is that hidden in the shallows of the information failure created by conventional business accounting practices are unexploited opportunities to increase profits, use materials more efficiently, and protect the environment. What's more, firms of any size and in any industrial sector can make such gains, given the accurate cost information that evolving environmental accounting practices provide (Ditz, Ranganathan & Banks 1995, p. v).*

### 1.1 BACKGROUND

Accounting is now facing the challenge to account for the environment not only through its traditional role of recording and reporting financial information, but also through its role to manage environmental performance. Environmental accounting, which can assist in meeting this challenge, is an inclusive field of accounting, but represents a broader term that relates to the provision of relevant firm-level environmental performance information to internal and external stakeholders (Bennett & James 2000; Deegan 2003). Being a subset of environmental accounting, environmental management accounting (EMA) is regarded as an extension of conventional management accounting, and it is the focus of this research. For the purpose of this study, EMA is defined as the generation, analysis and use of monetary and physical (or financial and non-financial) environment-related information in order to improve organisational financial and environmental performance (Bartolomeo et al. 2000; Bennett & James 1997).

There are a number of perceived limitations of conventional management accounting practices in terms of improving environmental performance through managing environmental costs<sup>1</sup> (e.g. environmental costs being allocated to overhead accounts) (Burritt 2004; Deegan 2003; UNDSO 2001). In general, it is also accepted that the large majority of management accounting systems currently being used by organisations fail to attribute any form of environmental costs to organisational operations (Deegan 2003; Epstein 1996; UNDSO 2001). These limitations of management accounting practices or systems have meant that many opportunities for reducing environmental costs and improving environmental performance are

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<sup>1</sup> Traditionally, environmental costs have been thought of as being the end-of-pipe costs (e.g. the costs in relation to cleaning up contaminated sites or wastewater treatment costs). However, for the purpose of this study, the term is interpreted more broadly as including material and energy used to produce goods or provide services, and the input costs associated with wastes being generated (e.g. the capital costs, labour costs, or costs associated with the consumption of material and energy to produce the waste). Environmental costs will be discussed in greater depth in Chapter Two.

being lost. For example, the United Nations Division for Sustainable Development (UNSD) states:

Conventional management accounting systems attribute many environmental costs to general overhead accounts, with the consequence that product and production managers have no incentive to reduce environmental costs and executives are often unaware of the extent of environmental costs.... When environmental costs are allocated to overhead accounts shared by all product lines, products with low environmental costs subsidize those with high costs. This results in incorrect product pricing which reduces profitability (UNSD 2001, p. 1).

The role of EMA in extending the utilisation of management accounting for the management of environmental performance is attracting increased recognition. This has shifted the focus of conventional management accounting from financial information provision to the reduction of resource consumption and more efficient use of natural resources (IFAC 2005). The applicability of EMA in managing environmental performance is becoming apparent (see Gray & Bebbington 2000). Indeed, EMA has attracted increasing attention and interest as a support mechanism to manage environmental performance, but there appears to be a lack of EMA studies that focus on service organisations<sup>2</sup> (see Burritt 2004 for a summary of available EMA studies). This lack has led to the conduct of this research, which attempts to fill the gap by adding to the existing body of knowledge on the potential of EMA to be used for the management of environmental performance by service organisations in general, but universities in particular.

## **1.2 PROBLEM STATEMENT**

Various industries have been included in EMA-related research and case studies, but universities as part of the service organisations have typically failed to be the focus of interest and attention. It is true that universities generate less obvious environmental impacts<sup>3</sup> relative to manufacturing industries, but they still have several significant environmental impacts – both direct and indirect (Bennett, Hopkinson & James 2006). Indirect impacts include changes in environmental behaviour through the role of education and research. Direct impacts relate to the use of paper and the generation of solid wastes, but mainly arise from the need to provide facilities services and management, which place substantial demand on two resources with significant environmental implications – energy and water. For the purpose of this study, costs pertaining to the consumption of energy, water and paper, and the generation of wastes are referred to as the major environmental costs for universities.

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<sup>2</sup> Industries within the service sector are highly diverse. Generally speaking, any industry that does not extract any resources or materials from the environment or is not involved in manufacturing any products falls into this category (Blair & Hitchcock 2001). The sector includes both producer and consumer services – producer services are those who provide services to the other industries (e.g. accounting firms) and consumer services are those who serve the general public directly (e.g. universities).

<sup>3</sup> Environmental impacts are defined as ‘the influence of a corporation’s activities on the physical environment (e.g. the impact on land, water and air quality and on biodiversity)’ (Schaltegger, Burritt & Petersen 2003, p. 31).

Having both direct and indirect environmental impacts, universities can contribute towards achieving sustainable development<sup>4</sup> by improving their facilities services and management. The environmental impacts caused by their operations should be minimised and associated environmental costs need to be managed. Available service-based case studies (but still quite limited) appear to support the uses and applications of EMA to service organisations in reducing environmental impacts and minimising environmental costs. However, extending the applicability of EMA to universities for the purpose of managing the costs and improving environmental performance remains unexplored. Further, the influence of factors arising from the institutional or technical environment on EMA adoption has not yet been examined within a university setting, and hence is not yet understood. As Ditz, Ranganathan and Banks states:

What's more, firms of any size and in any industrial sector can make such gains, given the accurate cost information that evolving environmental accounting practices provide (1995, p. v).

This study is an attempt to extend the applicability of EMA to this unexplored area that directs attention towards universities, the sector that fails to be in the spotlight of EMA studies, but will be the primary focus of this research.

### **1.3 RESEARCH OBJECTIVES**

Developed from the problem statement outlined in the previous section, the two main research objectives of this study are:

- Understanding current accounting practices for managing the major environmental costs within universities; and
- Identifying factors influencing EMA adoption within universities.

### **1.4 RESEARCH DESIGN**

Being an exploratory study, the research followed a qualitative, case study methodology to achieve the two main research objectives. A case study approach was adopted because it allows flexibility to help the researcher uncover important factors and issues arising from a real-life context. To make the overall study more robust, a multiple-case design was chosen (Yin 2003b).

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<sup>4</sup> The popular definition of sustainable development is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (UNWCED 1987, p. 43). The concept emerged in the 1980s as the need became apparent to balance economic development and social progress with a focus placed on the environment and the stewardship of natural resources. The publication of *Our Common Future* by the United Nations World Commission on Environment and Development (UNWCED) in 1987 popularised this term and concept.

The research studied five universities using a combination of face-to-face and telephone interviews. In-depth interviews were conducted with key individuals in each university with the management functions of either environmental management or management accounting for the purpose of understanding the current state of accounting practices for managing the major environmental costs. To explore factors that would influence the decision to adopt, or not to adopt, EMA, more interviews were performed with the senior management and heads of academic schools of some case universities. Due to various degrees of access, the number of participants from each university varied with RMIT University having the most participants of eleven. Due to the greater access, the University was studied in greater depth than the other four universities.

As it is an unexplored area of research to extend EMA utilisation to universities, it is necessary to understand the current state of accounting practices for managing environmental costs within universities. Deegan (2003) suggests that the scope of environmental costs considered in early stages of EMA studies be reasonably limited. In view of the infancy of EMA for universities, the scope of environmental costs investigated by this study was limited to the major environmental costs for universities. The major environmental costs refer to costs pertaining to the consumption of energy, water and paper, and the generation of wastes.

To guide and focus the study in order to achieve the two research objectives, research questions and propositions formed from a theoretical framework embraced by this research were then developed. In relation to the first research objective, this study aimed at investigating current accounting practices for managing the major environmental costs. The following research questions were utilised to achieve this objective:

- Are specific types of the major environmental costs separately identified and measured? If yes, what are they? If not, why not?
- How are the major environmental costs, both physical and monetary, being captured (if at all) within the current accounting systems?
- How are the major environmental costs used in supporting external environmental reporting and internal environmental management?

As the second research objective, this study attempted to explore factors influencing universities to embrace EMA. To achieve this objective, eight propositions developed from a theoretical framework that considers four theories<sup>5</sup> were employed to guide the study in

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<sup>5</sup> The four theories are contingency theory, institutional theory, legitimacy theory, and stakeholder theory. The eight propositions and their supporting theories will be discussed in depth in Chapter Five.

identifying factors that either assist in, or impede, EMA adoption within universities.

## 1.5 RESEARCH RESULTS AND FINDINGS

There appeared to be a general lack of the utilisation of EMA by the case universities. Efforts to improve environmental performance from an accounting perspective were still lacking. Several perceived limitations of management accounting systems for managing environmental costs were found. These limitations included (but were not limited to) a bias towards monetary information, allocation of environmental costs to overhead accounts, and misallocation and underestimation of environmental costs. In terms of performance measurement, there was a general lack of environmental performance indicators against which to assess overall environmental performance. In general, key managers were not held accountable for environmental costs incurred, and they were not assessed against their environmental performance.

Five key barriers<sup>6</sup> (*attitudinal, financial, informational, institutional, and management barriers*) were found that impede EMA adoption. Factors that provide further explanations about this lack of EMA utilisation included:

- *Attitudinal barriers: low priority of accounting for the environment and resistance to change*
- *Financial barriers: resource constraints, efficiency or financial considerations, and environmental costs are not considered significant*
- *Informational barriers: difficulties in collecting or allocating environmental costs, and low physical environmental uncertainty*
- *Institutional barriers: lack of institutional pressure, stakeholder power, and legitimacy considerations*
- *Management barriers: few incentives provided to manage environmental costs, lack of integrating the environment into strategic planning, lack of environmental responsibility & accountability, and lack of advocacy from the university leadership*

*Resistance to change, resource constraints, legitimacy considerations, and a lack of environmental responsibility & accountability* were supported by participants from the five case universities to be impeding EMA adoption. Therefore, they could be strong factors that provide explanations about a lack of EMA utilisation within universities.

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<sup>6</sup> The five barriers represent key themes that emerged from the coded data, which will be discussed in Chapter Six.

## **1.6 RESEARCH LIMITATIONS AND ASSUMPTIONS**

Several limitations and assumptions should be noted and considered in order to properly interpret the findings and results of this study. These limitations and assumptions are discussed below.

- Access, time and cost considerations associated with the collection of qualitative data limit the choice of case universities to two countries (i.e. Australia and Taiwan). Eight universities were initially approached, five of which agreed to participate.
- The research was primarily exploratory and descriptive. It studied a limited sample of five universities. As the number of case universities was limited, care must be exercised to generalise the findings and results to other universities.
- While some of the theoretical propositions may lead to the possibility of inferring a causal relationship, it remains difficult to empirically test such a relationship. To establish this relationship, it would be required to ensure that one factor always causes another, and no other factor has the same effect (Cooper & Emory 1995). Apparently, this is less likely to be achieved in a business setting.
- There are certainly other factors that may affect the decision to adopt, or not to adopt, EMA by universities. The study focused particularly on the theory-based factors that were suggested by the proposed theoretical framework and potential factors that emerged from the interview data.
- Subjectivity is inherent in all human inquiries and interpretations. This study was subject to this subjectivity limitation during the interview and analytical stages. The interview data was subject to the knowledge and biases of the participants, whereas the results were subject to the biases arising from the interpretations and judgements by the researcher. However, efforts and procedures have been undertaken to decrease the level of subjectivity, which will be revisited in Chapter Six.

## **1.7 RESEARCH CONTRIBUTIONS**

By achieving the first research objective, this research will:

- Provide specific information to the higher education sector, which is the focus of this study, about how the major environmental costs are accounted for and managed;

- Identify limitations of current management accounting systems being used by universities for the purpose of managing environmental costs;
- Provide accounting-based suggestions about how environmental costs can be better managed; and
- Extend the applicability of EMA to the higher education sector.

By reaching the second research objective, this research will:

- Extend EMA literature by providing a theoretical framework that helps explain a lack of EMA utilisation; and
- Provide suggestions that could assist universities to embrace some form of EMA.

## 1.8 THESIS ORGANISATION

This thesis comprises ten chapters. The following table provides the purpose of each chapter and an overview of the organisation of this thesis. The next chapter, Chapter Two, will provide a general discussion on management accounting for the environment.

**TABLE 1.1 OUTLINE OF THE THESIS**

Number	Chapter	Purpose
One	Introduction	To provide an overview of this study
Two	Management Accounting for the Environment	To gain a general understanding of management accounting for the environment
Three	Environmental Management Accounting	To provide a detailed discussion on EMA
Four	Environmental Management Accounting and the Higher Education Sector	To extend the applicability of EMA to universities
Five	A Theoretical Framework for Environmental Management Accounting	To discuss the theoretical framework embraced by this study
Six	Research Methodology and Methods	To outline and explain the research methodology and methods
Seven	Results and Findings – the Case of RMIT University	To present the results and findings from the interviews held with eleven RMIT participants
Eight	Results and Findings – the Other Four Cases	To present the results and findings pertaining to the other four cases
Nine	Theoretical Implications	To revisit the theoretical framework and advance theoretical implications for practice
Ten	Summary and Conclusions	To provide summary and conclusions of this thesis

## CHAPTER TWO

### MANAGEMENT ACCOUNTING FOR THE ENVIRONMENT

#### 2.1 INTRODUCTION

The purpose of this chapter is to gain a general understanding of management accounting for the environment. To achieve this goal, a brief outline of the relationship among accounting, management information and the environment will be given. The challenge arising from the relationship for accounting in general will then be presented. Key terms to be frequently used in this research will be defined, which include *environmental accounting*, *environmental management accounting*, *environmental management*, *environmental costs* and the notion of *accountability*. An environmental accounting framework will also be introduced which shows how environmental accounting takes into account the environment and meets the information needs of both internal and external stakeholders. Some of the perceived limitations of management accounting practices will then be discussed. Following this discussion, the development of management accounting for the environment will be provided which leads to the focus of this study – environmental management accounting.

#### 2.2 ACCOUNTING, MANAGEMENT INFORMATION AND THE ENVIRONMENT

The principle focus of accounting is the provision of information to external parties and internal participants for the purpose of external reporting and internal management. In this sense, accounting includes two broad categories – financial accounting and management accounting. In general, financial accounting is mainly designed for the preparation of financial statements to external stakeholders (e.g. investors, creditors and tax authorities), while management accounting focuses on satisfying the information needs of internal management for decision making. Financial accounting is regulated by national laws and international standards, but management accounting is not. Therefore, financial accounting aims at providing standardised information on organisational financial performance. On the contrary, management accounting practice and information can be tailored to address specific management needs and suit organisational goals and culture. It can be seen that management accounting is the focus of this study.

In the past, the environment did not seem to appear on the business agenda. Pressure was less evident to force organisations to minimise their environmental impacts and manage environmental costs (IFAC 2005). This has now changed. As worldwide environmental

incidents and disasters<sup>7</sup> happen from time to time, the environmental consequences or environmental impacts various human economic activities have brought about have gained increasing attention. Of particular interest to both external and internal stakeholders is organisational environmental performance, especially for sectors with perceived environmental impacts (e.g. manufacturing industries) and in countries with strong environmental regulatory regimes (e.g. the United States) (Gray & Bebbington 2001). This goes far beyond the compliance with environmental laws or regulations and raises major implications and challenge for accounting.

### **2.3 THE CHALLENGE FOR ACCOUNTING – ACCOUNTING FOR THE ENVIRONMENT**

Accounting is now facing the challenge to account for the environment through its traditional role of recording and reporting financial information and through its potential role to manage environmental performance. Long ago, Tinker and Niemark (1987) argued that society expects that organisations repair or prevent damage to the environment (i.e. manage and minimise their environmental impacts). Much of the challenge for accounting has now been reinforced further by the changing societal expectations and ever-growing pressure on improving organisational environmental performance. Due to the increasing community concerns over the environment, organisations have to face the fact that they do not have an inherent right to the environment (in particular the use of natural resources) and they have to fulfil a new ‘social contract’ that is emerging. Gray, Owen and Adams describe a society as essentially ‘a series of individual “social contracts” between members of society and society itself’ (1996, p. 39). These contracts define the rights and responsibilities of the parties in that relationship and change the challenge facing the business organisations. Donaldson and Dunfee indicate that the business game is now ‘played by different rules and harbours different penalties and benefits than it did decades ago’ (2002, p. 1855). Organisations today are held responsible and accountable for a variety of issues, including environmental issues. Failure to meet the expectations will result in the revocation of an organisation’s ‘license to operate’ and affect its long-term survival (Deegan 2002; Donaldson & Dunfee 2002).

The changing society expectations have brought about more and tighter environmental regulations. Costs of non-compliance are increasing and corporate expenditures in environmental protection have risen<sup>8</sup>. Gray and Bebbington argue that ‘without a “greener accounting” many environmental initiatives will simply not get off the ground’ (2001, p. 13).

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<sup>7</sup> See the *Sustainable Development Timeline* (IISD 2006) or the *Environment and Sustainability Chronology* (Sustainability Reporting Program 2007) for descriptions of these incidents and disasters.

<sup>8</sup> For example, the Australian Bureau of Census and Statistics reported that for the financial year of 1996-97, environmental protection expenditure incurred in Australia was about AU\$1.6 billion, representing 1.6 percent of its gross domestic product (GDP) in that period (McLennan 1999).

To manage the environmental issues, pressures, associated costs and potential cost savings, various types of expertise from the accounting discipline are required. Research and studies regarding how accounting can contribute to the environment are well documented (e.g. Bartolomeo et al. 2000; Bennett, Bouma & Wolters 2002; Bennett & James 2000; Bennett, Rikhardsson & Schaltegger 2003; Burritt 2004; Deegan 2003; Gray & Bebbington 2001; Gray, Owen & Adams 1996; Schaltegger & Burritt 2000). They also indicate problems with conventional accounting in addressing these issues.

Conventional accounting, in an economic/business context, involves identifying, measuring, and communicating economic information to facilitate informed judgments and decisions by users of information (Fiedler & Lehman 1995). In Australia, for example, Statement of Accounting Concepts 2 (SAC 2), paragraph 43, states that the objective of general-purpose financial reports is to 'provide information useful to users for making and evaluating decisions about the allocation of scarce resources' (SAC 2, paragraph 43, cited in Deegan 2007). It seems that annual reports prepared by companies that adopt this objective should be primarily economic in focus. A review of the *International Accounting Standards Board Conceptual Framework* (or *IASB Framework*) reveals that conventional accounting does not usually give explicit, separate recognition to organisation-related environmental impacts and fails to provide a full account of the use of many resources, such as land, air and water (Deegan 2007).

Indeed, many costs, which organisations impose on the environment, are not accounted for (e.g. climate change, an environmental crisis facing the whole world (Stern 2006)). Ideally, these omitted costs ought to be internalised. Therefore, there is a frequent call by individuals and governments to apply some form of *environmental accounting*, which explicitly takes into account environment-related issues and embraces a broader perspective than does conventional accounting. In 1992, for example, the European Union (EU) released a document entitled *Towards Sustainability* as part of its *Fifth Action Programme*, which suggests that the accounting profession take a role in implementing costing systems that internalise environmental costs previously ignored. Specifically, EU called for a 'redefinition of accounting concepts, rules, conventions and methodology so as to ensure that the consumption and use of environmental resources are accounted for as part of the full cost of production and reflected in market prices' (European Commission 1992, cited in Deegan 2006).

Having discussed the challenge of accounting for the environment, it seems suitable at this stage to define environmental accounting and related key terms, including *environmental management accounting* – the focus of this study.

## **2.4 DEFINITIONS OF KEY TERMS**

Terms to be frequently used in this research include *environmental accounting*, *environmental management accounting*, *environmental management*, *environmental costs*, and the notion of *accountability* in relation to accounting. This section provides definitions and explains how the terms are used within this study and how they relate to the broader term, *environmental accounting*.

### **2.4.1 ENVIRONMENTAL ACCOUNTING**

Environmental accounting is an inclusive field of accounting and covers all areas of accounting that may be affected by organisational responses to the environment-related issues.

According to Gray and Bebbington, environmental accounting includes:

- Accounting for contingent environmental liabilities/risks
- Accounting for asset re-valuations and capital projections as they relate to the environment
- Cost analysis in key areas such as energy, waste and environmental protection
- Investment appraisal to include environmental factors
- Development of new accounting and information systems to cover all areas of environmental performance
- Assessing the costs and benefits of environmental improvement programs
- Developing accounting techniques which express assets and liabilities and costs in ecological (non-financial) terms (2001, p. 7).

Therefore, environmental accounting is a broader term in relation to the provision of environment-related information to stakeholders both within and outside an organisation. According to the United States Environmental Protection Agency (USEPA 1995b), environmental accounting is an umbrella term that covers three distinct contexts: national income accounting, financial accounting and management accounting. It can be applied at a firm, regional or national level (Bennett & James 2000; Deegan 2003; USEPA 1995b). Within the firm level, the scale and scope of application can also be narrowed down to a division, a facility, a product line, a system, or an activity (Ministry of the Environment 2005; Schaltegger & Burritt 2000). The research undertaken in this thesis focuses on ‘firm-level’ environmental accounting.

Definitions applicable to environmental accounting are many and varied (e.g. Bennett & James 2000; Deegan 2003; Gray & Bebbington 2001; Howes 2004; Ministry of the Environment 2005; Schaltegger & Burritt 2000; USEPA 1995b). Some of the frequently used definitions of environmental accounting are provided in Table 2.1.

**TABLE 2.1 A SUMMARY OF DEFINITIONS OF ENVIRONMENTAL ACCOUNTING**

<b>Source</b>	<b>Definition</b>
USEPA (1995b, p. 4)	The term environmental accounting has many meanings and uses. It can refer to national income accounting, financial accounting, or internal business managerial accounting. National income accounting is a macro-economic measure. Green GDP is an example and has been frequently used as a key measure of the society's economic wellbeing with the consideration of environmental depletion and degradation costs (Uno & Bartelmus 1998). In this context, environmental accounting has been termed 'natural resources accounting'. Financial accounting refers to the estimation and public reporting of environmental liabilities and financially material environmental costs based on generally accepted accounting principles (GAAP). Management accounting is the process of identifying, collecting, and analysing environmental information primarily for internal purposes. Unlike financial accounting, which is ruled or governed by GAAP, management accounting practices and systems can be tailored to meet the needs of the business they serve.
Gauthier et al. (1997, p. 1)	Environmental accounting is that aspect of accountancy which, while indissociable from financial and management accounting, deals more specifically with environmental concerns; that is, the aspect of the information system that enables data collection and analysis, performance follow-up, decision-making and accountability for the management of environmental costs and risks.
Graff et al. (1998, p. 3)	Environmental accounting is a broad-based term that refers to the incorporation of environmental costs and information into a variety of accounting practices.
Schaltegger and Burritt (2000, p. 30)	Environmental accounting is a branch of accounting that deals with: <ul style="list-style-type: none"> <li>• Activities, methods and systems</li> <li>• Recording, analysis and reporting</li> <li>• Environmentally induced financial impacts and ecological impacts of a defined economic system</li> </ul>
Bennett and James (2000, p. 30)	Environmental accounting covers both national and firm-level accounting activities, the processing of both financial and non-financial information, and the calculation and use of monetised external damage costs as well as those that are internal to the firm.
Deegan (2003, p. 10)	Environmental accounting is a broader term that relates to the provision of environmental-performance related information to stakeholders both within, and outside, the organisation. While environmental accounting can be 'corporate-focused', it should also be appreciated that environmental accounting can also be undertaken at a national or regional level.
Howes (2004, p. 100)	Environmental accounting is all about the link between environmental and financial performance more visible, getting 'environmental sustainability' embedded within an organisation's culture and operations and providing decision-makers with the sort of information that can help them to reduce costs and business risk and to add value.
Ministry of the Environment (2005, p. 3)	Environmental accounting aims at achieving sustainable development, maintaining a favourable relationship with the community, and pursuing effective and efficient environmental conservation activities. These accounting procedures allow a company to identify the cost of environmental conservation during the normal course of business, identify benefit gained from such activities, provide the best possible means of quantitative measurement (in monetary value or physical units) and support the communication of its results. Thus, environmental accounting can be used as an environmental information system to support both internal and external functions of companies.

In spite of some differences, most definitions emphasise key themes such as a link between financial and environmental performance, quantitative measurement in monetary value and physical units, accounting for internal and external costs, wider stakeholder considerations and a need for an environmental accounting information system. These emerging themes are considered in the further development of environmental accounting. For the purpose of this study, environmental accounting is deemed to represent a broader term that relates to the provision of firm-level environmental performance information to both internal and external stakeholders.

The next section will define environmental management accounting, a subset of environmental accounting.

#### **2.4.2 ENVIRONMENTAL MANAGEMENT ACCOUNTING**

Environmental management accounting is viewed as an extension of conventional management accounting. Management accounting is defined as measuring and reporting 'financial and non-financial information that helps managers make decisions to fulfil the goals of an organization' (Horngren, Datar & Foster 2003, pp. 2-3). Birkin indicates that 'EMA is a straightforward development of management accountancy' (1996, p. 34). Bennett and James (1997) explain that EMA can be seen as 'environment-related management accounting', but does not have a bias towards financial information. According to the United Nations Division for Sustainable Development (UNSD 2003), EMA is 'simply a better and more comprehensive approach to management accounting'. The UNSD states:

The general use of environmental management accounting information is for internal organizational calculations and decision making. EMA (environmental management accounting) procedures for internal decision making include both physical procedures for material and energy consumption, flows and final disposal, and monetarized procedures for costs, savings and revenues related to activities with potential environmental impact (UNSD 2001, p.1).

The International Federation of Accountants (IFAC) defines EMA as:

... the management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices. While this may include reporting and auditing in some companies, environmental management accounting typically involves life-cycle costing, full-cost accounting, benefits assessment, and strategic planning for environmental management (1998a, para.1).

The two definitions reveal that the development of EMA is set within an environmental management context. Management accounting has an important role to play in managing environment-related issues. For example, management accountants have the expertise and skills to improve the quality of environment-related information, which can be applied to assist in decision-making in relation to investment appraisal, capital budgeting and strategic management (Everett & Neu 2000; IFAC 2005).

As EMA is a flexible tool, there are many other definitions existing in the literature differing in the scope or boundary of application. An important feature of EMA as reflected in some definitions is the focus of EMA on both monetary and physical aspects of organisational environmental impacts (e.g. Bartolomeo et al. 2000; Burritt, Hahn & Schaltegger 2002b; Graff et al. 1998). Being the focus of this study, EMA will be revisited and discussed in greater detail in the next chapter. However, some frequently used EMA definitions are summarised in Table 2.2. For the purpose of this study, EMA is defined as the generation, analysis and use of monetary and physical (or financial and non-financial)

environment-related information in order to improve organisational financial and environmental performance.

**TABLE 2.2 A SUMMARY OF DEFINITIONS OF ENVIRONMENTAL MANAGEMENT ACCOUNTING**

Source	Definition
Birkin (1996, p. 34)	Environmental management accounting provides a service to management that is rooted in the internal functions of the firm but is outward-looking where appropriate.... EMA is a straightforward development of management accountancy.
Bennett and James (1997, n.p.)	[EMA is] the generation, analysis and use of financial and non-financial information in order to improve corporate environmental and economic performance.
Graff et al. (1998, pp. 3-4)	In terms of management (or internal) accounting, EA (environmental accounting) is the way that business can account for the material use and environmental costs of their operations. Material accounting is a means of tracking material flows through a facility in order to characterize inputs and outputs for purposes of evaluating both resource efficiency and environmental improvement opportunities. Environmental cost accounting is how environmental costs – including those that are often hidden in general overhead accounts – are identified and allocated to the material flows or other physical aspects of a firm’s operations (as might be identified via material accounting).
Bartolomeo et al. (2000, p. 37)	[EMA is] the generation, analysis and use of financial and related non-financial information in order to integrate corporate environmental and economic policies, and build sustainable business.
UNSD (2001, p. 8)	Environmental management accounting thus represents a combined approach which provides for the transition of data from financial accounting and cost accounting to increase material efficiency, reduce environmental impact and risk and reduce costs of environmental protection.
Burritt, Hahn and Schaltegger (2002b, p. 41)	It is proposed that EMA be defined as a generic term that includes both Monetary Environmental Management Accounting (MEMA) and Physical Environmental Management Accounting (PEMA).
UNSD (2003, n.p.)	EMA is simply a better and more comprehensive approach to management accounting, with a particular focus on costs related to wasted raw materials and other environmental issues. Key points are: <ul style="list-style-type: none"> <li>• EMA focuses on costs internal to the company; EMA does not include costs to society or the environment for which a company is not held accountable.</li> <li>• EMA places particular emphasis on accounting for environment-related costs such as waste management costs and the lost value of wasted raw materials.</li> <li>• EMA encompasses not only cost information, but also information on quantities, flows and disposal of materials and energy.</li> <li>• EMA information is valuable for many types of management activities or decisions, but is particularly useful for environmental management.</li> <li>• EMA’s main use is typically for internal management and decision-making, but EMA information is increasingly being used for external reporting purposes in financial reports or annual environmental reports.</li> </ul>
Bouma and Correlje (2003, p. 259)	EMA can be regarded as a subset of environmental accounting which refers to accounting systems and techniques that provide decision-makers and management with financial and non-financial information about the firm or organisation and its environment.
Bennett, Rikhardsson and Schaltegger (2003, p. vii)	EMA is understood here as environmental accounting which is specifically addressed to supporting the information needs of the organisation’s own management.
Rikhardsson et al. (2005a, p. 2)	... EMA is a form of technology. Not in the sense that a car or a computer is a technology, but in the sense of a managerial technology, which combines knowledge, methodology and practice and applies these to linking environmental management and economic results. Technology is often defined as putting knowledge to practical use, and EMA covers various tools and techniques of targeted information collection, analysis and communication and is thus a type of information management technology or managerial technology... it is important to emphasize that EMA covers a large set of different tools ranging from environmental cost accounting, to investment appraisal, budgeting, performance measurement and material flow accounting.

### **2.4.3 ENVIRONMENTAL MANAGEMENT**

The term environmental management appears frequently in EMA literature mainly due to its emphasis on environmental performance. Like environmental accounting and EMA, there are different ways of defining environmental management. Gray and Bebbington define environmental management broadly as:

... the range of responses by companies to environmental issues in reviewing their environmental position, developing and implementing policies and strategies to improve that position and in changing management systems to ensure ongoing improvement and effective management (2001, pp. 7-8)

According to Klassen and McLaughlin, environmental management ‘encompasses all efforts to minimize the negative environmental impact of the firm’s products throughout their life cycle’ (1996, p. 1199). Schaltegger, Burritt and Petersen explain that environmental management helps to reduce ‘environmental impacts imposed by existing technology in an economic way, as far as possible’ (2003, p. 30). The provision of environmental performance information enables stakeholders to understand how successful an organisation is doing in reducing or minimising environmental impacts. The broader definition of environmental management by Gray and Bebbington (2001) will be used for the purpose of this study.

To assist in environmental management, the development of environmental management systems attracts increasing interest and attention, for example the European Union’s Eco-Management and Audit Scheme (EMAS), the British Standards Institute’s Environmental Management Standard BS7750 and the International Organisation for Standardisation’s ISO 14000 series<sup>9</sup>. These standards or systems share a commonality to ensure that environmental objectives and targets are measurable and achievable via three mechanisms – environmental efficiency of an organisation’s operations, compliance with laws, regulations and internal environmental policy, and reliability of management reports (KPMG 1997). They have provided a demanding framework for managing environmental performance and raised important implications for EMA in areas such as business strategic planning, costs/benefits analysis of environmental improvement or programs, and environmental performance reporting (Gray & Bebbington 2001). The focus on minimising environmental impacts and managing environmental performance gives rise to the need to introduce environmental costs.

### **2.4.4 ENVIRONMENTAL COSTS**

A cost is ‘a resource sacrificed or forgone to achieve a specific objective... [It is] usually measured as the monetary amount that must be paid to acquire goods or services’ (Horngren,

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<sup>9</sup> Whilst these standards have much in common, there are still some important differences that have been the subject of discussions. See Gray and Bebbington (2001) for discussions.

Datar & Foster 2003, p. 30). Atkinson, Kaplan and Young define environmental costs as follows:

Environmental costs fall into two categories: explicit and implicit. Explicit costs include the direct costs of modifying technology and processes, costs of cleanup and disposal, costs of permits to operate a facility, fines levied by government agencies, and litigation fees. Implicit costs are often more closely tied to the infrastructure required to monitor environmental issues. These costs are usually administration and legal counsel, employee education and awareness, and the loss of goodwill if environmental disasters occur (2004, p. 298).

The explicit/implicit dichotomy seems to offer limited guidance in identifying environmental costs, but it reveals the difficulties in defining environmental costs. Ideally, environmental costs should include all costs in relation to organisational activities that impact the environment. In practice, however, that is not feasible. For example:

From an all-embracing systems viewpoint, companies are subsystems of the economy, the economy is a subsystem of society and society is a subsystem of the natural environment. From this perspective, environmental accounting would include all costs that can possibly exist – social, economic and company-level costs. Every use of the environment could be seen as a ‘consumption of goods and services’ and could be expressed as an environmental cost. To attempt to do so, although, of course, an ideal situation, would in practice not be feasible (Schaltegger & Burritt 2000, p. 96).

In general, it is agreed that two types of environmental costs exist – private or internal costs and externalities or societal costs (Deegan 2003; Schaltegger & Burritt 2000; UNDSO 2001; USEPA 1995b). Private or internal costs are ‘costs that directly impact a company’s bottom line’, whereas externalities or societal costs ‘encompass the costs to individuals, society, and the environment for which a company is not accountable’ (USEPA 1995b, p. 1). Schaltegger and Burritt (2000) explain that externalities are costs borne by the society as a whole rather than those who cause the costs and enjoy the benefits, and traditionally these costs are not reflected in a company’s account. This study does not consider externalities, but instead will focus on private costs only. Hence, environmental costs are referred to as costs that directly impact organisational financial performance for the purpose of this study.

It should be noted that for internal management, it is more important to identify relevant environmental costs (UNDSO 2001; USEPA 1995b). Whether an environmental cost is relevant depends on how the cost information will be used, and under what scope or scale the cost identification will be applied. Burritt indicates that the considerations in relation to the relevance of environmental costs typically include:

- The management function (e.g. decision-making or internal control and accountability);
- The specific decision being made (e.g. capital investment);
- The role of the manager in the value chain (e.g. design or production);
- The responsibility level of the manager (e.g. top manager or line manager); and
- The appraisal system (e.g. individual performance appraisal) (2004, p. 15).

## 2.4.5 THE NOTION OF ACCOUNTABILITY

The role of accounting to provide information leads to the need to ensure ‘flows of information in which those controlling the resources provide accounts to society of their use of those resources’ (Gray, Owen & Adams 1996, p. 37). This is accountability, which reflects a ‘responsibility or duty’ to provide information and a ‘right’ to receive the information. Jackson indicates that accountability ‘involves explaining or justifying what has been done, what is being done and what has been planned’ (1982, p. 220). Gray, Owen & Adams define accountability as ‘the duty to provide an account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible’ (1996, p. 38). Gauthier et al. explain accountability within the context of environmental accounting as follows:

Accountability is defined as the obligation imposed on a manager (leader, administrator, etc) by the law or a regulation or contract to demonstrate that he or she has managed or controlled, in accordance with certain explicit or implicit conditions, the resources with which he or she has been entrusted. Accountability, therefore, requires disclosure of the information deemed necessary to account for the company’s performance with respect to the issues and objectives previously established. In the context of environmental accounting, a company must account for its overall performance, including its performance with regard to environmental issues (1997, p. 29).

Two major themes are involved in this context: (i) managers being held responsible and accountable to meet organisational environmental objectives or targets, and (ii) providing an account of actions taken or progress made to improve environmental performance. According to Ijiri (1983), this accountability relationship exists not only outside but also inside a firm. Externally, a firm may be required to provide an account to investors, interest groups, government, or the public in general. Internally, managers and employees are also accountable to their respective supervisors based upon the organisational hierarchy of authorities and responsibilities. Under this relationship, environmental accounting acts as a mechanism to assure a smooth flow of the required environmental performance information to both external and internal stakeholders. For the purpose of this thesis, the notion of accountability as defined by Gauthier et al. (1997) is adopted.

Burritt and Welch (1997) emphasise that simply giving an account is not enough to discharge accountability. Enforcement mechanisms are crucial and required to hold the accountor to account for actions taken and consequences incurred. Enforcement mechanisms refer to the power of the accountee, and they may include accounting and audit procedures, regulations and obligations, or fiduciary duties of senior management. For example, Australia, Denmark, the Netherlands, Norway, Sweden and the United States all have mandatory requirements that organisations report aspects of their environmental performance to the public (KPMG 1999).

However, a literature review reveals that internal drivers to improve accountability tend to be ignored. Parker (2000b) indicates that limited attention has been paid to the improvement of accountability through internal management (e.g. innovations and developments in accounting information and reporting for internal decision-making and control in corporations). He argues that while considerable environmental information has been disclosed, little is known about management and accounting control systems in use and attitudes of managers to environmental costing in particular. Parker's argument highlights an imbalance deserving attention – given that while accounting can play a role in external environmental reporting, it has the potential to make significant contributions to the internal management of environmental performance (Parker 2000b). This generates the need to introduce a specific dimension of accountability – environmental accountability.

#### **2.4.5.1 ENVIRONMENTAL ACCOUNTABILITY**

Environmental accountability requires an organisation to be involved in some sort of environmental management and to provide both financial and non-financial accounts of the environmental impacts caused and management progresses made (Burritt & Welch 1997). Parker (2000b) explains that the development of environmental accountability requires management accounting, especially in areas such as environmental costing, investment appraisal, environmental performance indicators, capital budgeting, strategic management and management behaviour change. Gauthier et al. state:

Information compiled and distributed internally is intended to serve two well-defined purposes: to support decision-making and to track the company's environmental management performance and foster its continuous improvement (1997, p. 29).

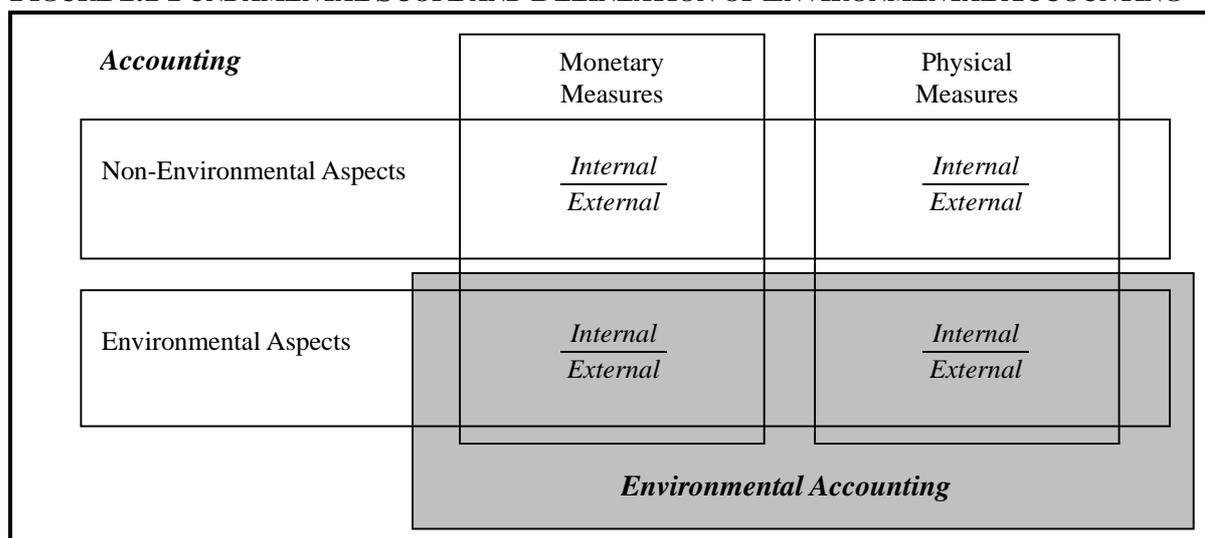
Gray, Owen and Adams concur that 'more information usually leads to different actions and demands for even more, rather than less, information' (1996, p. 43). If the concept of this information transparency is applied within the context of environmental accountability, environmental accountability can be seen as a result of managers being held responsible for environmental performance, which in turn increases managers' responsibilities and drives continuous environmental improvement (Gray, Owen & Adams 1996).

#### **2.5 FIRM-LEVEL ENVIRONMENTAL ACCOUNTING**

In the preceding sections, a number of the basic but essential issues relevant to management accounting for the environment were discussed, including key definitions. With this background, it is useful to introduce an environmental accounting framework that shows where EMA resides within the broader environmental accounting.

Various perceptions and different approaches were proposed and developed to classify the broader environmental accounting (for example, Bartolomeo et al. 1999; Bennett & James 2000; Bennett, James & Klinkers 1999; Birkin 1997d; Boons et al. 2000; Gray & Bebbington 2001; Gray, Owen & Adams 1996; Lesourd & Schilizzi 2001; Maunders & Burritt 1991; Richardson & Henriques 2004; Schaltegger & Burritt 2000; Schaltegger, Burritt & Petersen 2003). Although the term environmental accounting itself has been defined differently and used loosely and ambiguously, there is consensus that environmental accounting explicitly takes into account monetary and physical environmental information. This information can be used for the purposes of both internal management and external reporting. Given this general consensus, the fundamental scope and delineation of environmental accounting can be distinguished as shown in Figure 2.1.

**FIGURE 2.1 FUNDAMENTAL SCOPE AND DELINEATION OF ENVIRONMENTAL ACCOUNTING**



Source: Adapted from Burritt, Hahn and Schaltegger (2002a, p. 23)

Figure 2.1 shows different focal points on organisational activities (environmental and non-environmental) in an attempt to balance two types of measures (monetary and physical) and to target various stakeholders for the purposes of internal decision support and external reporting. It is clear that environmental accounting is part of accounting, but different from conventional accounting, environmental accounting explicitly considers environmental impacts caused by organisational activities (Burritt, Hahn & Schaltegger 2002b).

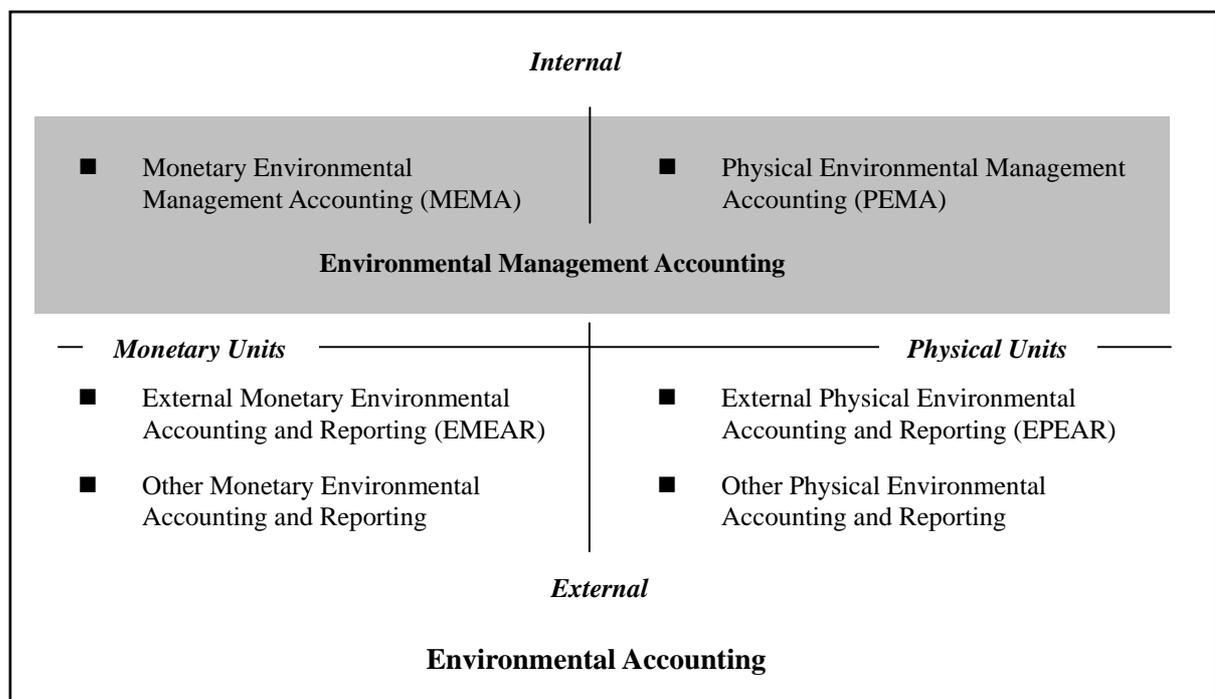
The monetary and physical measures that environmental accounting emphasises are not new to conventional accounting. Traditionally, managers need physical data to make decisions about production efficiency, product cost allocation or performance measurement. For example, physical amounts of inputs are controlled and possibly decreased to achieve a given

output level to improve production efficiency (Horngren, Datar & Foster 2003). From the perspective of efficiency (i.e. the concept of ‘producing more with less’ or ‘producing the same with less’), the existing physical data are of great use in environmental accounting. However, most of them are not making their way into the decision-making process. For the purpose of integrating this physical information into decision-making process, a discussion of subsets of environmental accounting is required.

### 2.5.1 SUBSETS OF ENVIRONMENTAL ACCOUNTING

A literature review suggests three major subsets of environmental accounting, namely EMA, external environmental accounting and reporting, and other environmental accounting. Figure 2.2 shows the subsets of environmental accounting expressed at different measures and for different stakeholders.

**FIGURE 2.2 SUBSETS OF ENVIRONMENTAL ACCOUNTING**



Source: Modified from Burritt, Hahn and Schaltegger (2002a, p. 27)

#### 2.5.1.1 ENVIRONMENTAL MANAGEMENT ACCOUNTING

As a subset of environmental accounting, EMA takes in both monetary and physical aspects of environmental accounting. EMA has the primary purpose of providing internal decision support for the management of both environmental and financial performance, part of which belongs to the scope of traditional management accounting. As the classification of monetary and physical information does not always provide a useful distinction in conventional

management accounting where both co-exist, it is suggested that EMA be seen as a generic term that includes both monetary and physical EMA as reflected in Figure 2.2 (Burritt, Hahn & Schaltegger 2002a). However, the distinction between monetary and physical information must not be abandoned completely because it encourages the management and measurement of non-financial aspects of corporate environmental performance. This physical information is argued to be useful in reflecting the 'relevant cost' of organisations (Johnson & Kaplan 1987; Kaplan & Norton 1996). The distinction between monetary and physical information will be revisited in the next chapter.

#### ■ ***MONETARY ENVIRONMENTAL MANAGEMENT ACCOUNTING (MEMA)***

MEMA extends the use of conventional management accounting to deal with environmental aspects of organisational activities expressed in monetary units (e.g. financial costs of ensuring compliance with environmental laws or regulations; investment in pollution prevention measures). It helps address the issues in relation to track, trace and treat environmental costs and associated revenues (or cost savings), which in turn can serve as the basis for improving environmental performance (Schaltegger & Burritt 2000). MEMA focuses on the financial aspect of organisational activities that impact the environment, and it is useful in setting desired, but achievable, goals and targets (Burritt, Hahn & Schaltegger 2002a; Schaltegger & Burritt 2000). Further, it acts as a control and monitor device that drives environmental accountability.

#### ■ ***PHYSICAL ENVIRONMENTAL MANAGEMENT ACCOUNTING (PEMA)***

PEMA is used as an internal management tool to deal with organisational environmental impacts expressed in physical units (e.g. electricity usage being measured in kWhs or greenhouse gas produced in tonnes). According to Schaltegger and Burritt, it serves as:

- An analytical tool designed to detect ecological strengths and weaknesses;
- A decision-support technique concerned with highlighting relative environmental quality;
- A measurement tool that is an integral part of other environmental measures such as eco-efficiency;
- A tool for direct and indirect control of environmental consequences;
- An accountability tool providing a neutral and transparent base for internal and, indirectly, external communication; and
- A tool with a close and complementary fit to the set of tools being developed to help promote ecologically sustainable development (2000, p. 261).

### **2.5.1.2 ENVIRONMENTAL ACCOUNTING AND REPORTING**

Environmental accounting and reporting is concerned with the aspect of accounting which assesses the financial effects (returns and gain) of environmental impacts on organisations to inform external stakeholders (e.g. investors, lenders and other financial stakeholders). The two dimensions of environmental accounting and reporting for external stakeholders are

discussed in the following section.

#### ■ ***EXTERNAL MONETARY ENVIRONMENTAL ACCOUNTING AND REPORTING (EMEAR)***

EMEAR is based on the same conventions or principles as conventional financial accounting. Therefore, issues in relation to conventional financial accounting have been carried over to EMEAR (but with an environmental focus), for example:

- Whether to capitalise or expense environmental induced costs,
- How to treat contingent environmental liabilities,
- How to measure environmental assets,
- How to treat indirect environmental costs, and
- How to treat tradable emission allowance (Schaltegger, Burritt & Petersen 2003; Schaltegger, Muller & Hindrichsen 1996).

To date, more attention has been placed on this subset, especially in the US where the huge liabilities arising from the remediation of contaminated sites has attracted much attention (Ditz, Ranganathan & Banks 1995). Although the scale of such liabilities is less in the UK and the other European countries, it can be significant for some organisations and may become more so as more rigorous legislations are introduced (Bartolomeo et al. 2000).

#### ■ ***EXTERNAL PHYSICAL ENVIRONMENTAL ACCOUNTING AND REPORTING (EPEAR)***

Examples of EPEAR include annual reports with environment-related information or stand-alone environmental reports that are issued to meet the information need of external stakeholders. Over the past decade, a number of such environmental reports have been published in response to the increasing demand from the general public, the media, shareholders, environmental funds, non-government organisations and pressure groups (Schaltegger, Muller & Hindrichsen 1996). The Global Reporting Initiative on sustainability (GRI) has developed reporting guidelines to provide guidance for organisations that voluntarily choose to report related information<sup>10</sup>. These guidelines are universally applicable and comparable to enable stakeholders to understand disclosed information. Total energy used, energy per square foot, energy per capita and greenhouse gas emissions are some examples of physical environmental information that can be included in sustainability reports.

Gray and Bebbington (2001) argue that this subset is where financial accounting has much to contribute, especially in the area of reporting environmental performance and in the generation, collection and analysis of quantitative data on the consumption of resources and

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<sup>10</sup> More than 1,000 organisations around the world report their sustainability information using the GRI guidelines, including banks and universities. See <http://www.globalreporting.org/AboutGRI/> for more information.

materials. Much of this environmental information has already existed but needs to be integrated into accounting records and systems.

### **2.5.1.3 OTHER ENVIRONMENTAL ACCOUNTING AND REPORTING**

This subset includes monetary and physical environmental regulatory accounting and reporting (ERAR). Monetary ERAR extends considerations of conventional accounting to different aspects of how environmental issues affect organisations. Physical ERAR measures data in physical units and provides a means to ensure compliance with particular regulations (Schaltegger & Burritt 2000). Several specific accounting systems, such as tax accounting and bank regulatory accounting, are covered under this subset. Environment-related information is generated and reported to fulfil the requirements imposed by various government tax agencies or bank regulatory agencies. Environmental issues considered include (but are not limited to) effects of pollution subsidies and accelerated depreciation on cleaner production technologies, and the consequences of various environmental taxes (e.g. taxes on carbon dioxide emissions, sulphur emissions and discharges of volatile organic compounds) (Schaltegger & Burritt 2000). Insurance companies represent another interest group who requires such information for risk assessment, primarily due to the consequences of increasing contingent liabilities resulting from the negative impacts on the environment (Schaltegger, Burritt & Petersen 2003).

Having discussed the framework in which EMA is part of the broader environmental accounting, it would be useful to bring up a range of perceived limitations of current management accounting practices, which require insights and directions provided by this framework to help make changes possible. An introduction to the limitations is deemed necessary to understand issues arising from the attempt to apply some form of EMA and to discharge environmental accountability.

## **2.6 PERCEIVED LIMITATIONS OF MANAGEMENT ACCOUNTING PRACTICES**

It is generally agreed that conventional management accounting pays little or no attention to attributing environmental costs to an organisation's operations (Deegan 2003; Epstein 1996; UNDSO 2001). Arguably it is due in part to the mistaken belief that environmental costs are not significant and partly because general management accounting has a bias towards monetary information or tends to ignore the importance of physical information in managing environmental impacts. Burritt indicates that 'internal accountability is based on visibility of environmental costs' (2004, p. 15). The ignorance or invisibility of environmental costs has meant that many opportunities for managing and reducing environmental costs are being lost.

There are also a number of other limitations having been identified that together make it difficult to collect and evaluate environmental costs effectively (Burritt 2004). These limitations include (but are not limited to) the allocation of environmental costs to overhead accounts as well as misallocation and underestimation of environmental costs, which could lead to missing, inaccurate or misinterpreted information being used for environmental management decisions. Several studies indicate that part of the reason might be a lack of, or poor, communication between managers with the accounting and environmental management functions (e.g. Bakker 1998; Deegan 2003; Ditz, Ranganathan & Banks 1995; Epstein 1996; UNDSO 2001).

The above-mentioned limitations are not specific to a particular industry, but instead they are common to both manufacturing and service sectors. These limitations will be examined in turn, including the issue that environmental costs are not considered significant, a bias towards monetary information, allocation of environmental costs to overhead accounts, misallocation and underestimation of environmental costs, and poor communication between managers with accounting and environmental management functions.

### **2.6.1 ENVIRONMENTAL COSTS ARE NOT CONSIDERED SIGNIFICANT**

Parker (2000b) argues that responses of management accountants to environmental issues have shown them to be notably reticent, and they typically do not consider these issues to be relevant to their profession. Gray et al. (1998) explain part of the reason being that they are not convinced that environmental costs are significant enough to be separately identified and treated. Epstein (1996) indicates that many organisations continue to underestimate product costs because they have no systems for accurately accumulating environmental costs. Ditz, Ranganathan and Banks state that 'environmental costs are dispersed throughout most businesses and can appear long after decisions are made' (1995, p. 1). Managing environmental costs does not seem to be a priority until end-of-pipe costs or economic benefits of managing these costs become evident (Graff et al. 1998). Chinander (2001) concurs that it is not easy to attract attention and interest in the environmental area simply because environmental impacts may be hard to see, have lagged effects with long latency periods, and are possibly less visible than effects due to poor safety performance.

If environmental costs are deemed to be insignificant, chances to manage and reduce these costs are low and tend to be ignored. Du Pont, for example, found that the environmental cost of one particular pesticide produced represents more than 19 percent of the company's total manufacturing cost (Ditz, Ranganathan & Banks 1995). Without segregated information, it is hard even for companies like Du Pont to realise how significant its environmental costs are.

This is where EMA has an important role to play – separate identification of environmental costs, both monetary and physical.

## **2.6.2 A BIAS TOWARDS MONETARY INFORMATION**

Bennett and James (1997) indicate that general management accounting has a bias towards monetary or financial information. It is, in large part, because management accounting has been driven more by the external professional accounting rules or regulations. Evidence from many entities reflects the fact that external financial reporting determines the information for internal decision-making (Ditz, Ranganathan & Banks 1995; Johnson & Kaplan 1987). Stone indicates that ‘its [management accounting’s] failures have been attributed to an undue influence of financial accounting concerns’ (1995, p. 102). Horngren, Datar and Foster state that ‘a cost concept used for the external reporting purpose of accounting may not be an appropriate concept for internal, routine reporting to managers’ (2003, p. 15).

According to Johnson and Kaplan (1987), conventional management accounting systems attempt to achieve three goals: allocating certain period costs to products or services for periodical financial statement preparation, providing process control information to cost centre managers, and providing estimated product cost to product managers. However, only the first goal is fulfilled well due to a consideration in favour of financial accounting. The relevant cost for internal management is thus lost (Johnson & Kaplan 1987; Otley 2001; Schaltegger & Burritt 2000). The International Federation of Accountants (IFAC) states:

Although larger manufacturing companies annually generate millions of data records concerning material movements from Enterprise Resource Planning (ERP) and other software systems, the available information often is still not sufficiently accurate or detailed for environmental, efficiency and other decision-making purposes. For example, sometimes the posting of materials purchase information does not allow clear identification of the amount and value of different categories of purchased materials... If, however, this cost information is recorded in the accounting records as a single lump sum figure, with no detail on the split between materials purchase costs and other processing costs, then disaggregation of these costs for later decision making can be difficult and time consuming (2005, p. 21).

In contrast to financial accounting, management accounting has a different time period for reporting, covers different categories of fixed and variable costs, requires different degrees of traceability and allocation, and serves different groups of audiences or stakeholders. Management accounting systems require a different and separate consideration from the current one that tends to be affected by financial accounting and has a bias towards monetary information (Johnson & Kaplan 1987; Stone 1995). According to Kaplan and Norton (1992; 1993), managers need both monetary (financial) and physical (operational) measures to effectively manage an organisation (particularly in terms of environmental issues). A choice between the two is not necessary.

The two limitations (the issue that environmental costs are not considered significant and the existence of a bias towards monetary information) have impacts on how environmental costs are accounted for within management accounting systems. The other two limitations, allocation of environmental costs to overhead accounts as well as misallocation and underestimation of environmental costs, are related to the design of such systems. They are discussed in the following.

### **2.6.3 ALLOCATION OF ENVIRONMENTAL COSTS TO OVERHEAD ACCOUNTS**

Most available EMA studies dealing with the identification of environmental costs address this issue – they find that indirect environmental costs are being accumulated in general overhead accounts. Many of these costs are product or process specific and have environmental implications (e.g. energy cost, water cost, waste treatment cost and legal expenses associated with particular emissions or releases). This common practice often contributes to environmental costs being hidden and distorts environment-related information (Deegan 2003; Ditz, Ranganathan & Banks 1995; UNDSO 2001). The United Nations Division for Sustainable Development (UNDSO) indicates:

A rule of thumb of environmental management is that 20 percent of production activities are responsible for 80 percent of environmental costs. When environmental costs are allocated to overhead accounts shared by all product lines, products with low environmental costs subsidize those with high costs. This results in incorrect product pricing which reduces profitability (2001, p. 1).

Ditz, Ranganathan and Banks state:

Traditionally, most environmental costs within firms are not traced directly to their sources. Rather, they are accumulated in overhead pools and allocated across production processes in proportion to such simple measures as labour hours or units of output. As long as the costs stay small, sorting out the exact contributions of every process or activity scarcely seems worth the trouble.... Yet, when the costs become significant, and when different parts of an organization contribute to them unequally, tighter accounting can do more than pay for itself. Consider what happens when inaccurate cost allocations misrepresent costs, thus sending the wrong signals to managers and other decision-makers inside the company (1995, p. 9).

When environmental costs are accumulated in overheads, subsequent cost allocation can be problematic. Overhead costs typically are allocated to cost centres in proportion to such simple bases as labour hours, product units or floor spaces. This might be an inaccurate way to allocate some typical environmental costs. According to Deegan (2003), an example is wastewater treatment costs, which might be predominantly caused by some particular products whose production generates significant amount of wastewater. In this case, allocation of wastewater treatment costs to all of the company's products would be inaccurate, as would be product pricing and other decisions based on that information. Such allocation provides limited incentives for managers to reduce or control environmental costs.

Most of the recent EMA case studies draw similar conclusions (e.g. Bennett et al. 1996; Deegan 2003; Kreuze & Newell 1994; Rogers & Kristof 2003). Therefore, a review of overhead accounts is considered a key procedure for projects or case studies aimed at identifying and then reducing environmental costs. A subsequent assessment of the relative importance of environmental costs and cost analysis can then help an organisation determine whether the cost allocation bases being used are appropriate. The United States Environmental Protection Agency (USEPA) suggests:

Separating environmental costs from overhead accounts where they are often hidden and allocating them to the appropriate product, process, system, or facility directly responsible reveals these costs to managers, cost analysts, engineers, designers, and others. This is critical not only for a business to have accurate estimates of production costs for different product lines and processes, but also to help managers target cost reduction activities that can also improve environmental quality (1995b, p. 20).

#### **2.6.4 MISALLOCATION AND UNDERESTIMATION OF ENVIRONMENTAL COSTS**

In addition to the potential problems with the use of overhead accounts, environmental costs are often hidden because they are mistakenly included in some traditional cost categories, such as raw materials, utilities, or packaging. Ditz, Ranganathan & Banks state:

Ultimately, managers must look beyond their traditional sources of cost information to develop a truer picture of environmental costs. But even existing cost information, when examined through an environmental lens, yields new insights.... Environmental costs are hidden in many of the conventional cost categories. At least some portion of costs that are commonly scored as 'labour' or 'materials' are a consequence of environmental objectives (1995, p. 10).

Waste cost<sup>11</sup> seems to be a good example to address the issue because it is regarded as one of the most significant environmental costs in organisations (Deegan 2003; HEEPI 2007c). A common practice for costing waste is simply to consider and include the contract cost paid to have the waste removed and dumped, or if waste is going to the sewer, the sewerage cost being paid. The amount and value of the non-product output (in the form of waste) and the true cost of waste management (e.g. cost of waste handling, recycling, disposal and treatment) have been long ignored in calculating waste cost, even in large and well-managed organisations (UNSD 2003). The Australian case studies by Deegan (2003) suggest that organisations really do seem to need a separate account for waste which records the cost incurred in producing the waste stream, but not simply the waste disposal cost. A simple refinement of management accounting systems might provide the necessary impetus for significant financial and environmental improvement.

Given this practical drawback of conventional accounting information, it is not surprising that managers have a distorted picture of environmental costs. For example, S.C. Johnson Wax

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<sup>11</sup> Waste can include solid, liquid, or gaseous waste, some of which might be hazardous and could potentially result in environmental liabilities.

found that environmental costs identified for one consumer product are approximately 2.4 percent of their net sales, but a closer look at this product revealed that environmental costs exceed the operating profit for that product (Ditz, Ranganathan & Banks 1995). Environmental costs can be substantial and significant enough to affect the profits, but environmental cost information being wrongfully accumulated in other cost categories makes it less possible to recognise or quantify relevant costs for a particular process, service or product. A literature review reveals that poor communication between management accountants and environmental managers explains part of the problem.

### **2.6.5 POOR COMMUNICATION BETWEEN MANAGERS WITH ACCOUNTING AND ENVIRONMENTAL MANAGEMENT FUNCTIONS**

The fact that environmental costs might be hidden in other expenses (or even unaccounted for) constitutes a barrier to implement environmental policies or initiatives in relation to environmental management (e.g. Bakker 1998) and management accounting (e.g. Deegan 2003; Ditz, Ranganathan & Banks 1995; Epstein 1996). Arguably, it could be due to a missing link between environmental management and management accounting, or a poor communication between people with environmental and accounting functions (Deegan 2003; UNDSO 2001). The United Nations Division for Sustainable Development states:

Experience shows that the environmental manager barely has access to the actual cost accounting documents of the company and is only aware of a tiny fraction of aggregate environmental costs. On the other hand, the (financial) controller does have most of the information but is unable to separate the environmental part without further guidance. In addition, he or she is limited to thinking within the framework of existing accounts. Also, the two departments tend to have a severe language problem (2001, p. 8).

Gray and Bebbington (2001) explain that environmental management is a multifunctional task and its success often depends on co-operation between different functions, including primary activities (e.g. production or providing services) and support activities (e.g. accounting). Traditionally, accounting or financial managers have most of the environmental cost information, but they have difficulties in separating the environmental part without further assistance and guidance (UNDSO 2001). Conversely, environmental managers make efforts to evaluate and reduce environmental impacts, but they seldom relate the improvement in production efficiency and environmental responsibility to the dimension of cost savings (Epstein 1996). Poor communication and coordination among related personnel or the missing link between environmental management and management accounting makes it less possible to use potentially useful information in making management decisions. Epstein states:

With such integration, information can be provided that facilitates the consideration of environmental costs and benefits in decisions related to financial reporting, financial analysis, capital investments, product costing, product pricing, product and process design, and performance evaluation. Managers throughout

the organization would benefit from a broad identification of the current and future environmental impacts of products and processes and a better understanding of how these impacts are likely to affect other company operations (1996, p. 86).

## **2.7 THE ROLE OF ENVIRONMENTAL MANAGEMENT ACCOUNTING IN THE DEVELOPMENT OF MANAGEMENT ACCOUNTING FOR THE ENVIRONMENT**

In response to criticisms of management accounting in general, a number of innovative management accounting techniques<sup>12</sup> have been developed. These techniques have shifted the focus and impacted on the whole process of management accounting, including planning, controlling, decision-making and communication (Kaplan & Atkinson 1998; Otley 1995). EMA is also subject to the same influence.

In 1998, the International Federation of Accountants (IFAC) issued a statement on management accounting concepts outlining the development of management accounting through four distinguishable stages with a different focus in each stage. The four stages are:

- Stage 1 (pre 1950) – a focus on cost determination and financial control;
- Stage 2 (by 1965) – a focus on the provision of information for management planning and control;
- Stage 3 (by 1985) – a focus on the reduction of waste in resources used in business processes; and
- Stage 4 (by 1995) – a focus on generation or creation of value through the effective use of resources (IFAC 1998b).

The focus of management accounting has been extended from information provision (Stage 2) to the reduction of resource loss (Stage 3) and to the effective use of resources (Stage 4) (IFAC 2005). The shift in focus has made management accounting an integral part of the environmental management process in contemporary organisations. In particular, the focus in Stage 3 is central to physical EMA in terms of accounting for the flows of natural resources (i.e. energy, water and other materials), whereas the focus in Stage 4 is parallel to that of EMA that considers benefits and costs with regard to eco-efficiency<sup>13</sup>.

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<sup>12</sup> Activity based costing (ABC), strategic management accounting and the balanced scorecard are among the most notable contributions. These management accounting techniques have now been applied in the context of environmental management (e.g. Bennett, Rikhardsson & Schaltegger 2003; Schaltegger & Wagner 2006).

<sup>13</sup> According to Schaltegger and Burritt (2000), eco-efficiency can be expressed as a ratio: the denominator being value added by products or services produced by an organisation and the numerator being environmental impacts added by the organisation. They explain that there is no best single measure of eco-efficiency and the chosen measures can be organisation specific. However, eco-efficiency provides a means that helps measure the combined economic and environmental performance of an organisation, which in turn links monetary and physical EMA in a systematic manner.

For most organisations having applied or implemented EMA, their main focus is on meeting the goals of Stages 1 and/or 2 with implemented practices ranging from simply adjusting existing accounting systems to adopting an integrated EMA system that links monetary and physical information. The International Federation of Accountants (2005) comments that the current EMA applications are continuing to move in the same direction as suggested in the development of management accounting. When inattention to environmental costs is justified to be ineffective, and the efficient use of resources proves to create value over the long run, EMA is part of the solution to problems with conventional management accounting, and fits in well with the trend of management accounting for the environment.

## **2.8 CONCLUSION**

This chapter had the goal of describing management accounting for the environment in general. The relationship between management accounting and the environment was given. Key terms arising from the relationship were defined. EMA as a subset of the broader environmental accounting was briefly introduced followed by a discussion about perceived limitations of management accounting systems and practices. Some impediments to EMA adoption were also covered. Parallel to the further development of management accounting for the environment, EMA – the focus of this study – will be revisited in greater detail in the next chapter.

## **CHAPTER THREE**

### **ENVIRONMENTAL MANAGEMENT ACCOUNTING**

#### **3.1 INTRODUCTION**

The previous chapter has provided a general introduction to management accounting for the environment. The purpose of this chapter is to provide a detailed discussion on environmental management accounting – the focus of this study. A review of EMA development will be given. Types of environmental information included under EMA will be presented. Three cost schemes will be introduced which help identify and categorise environmental costs. Various costing approaches used to assist EMA in supporting environmental management will then be provided. Given the role of information provision, EMA has many uses and applications in addition to environmental cost identification. Its important uses and applications will be reviewed, which include decision support, performance measurement, improvement of environmental accountability, and external environmental reporting support. To conclude, selected EMA case studies highlighting the service sector will be provided.

#### **3.2 THE DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING**

According to Mathews (1997), the pioneers who explicitly identified how environmental issues can be addressed by management accounting include American Accounting Association (AAA) (1973), Ullmann (1976) and Dierkes and Preston (1977). In the 1970s, some requirements for disclosing pollution information (e.g. material effects on pollution abatement activities) were enacted in the US (see Freedman & Jaggi 1981). However, AAA (1973) indicates that the role of accounting is questionable in providing such information. Ullman (1976) argues that companies are not aware of their environmental impacts, and changing management behaviours seems to be both a motivational and an informational problem. Ullman (1976) develops a model devoted entirely to the provision of environment-related information, which can be seen as an early development of physical environmental accounting systems. Dierkes and Preston (1977) propose a model based on physical input/output data and emphasise non-financial quantification of externalities.

It was not until 1980s that the environment or environmental management was linked to management accounting, and the potential of management accounting in managing environmental issues was shown (Bouma & van der Veen 2002). In this period, some of the US environmental regulations were highly influential in environmental accounting and reporting, for example the passing of the *US Superfund Amendment and Reauthorization Act*

of 1986 (SARA). SARA not only reinforced the *Comprehensive Environmental Response Compensation and Liability Act (CERCLA<sup>14</sup>)*, but also inspired the legislators in other countries, such as Canada and the UK, to enact environmental regulations. Through the increasingly demanding regulations, a business case<sup>15</sup> was made that demonstrates environmental programs help reduce environmental impacts and generate financial gains, or so-called 'win-win situations' (see Walley & Whitehead 1994). However, it requires management accounting to assist in determining costs and benefits of environmental management programs. This has provided an avenue to the development of EMA.

In the early 1990s, continuing interest and attention on environmental management enabled the launching of environmental auditing, which contributed to the further development of EMA (Gray & Bebbington 2000; Maltby 1995; Mathews 1997). The International Chamber of Commerce (ICC) defines environmental auditing as follows:

... a management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organisation, management and equipment are performing with the aim of helping to safeguard the environment by: (i) facilitating management control of environmental practices; and (ii) assessing compliance with company policies, which would include meeting regulatory requirements (1991, p. 3).

Environmental auditing recognises the need for business to assess the extent of its environmental impacts as a step before attempting to manage environmental performance. The interest in environmental auditing also advances the development of a number of voluntary guidelines, such as EMAS, BS7750 and ISO 14000 series. These guidelines expand public interest to environmental management systems (EMS), which became popular in later 1990s, and raised significant implications for management accounting in its role as a support mechanism to manage environmental performance.

At the time of 1990s, the applicability of management accounting in responding to environmental issues and managing environmental performance was becoming apparent (Gray & Bebbington 2000; Mathews 2000; Stone 1995). Increasing academic and applied research was conducted and a number of contributions to EMA were made (e.g. Bailey & Soyka 1996; Bartolomeo et al. 1999; Bennett et al. 1996; Ditz, Ranganathan & Banks 1995; Epstein 1996; Schaltegger, Muller & Hindrichsen 1996; Tuppen 1996). Several company experiences or initiatives demonstrated that environmental costs can be significant and minimising the costs through appropriate management actions can be profitable. For example,

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<sup>14</sup> CERCLA requires the site users, but not necessarily those who caused the damages (if any), to clean up the contaminated sites.

<sup>15</sup> One of the well-known cases is 3M Company. The 'Pollution-Prevention-Pays' program adopted by the company in 1973 demonstrated that pollution control programs help reduce environmental impacts and realise environmental cost savings (Lober 1998, p. 27).

the 'Green Ledgers' study by the World Resources Institute found that environmental costs (by their definition) comprise nearly 20% of operating costs (excluding feedstock) at Amoco Oil's Yorktown refinery, over 19% of manufacturing costs (excluding raw materials) for one chemical additive at Ciba-Geigy, and more than 19% of manufacturing costs for one agricultural pesticide at Du Pont (Ditz, Ranganathan & Banks 1995). A number of European projects, such as in the Netherlands and the UK, also reported similar findings which show the extent of environmental costs and opportunities to reduce the costs (see Bartolomeo et al. 2000). There were also cases which demonstrate that EMA helps make profits or generate financial gains through reduction in environmental impacts (Lober 1998), or through the management and prevention of environmental liabilities (Lawrence & Cerf 1995).

Particularly in the US, many EMA initiatives were conducted or supported by the US Environmental Protection Agency (USEPA). For example, a document entitled 'An Introduction to Environmental Accounting as a Business Management Tool' was produced to help define key concepts and terms related to EMA and provide an environmental cost categorisation scheme to identify environmental costs (USEPA 1995b). In collaboration with organisations such as Tellus Institute, the USEPA has also developed research into trends and practices in industries (e.g. chemicals and electroplating) and individual companies (e.g. AT&T and Ontario Hydro<sup>16</sup>) (Graff et al. 1998). Bennett and James (2000) have collected related articles giving summaries of the results and findings of studies on these participating companies. The cost scheme by the USEPA will be revisited when various schemes to identify and categorise environmental costs are looked at.

In the 21<sup>st</sup> century, EMA receives increasing attention as considerable environmental incidents create significant financial consequences for various organisations that need to be managed (Schaltegger & Burritt 2000). Some international governments and professional accounting bodies have devoted themselves to promoting EMA, for example the United Nations Division for Sustainable Development (UNSD) International Experts Group on EMA, and the International Federation of Accountants (IFAC). Documents such as *Environmental Management Accounting: Procedures and Principles* (UNSD 2001) and *International Guidance Document: Environmental Management Accounting* (IFAC 2005) were produced to guide EMA studies and practices. Various EMA tools are now available (e.g. Burritt, Hahn & Schaltegger 2002b; Howes 2002; Ministry of the Environment 2005). Also, there is a network of researchers, consultants, business people and policy advisors interested in EMA as an environmental management tool. Regular discussion of EMA development at conferences or

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<sup>16</sup> Some of the related works are available at the Environmental Management Accounting Research and Information Centre hosted by the Tellus Institute. Visit [www.emawebsite.org](http://www.emawebsite.org) for more information.

workshops is now becoming a norm (Burritt 2004). Indeed, an increasing number of EMA case studies in various industries, including smaller business, are gradually building up.

The trend of EMA development shows that EMA has attracted increasing attention and interest, but it also reveals a lack of EMA case studies in the service sector (see Burritt 2004 for a summary of available EMA case studies). The importance of physical EMA was identified in the early development of EMA (see Ullmann 1976). Related studies and projects demonstrate that environmental costs can be significant and support the applicability of EMA. Therefore, efforts to promote EMA are centred on developing tools to help identify or define the environmental costs and explain the uses and applications of EMA within organisations. The next section will consider types of information under EMA and explain how EMA fulfils the role as a support mechanism to environmental management by providing environmental cost categorisation schemes and costing approaches.

### **3.3 TYPES OF INFORMATION INCLUDED UNDER ENVIRONMENTAL MANAGEMENT ACCOUNTING**

In practice, EMA adoption ranges from simple adjustments to existing accounting systems to implementation of a comprehensive EMA system that links conventional monetary and physical information systems. To implement EMA practices, both monetary and physical data on material uses, labour hours and other cost drivers are relevant and required. The two types of information – monetary and physical – included under EMA are discussed below.

#### **3.3.1 PHYSICAL ENVIRONMENTAL INFORMATION**

According to the International Federation of Accountants (IFAC) (2005), EMA places particular emphasis on the physical information related to the flow of energy, water, materials and wastes. It is because material purchase costs can be a significant cost driver, and many of the organisational environmental impacts are directly associated with the use of these resources and the generation of wastes. The physical information collected under EMA is therefore essential to the identification of many environmental costs, and allows an organisation to assess and report the physical aspects of its environmental performance. This is true not only for manufacturing industries but also for service organisations. Resources such as energy, water and other materials are essential to support organisational activities and operations. To set measurable environmental targets and effectively manage environmental impacts, tracking and reducing the amounts of resources used and wastes generated is necessary. Physical EMA requires an organisation to trace resources/materials inputs and outputs and to ensure that the resources/materials are not left unaccounted for. The physical

information collected can then be used to create environmental performance indicators (EPIs), which in turn help an organisation set environmental targets and report its environmental performance. The IFAC (2005) states that physical information does not provide all the required data to effectively manage organisational environmental impacts, but it is the information that management accounting can provide for the purpose of environmental management.

### **3.3.2 MONETARY ENVIRONMENTAL INFORMATION**

How monetary environmental costs (or simply environmental costs) are measured mainly depends on the intended use of the information. Environmental costs typically refer to the types of costs that are clearly driven by efforts to control or prevent environmental damages (e.g. the costs associated with cleaning up sites after production or wastewater treatment costs). According to the IFAC (2005), environmental costs under EMA comprise other monetary information needed to cost-effectively manage organisational environmental performance. Examples include the purchase costs of natural resources (e.g. energy and water) and materials that are used or eventually become wasted. The IFAC (2005) explains that resource/material purchase costs are certainly considered in internal management decision-making, but they do not necessarily be considered as environmental costs. However, the costs are environment-related and this information is required to evaluate the financial aspects of organisational environmental management related to the use of the resources and materials. In this regard, physical EMA can be linked to monetary EMA by supplying the required information on the amounts of resources/materials used and wastes generated to assess the purchase costs.

As mentioned, the intended use of information helps determine the environmental costs an organisation would choose to trace. For organisations to determine relevant environmental costs that suit their operations and strategic planning, an introduction to environmental cost categorisation is required.

### **3.4 IDENTIFICATION AND CATEGORISATION OF ENVIRONMENTAL COSTS**

Various schemes of cost categorisation have been proposed to help identify and classify environmental costs. The basis for categorising environmental costs varies with some being more representative of conventional cost accounting (e.g. materials vs. labour), some reflecting the types of environmental activities (e.g. pollution control vs. prevention), and some focusing on data visibility in the accounting records (e.g. obvious costs vs. hidden costs). Although the emphasis of these schemes varies, they are not mutually exclusive and include

most of the common environmental costs. It is beyond the scope of this study to discuss all the available schemes of cost categorisation in any detail, but instead a summary is provided in Table 3.1, which shows various ways environmental costs can be classified.

**TABLE 3.1 VARIOUS SCHEMES OF COST CATEGORISATION**

Basis	Source	Description
Conventional Cost Accounting	<ul style="list-style-type: none"> <li>• Horngren, Datar and Foster (2003)</li> <li>• Schaltegger and Burritt (2000)</li> <li>• IFAC (2005)</li> </ul>	Job and process; direct and indirect; historical and standard; fixed and variable; ordinary and extraordinary.
Function	<ul style="list-style-type: none"> <li>• Gray and Bebbington (2001)</li> <li>• Parker (1997; 2000a)</li> </ul>	Fines and penalties; compliance and administration; waste management costs; energy costs; remediation costs; capital costs.
Activity	<ul style="list-style-type: none"> <li>• Kim (2002)</li> <li>• Japanese Ministry of the Environment (2005)</li> <li>• IFAC (2005)</li> </ul>	Environmental activities such as pollution prevention costs, pollution treatment costs, environmental system costs, stakeholder costs and environmental damage costs.
Proactive vs. Reactive	<ul style="list-style-type: none"> <li>• Epstein (1996)</li> <li>• Parker (2000a)</li> </ul>	Strategic positioning; risk prevention; compliance; remediation; disposal and claims
Visibility	<ul style="list-style-type: none"> <li>• Henn and Fava (1993)</li> <li>• Parker (2000a)</li> </ul>	Lowest visibility (cost to society of pollution); low visibility (producers' indirect costs); high visibility (producers' direct costs)
Strategy	<ul style="list-style-type: none"> <li>• Parker (2000a)</li> </ul>	Front-of-pipe costs; end-of-pipe costs; compliance costs; voluntary beyond-compliance costs; contingent costs
Measurability	<ul style="list-style-type: none"> <li>• USEPA (1995b)</li> </ul>	Conventional; hidden; contingent; relationship/image; societal costs.
Cost of Quality	<ul style="list-style-type: none"> <li>• Ansari et al. (1997)</li> <li>• Russell, Skalak and Miller (1994)</li> </ul>	Prevention, assessment (appraisal), control (internal failure) and external failure.
Life Cycle and Activity	<ul style="list-style-type: none"> <li>• Kreuze and Newell (1994)</li> </ul>	Life cycle: research and development, design, production, etc.; Activity: unit, batch, product sustaining and facility level costs.
Quantitative/Qualitative vs. Financial/Non-financial	<ul style="list-style-type: none"> <li>• Gauthier et al. (1997)</li> </ul>	Examples of quantitative financial data include evaluation costs, prevention costs, control costs, correction costs and public image costs. Examples of quantitative non-financial data include waste, effluent and spills, compliance and evaluation, training, raw materials and energy savings, and public image. Examples of qualitative data include consequences of non-compliance on the company's image and the climate of work or accreditations obtained.
Target Audience	<ul style="list-style-type: none"> <li>• Schaltegger and Burritt (2000)</li> </ul>	Internal audience: managers and employees External audience: shareholders, tax agencies, environment agencies, suppliers, creditors, general public, local communities, NGOs, etc.

*Source: Modified from Burritt (2004, pp. 14-5) and Parker (2000a, p. 46)*

In particular, the cost schemes by the USEPA (1995b), the IFAC (2005) and the Japanese Ministry of the Environment (MOE) (2005) are more comprehensive in terms of environmental cost coverage and appear to be influential in the development of EMA. They will be discussed in turn.

### 3.4.1 THE USEPA ENVIRONMENTAL COST SCHEME

The USEPA environmental cost scheme categorises environmental costs on the basis of measurability (1995b). Table 3.2 provides the cost scheme with examples of environmental costs an organisation might choose to consider. Costs included in Tiers 1 to 4 are referred to as private or internal costs, which have direct impacts on an organisation's financial bottom line. Tier 5 costs are often referred to as externalities or external costs, and represent costs that an organisation incurs as a result of operations and receives the benefit without being legally held accountable for the damages caused.

The scheme will be used as guidance to help determine the scope of environmental costs considered in this study. However, only private costs will be considered as they are where organisations starting to implement EMA typically begin (USEPA 1995b). Further, according to Deegan (2003), experiences and lessons learned from the Australian EMA case studies suggest that in the early stages of implementing an EMA system, the scope of environmental costs to be examined be limited to a manageable number (e.g. the consumption of energy and materials). Therefore, Tier 1 conventional costs as shown in Table 3.2 will be the main focus of this study. In particular, this study will look at costs in relation to the consumption of energy, water and paper as well as the generation of wastes. Justification for these costs will be provided in the next chapter.

**TABLE 3.2 THE USEPA ENVIRONMENTAL COST SCHEME**

Tiers	Spectrum	Examples
Tier 1	Conventional Costs	Include costs of direct raw materials, utilities, labour, supplies, capital equipment and related depreciation.
Tier 2	Hidden Costs	Include three subcategories: <i>Up front costs</i> : such as search costs relating to finding environmentally-conscious suppliers and initial design costs of environmentally preferable products <i>Regulatory costs</i> : such as monitoring/testing and environmental insurance, which are often obscured in overheads <i>Voluntary Costs</i> : such as community relations/outreach, habitat and wetland protection, and financial support to environmental groups and/or researchers
Tier 3	Contingent Costs	Defined in probabilistic terms and include future compliance costs, legal expenses, natural resource damages and economic loss damages.
Tier 4	Relationship/Image Costs	These costs are difficult to determine and would seldom be separately identified within an accounting system, which include corporate image relationship with customers, and relationship with investors, insurers, workers, suppliers or host communities.
Tier 5	Societal Costs	Could include environmental damage caused by an organisation for which it is not held accountable, or adverse health effects caused by organisation-generated emissions for which the organisation is not held responsible. With the exception of a few organisations worldwide, most entities ignore these costs for profit calculation.

Source: Modified from (Deegan 2003, p. 19) and USEPA (1995b, p. 9)

The other two cost schemes proposed by the IFAC (2005) and the Japanese Ministry of the Environment (2005) will be introduced in the next section highlighting the differences existing between the two and the USEPA cost scheme.

### **3.4.2 THE JAPANESE ENVIRONMENTAL ACCOUNTING GUIDELINES**

The *Environmental Accounting Guidelines (2005 Version)* by the Japanese Ministry of the Environment (2005) apply an activity-based cost categorisation, which focuses on the costs incurred to prevent, reduce, and/or avoid environmental impacts. Most of the environmental cost categories, included in the USEPA cost scheme, are covered, but contingent and relationship/image costs as classified by the USEPA (1995b) are not considered in the guidelines. However, the guidelines include and specify costs associated with the prevention of global warming, which reflects the effort and emphasis on global warming as an important issue by the Japanese Government. The guidelines define these costs, which are 'global environmental conservation costs' as follows:

Global environmental conservation costs are those costs associated with negative environmental impacts on the global environment or a wide portion of it, resulting from human activities. Costs are allocated for the prevention of global warming, to prevent the ozone depletion and other global environmental conservation efforts (Ministry of the Environment 2005, p. 15).

### **3.4.3 THE IFAC'S INTERNATIONAL GUIDANCE DOCUMENT ON ENVIRONMENTAL MANAGEMENT ACCOUNTING**

The IFAC's *International Guidance Document on Environmental Management Accounting* (IFAC 2005) separately and explicitly discusses monetary and physical environmental costs. The document adopts cost categorisations based on conventional cost accounting and types of environmental activities to assist in the definition of monetary environmental costs. Proposed monetary environmental cost categories include materials costs of product outputs, materials costs of non-product outputs, waste and emission control costs, prevention and other environmental management costs, research and development costs, and less tangible costs. Physical environmental cost categories contained in the document are corresponding to the standard practice of mass balancing<sup>17</sup> (an input/output balance) and the general structure of ISO14301 for environmental indicators for operational systems (IFAC 2005). In the physical aspect, special attention has been given to materials flows, which include water, energy and non-product outputs (e.g. waste and emissions), and represent a major difference from the Japanese guidelines and the cost scheme proposed by the USEPA.

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<sup>17</sup> According to the IFAC (2005, p. 30), the accounting for resources/materials flowing into and out of an organisation is referred to as a 'mass balance' or sometimes a 'materials balance', an 'input-output balance', and an 'eco-balance'.

The three cost schemes help identify and categorise environmental costs. However, there are also various costing approaches being applied in practice that can be used for EMA purpose beyond identifying relevant environmental costs. It is useful to have a discussion of these approaches now.

### **3.5 ENVIRONMENTAL COSTING APPROACHES**

In practice, costing approaches being used for the purpose of implementing EMA include activity based costing (ABC), material flow accounting, full cost accounting and life cycle costing (Burritt 2004). ABC helps recognise environmental cost drivers and enables subsequent cost allocations. Material flow accounting is useful for organisations with a high proportion of material costs in overall operating costs. Full cost accounting calls for accounting not only for private costs but also for externalities. Life cycle costing considers environmental costs traceable to the organisation that generates environmental impacts (if any), and also takes suppliers and disposal of products into consideration. The discussion follows.

#### **3.5.1 ACTIVITY BASED COSTING<sup>18</sup>**

Costing systems were designed long before environmental costs were anticipated. Activity based costing (ABC) is regarded as one of the best tools to refine existing systems and is a costing method most management accountants feel familiar with (Horngren, Datar & Foster 2003). Rogers and Kristof (2003) indicate that ABC can be applied within environmental accounting. Schaltegger and Muller (2000) explain that environmental costs will be naturally highlighted by ABC activities when environmental impacts and related factors become significant cost drivers. According to Kreuze and Newell (1994), ABC can provide more relevant product cost information, which in turn will generate a more realistic understanding of profitability. It would become more so when specific processes or systems are involved that generate significant environmental impacts (Parker 2000a). Thus, it is emphasised that the use of ABC in environmental costing will generate a major advantage – the integration of environmental costs into corporate strategic goals and the linkage of management objectives and activities (Schaltegger & Burritt 2000).

In Australia, four pilot case studies were conducted using ABC to allocate environmental costs (see Deegan 2003). One of the lessons learned is that some form of materials tracking is

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<sup>18</sup> Activity based costing, unlike traditional costing systems, calculates costs based on individual activities, which can be an event, task, or unit of work with a specified purpose. According to Horngren, Datar and Foster (2003), a simple two-stage approach can be used in the process: costs are first traced to activities and then allocated to products or services consuming the activities.

required, especially for those products or processes that generate higher environmental impacts to an organisation. The rationale is that the determination of environmental costs itself is not sufficient to identify the possibilities for cost reduction. Informed by the results of selected material tracking, ABC can then be used to suggest how to allocate environmental costs and identify the opportunities for reducing organisational environmental impacts.

Deegan (2003) indicates that only modest modifications to existing accounting systems will enable the use of ABC, which in turn help generate both financial and environmental benefits. However, as the financial benefits of implementing a comprehensive EMA system might not always be justified, it is suggested that the use of ABC be extended to incorporate accounting for the environmental costs (Bartolomeo et al. 2000; Haveman & Foecke 2000). Although ABC's potential in identifying environmental costs is supported, little evidence is found that ABC initiatives automatically reveal environmental costs. Bartolomeo et al. (1999) suggest to engage environmental managers or experts in the accounting process to ensure that separate identification of environmental costs occurs.

### **3.5.2 MATERIALS FLOW ACCOUNTING**

Materials flow accounting is also termed as 'energy and material accounting' (Bartolomeo et al. 2000, p. 34; Bennett & James 1997, p. 34) or simply 'flow cost accounting'. According to the IFAC:

For a complete and integrated picture of materials use, the details of materials flows must be traced through all the different organizational materials management steps, such as materials procurement, delivery, inventory, internal distribution, use and product shipping, as well as waste collection, recycling, treatment and disposal, all with the materials balance numbers attached. This type of accounting can be referred to as 'materials flow accounting' (2005, p. 31).

Materials flow accounting can be used to help identify physical environmental costs. Strobel and Redmann state:

[Materials flow accounting] aims to identify and analyse the entire system of materials flows as an essential cost driver. Not only the materials costs but also all the system costs are assigned to materials flows (2002, p. 70).

Birkin (1996; 1997a; 1997b; 1997c; 1997d; 1997e) argues that non-financial materials and energy flows should be separately identified if management accounting is to take the environment into account. Loew (2003) concurs that materials flow accounting is a useful approach to improve eco-efficiency because the calculation of environmental costs alone fails to provide sufficient information.

In practice, materials flow accounting is an increasingly common approach used to ensure that resources or materials flowing into and out of an organisation are accounted for, particularly

in Germany, Austria and Switzerland, but is less used in the UK and the US (Bartolomeo et al. 2000; Bennett & James 2000). Building on the findings from 12 Austrian EMA pilot projects, it is suggested that for companies with less than 20 percent of materials costs to overall operating costs, materials flow accounting is not recommended from a financial or economic perspective (Jasch 2002). Therefore, materials flow accounting is particularly suitable for organisations with a high proportion of material costs to overall operating costs. A slightly modified version of this approach is becoming popular in Japan. Five pilot projects undertaken in Japan support that materials flow accounting has the potential to identify opportunities for cost savings through the reduction of materials used or wastes generated (see Kokubu & Nakajima 2004).

### **3.5.3 FULL COST ACCOUNTING<sup>19</sup>**

Full cost accounting is a term used by accounting professionals to describe environmental accounting practices (USEPA 1995a). The Canadian Institute of Chartered Accountants (CICA) defines full cost accounting as:

... the integration of an entity's internal costs (including all internal environmental costs) with the external costs relating to the impacts of the entity's activities, operations, products and/or services on the environment (1997, p. xiii).

Bebbington et al. indicate that full cost accounting is a tool 'that highlights the current unsustainability of our collective economic activities and provides an indication of the source of that unsustainability' (2001, p. 137). Full cost accounting entails a consideration of externalities. From an environmental perspective, full cost accounting can be seen as an approach used to measure not only internal costs but also environmental externalities generated by business operations<sup>20</sup> (Deegan 2005).

In the context of accounting for the externalities, researchers such as Bebbington et al (2001) argue that full cost accounting helps transform the current economic system towards sustainable development. Experiments with some form of full cost accounting have been conducted, such as IBM, Anglian Water and Wessex Water in the UK, Baxter International in the US, Interface Europe, and Landcare Ltd in New Zealand.

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<sup>19</sup> Full cost accounting is the method used to trace and allocate all direct and indirect costs to a product, product line, process, service or activity for the purposes of inventory valuation, product pricing decision and profitability analysis (Schaltegger & Burritt 2000; USEPA 1995b).

<sup>20</sup> Sometimes, 'full cost accounting' is used as a synonym for 'full cost environmental accounting' or 'total cost accounting', and the term can be used to include private costs only or both private and societal costs together (USEPA 1995b). Therefore, care should be taken while using the term. Full cost environmental accounting roots in full cost accounting but highlights environmental aspects; total cost accounting probably has its origins in the environmental profession and bears less meaning to accountants.

Ontario Hydro is another well-known example of full cost accounting application. The organisation adopted the damage cost approach to estimate external impacts. Considering full life cycle impacts, this approach first used site-specific environmental and health data from a particular operation, and then applied modelling techniques combined with economic methods to estimate and translate external impacts (and costs) into monetary values (USEPA 1996). Another example is BSO/Origin<sup>21</sup>, a Dutch company. The company placed financial values on its externalities. In 1990, the company employed a costing technique, which is known as the cost of control approach, to determine the costs that would be incurred to control emissions if a higher standard than the *Dutch National Policy Plan* was adopted. In addition to the emissions produced by BSO/Origin itself, this technique considered the impacts from emissions of BSO/Origin's power suppliers and waste treatment. Hypothetical costs were calculated to obtain a net added value of the company. This technique was used from 1990 up to 1994. In 1995, a new approach was adopted to subtract the 'extracted value' from traditional operating income rather than from the value added to obtain 'sustainable operating income' (see Bebbington et al. 2001, p. 80; Deegan 2005, p. 301 for detailed discussion).

Tuppen (1996) notes that BSO/Origin's full cost accounting practice is an exercise that contributes more to professional and public awareness, and stresses that the influence of Ontario Hydro's practice on management decision-making is limited. Deegan (2005) concurs that accounting for externalities in the way Ontario Hydro and BSO/Origin have undertaken is far from a common practice, and it is unlikely that many organisations would embark on that process. Difficulties and controversies in accounting for externalities explain why the general business response in practice is still limited

#### **3.5.4 LIFE CYCLE COSTING**

Life cycle costing (LCC) is a costing approach that considers costs related to a product's (or system's, operation's and activity's) life cycle from research and development through final disposal, or from cradle to grave (Kreuze & Newell 1994; Parker 2000a). It is used to refer to the incorporation of environmental costs into process or product design. The USEPA (1995b) indicates that LCC has its foundation in life cycle analysis or assessment (LCA). While LCA focuses on physical environmental impacts over a product's life cycle, LCC attempts to internalise some of the costs associated with the impacts, largely those traceable and measurable (Parker 2000a; Schaltegger & Burritt 2000; USEPA 1995b). In practice, there are two costs receiving increasing attention and being examined by the use of LCC – (i) the costs of dealing with emissions or wastes produced by the operation of equipment or machines, and

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<sup>21</sup> BSO/Origin is now Origin, a merger of BSO/Origin and Phillips C&P, which was enacted in 1996.

(ii) the costs of disposing a product at the end of its operating life (Bennett & James 2000).

The concept has now been used to extend corporate accounting boundaries to include suppliers and customers and to take future costs into account. Bennett and James (2000) explain that the extension means all the costs incurred over a product's operating lifetime will be considered, including environmental costs involved in buying, using and disposing of that product.

### **3.5.5 A SUMMARY OF THE COSTING APPROACHES**

As discussed, the costing approaches can be used for the purpose of implementing EMA in different ways. ABC can be used to integrate environmental costs into strategic environmental goals and planning, and to provide a linkage between management objectives and activities. Material flow accounting can be applied to identify physical environmental costs. It is particularly suitable for organisations with a higher percentage of materials costs to overall operating costs in order to ensure that materials flowing in and out of an organisation are not left unaccounted for. Full cost accounting intends to account for externalities, but difficulties and controversies created in the process limit its general practice. Life cycle costing is used to incorporate environmental costs into process or product design, and extends accounting boundaries to include suppliers, customers and future costs.

The cost schemes to assist environmental cost identification, and the costing approaches that EMA can use to support management have been discussed. The next section provides discussion about how EMA can be applied for the purpose of environmental management.

### **3.6 USES AND APPLICATIONS OF ENVIRONMENTAL MANAGEMENT ACCOUNTING**

Macve notes that the 'challenge for environmental costing is not just to increase the technical sophistication by which environmental factors are traced through activities, but to construct a new accountability that is linked to real incentives' (1997, p. 196). EMA can be used for decision support, is valuable to assess environmental performance against established targets, holds managers responsible and accountable for their management and performance to improve environmental accountability, and provides physical and monetary information to support external environmental reporting. The uses and applications of EMA are discussed in turn.

### **3.6.1 DECISION SUPPORT**

Managers need to make business decisions about investment projects, materials choices, product pricing and product mix. In the past, many organisations failed to consider the full range of environmental costs needed for sound decision-making (White & Savage 1995). Decisions were often made without command of all the relevant costs, including the environmental costs. The increasing community concerns, the introduction of environmental regulations and the ratification of environmental agreements (e.g. Kyoto Protocol) have complicated the decision-making process, which in turn makes it increasingly important to account for environmental costs to aid in decision-making.

In 1992, the US Environmental Protection Agency launched an environmental accounting project (see Graff et al. 1998 for details) to demonstrate the environmental costs of non-prevention practices, and the economic benefits of proactive pollution prevention in order to encourage the incorporation of environmental costs into decision-making. Results reveal that many significant environmental costs are hidden or not yet recognised. However, evidence supports that pollution prevention pays (Graff et al. 1998). In 1993, the World Resources Institute (WRI) initiated nine case studies to explore how organisations account for their environmental costs (see Ditz, Ranganathan & Banks 1995). The scale of the studied companies was limited to some particular products and the scope of environmental costs was restricted to internal costs. It was found that aggregated environmental costs in some cases are significant (e.g. for S.C. Johnson Wax, the environmental costs of one particular product examined even exceed the operating profit for that product). Building on the findings of the nine cases, five recommendations were distilled for decision support:

- Inform decision-makers of the environmental costs they generate;
- Increase accountability of managers for environmental costs and benefits;
- Develop proxies that anticipate future costs and other measures of performance;
- Create incentives to address the causes of current and future costs; and
- Incorporate environmental accounting into ongoing business processes (Ditz, Ranganathan & Banks 1995, pp. 37-8).

### **3.6.2 PERFORMANCE MEASUREMENT**

Environmental cost information can be used to support decision-making, but it is also valuable to measure results and improvements with regard to established environmental targets and objectives. It is argued that 'performance measurement and progress reporting are key factors in ensuring the success of the environmental management system, since a company essentially manages what it measures' (Gauthier et al. 1997, p. 10).

As mentioned, physical EMA can assist monetary EMA in creating environmental performance indicators that enable environmental performance measurement. From an environmental management point of view, the absolute value or physical information is key to reflect the consumption of resources and materials, or the generation of wastes and emissions, to identify and minimise environmental impacts. As EMA is a flexible tool applicable to different scales and levels, relative indicators can also be created to assess the performance of product/service lines or sub-divisions (USEPA 1995b). The relative indicators allow the distinction between changes in environmental performance as a result of changes in some environmental costs or environmental management efforts. The IFAC explains:

EPIs can be calculated at many different levels – for the organization as a whole, for specific products or product lines, for specific material groups, etc., depending on the intended use of the information. For example, a local community might be more interested in wastewater generation rates for a facility as a whole, while internal managers would also be interested in wastewater generation rates for specific process lines in order to make process improvements (2005, p. 32).

### **3.6.3 IMPROVEMENT OF ENVIRONMENTAL ACCOUNTABILITY**

EMA is valuable to decision support and performance measurement, in particular because of environmental cost information it provides to managers, most of whom are held responsible and accountable for their management and performance (at least to some degree). As accountability reflects a responsibility to provide information and a right to receive the information, there is indeed a need to compile the environmental data into reports, not only for external users but also for internal managers.

Adams (2002) indicates that, in general, firms reporting environmental information would develop better internal control systems to assist decision-making in achieving cost-savings and improving environmental performance. External environmental reporting has gained much attention and has been the main focus of many researchers (e.g. Adams 2004; Deegan 2002; Gray, Kouhy & Lavers 1995; O'Donovan 2002). However, Parker (2000b) observes that in practice only limited attention has been paid to the improvement of accountability through internal management. Given that while accounting can play a role in external environmental reporting, it has the potential to make significant contributions to the decision processes involved in managing environmental impacts and improving environmental performance (Parker 2000b).

EMA enables relevant environmental information to be provided, and environmental reports to be generated. The information can be applied to make sound decisions and used to discharge environmental accountability. Internal reports for the purpose of environmental management can be seen as an extension of external environmental reporting. They provide

environmental costs to the eyes of managers, set achievable environmental goals and objectives, ensure performance follow-up, and hold managers accountable for environmental performance, which together would help improve financial and environmental performance (Gauthier et al. 1997).

#### **3.6.4 EXTERNAL ENVIRONMENTAL REPORTING SUPPORT**

The use of EMA in providing environmental reports for internal use has been addressed. EMA has also been used to support external environmental reporting. There are several types of reports that may be used to disclose environmental information such as financial statements, annual reports or stand-alone sustainability reports. According to the IFAC (2005), there is a growing trend for organisations to include both physical and monetary environmental cost information in their reports to external stakeholders. Some are for regulatory compliance, but many voluntarily choose to report. In spite of the purposes to report, EMA plays a key role in providing both physical and monetary information to support external reporting.

As stated previously, accountability requires information to be provided to both internal and external stakeholders. As community environmental concerns increase, a growing number of external stakeholders show interest in organisational environmental management and performance. It is argued that environmental accounting and reporting is fundamental to discharge accountability (Gray, Owen & Adams 1996). Findings of an international survey conducted by KPMG (2002) suggest that external environmental reporting is of increasing importance to be used in providing required information about corporate environmental performance to the wider community. Not only industries perceived with high environmental impacts but also service organisations are reporting environmental information, and the number of the reporting entities is growing (GRI 2007). This increases the need for EMA to act as a support mechanism in supplying required information.

The potential uses and applications of EMA enable EMA to assist organisations in meeting the environmental challenge for management accounting and constructing a new environmental accountability. Its uses and applications attract interest and attention of organisations with perceived high environmental impacts, such as manufacturing industries (see Bennett & James 2000 for examples). However, a literature review highlights a lack of EMA application in service organisations (Burritt 2004). The following section will specify the need for the service sector to manage its environmental impacts and introduce two of the service-based EMA case studies to show the potential of EMA uses and applications within this sector.

### 3.7 SELECTED ENVIRONMENTAL MANAGEMENT ACCOUNTING CASE STUDIES

In manufacturing industries, the uses and applications of EMA are growing, but a literature review brings to light that limited attention has been paid to either the impacts of the service sector on the environment, or how the sector utilises the environment for conducting service activities (perhaps with the exception of financial service organisations<sup>22</sup>). It is partly due to the fact that the service industries use fewer natural resources and impact the environment less obviously than the manufacturing industries do. From the perspective of resources consumption, however, the service sector still impacts the environment, which needs to be managed. Consider the following argument made by Blair and Hitchcock:

Every activity that occupies a building uses energy in heating, lighting and equipment. They [service industries] contribute to pollution through the travel of their employees and clients, produce waste from canteens, consume water and materials and almost certainly produce large volumes of paper waste.... Every service activity has some environmental impact, however slight (2001, pp. 212-4).

Environmental impacts of the service sector exist and they matter because of the increasing dominance of this sector<sup>23</sup>. EMA case studies on manufacturing companies are increasing and some are well documented (see Burritt 2004 for a list of available case studies). However, the service sector has failed to be the focus of EMA-related research and case studies. As such, the potential contributions EMA can make to the service sector are typically ignored. The reason to this lack of EMA implementation within the service sector still remains less explored. Nevertheless, it is believed that additional case studies in the service sector are required to provide different insights into the potential uses and applications of EMA.

Most of the available EMA examples are in the manufacturing sector, and there are few EMA studies in relation to the service sector. Among the few studies on the service organisations are two Austrian cases (Osterreichische Nationalbank and Raiffeisen Holding NO Wien in baking industries) (Jasch 2002), and two Australian cases (Methodist Ladies College, Perth and AMP Services) (Deegan 2003). Bennett (2004) points out that for small or office/service based organisations, EMA seems not to be easy to be applied due to the lack of case studies in

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<sup>22</sup> GRI (2005) indicates that direct environmental impacts (e.g. the amounts of energy consumed and volumes of wastes generated) and indirect impacts (i.e. reputation risk or image damage) are now areas of intense interest to many stakeholders of the financial service organisations (e.g. banks and insurance companies).

<sup>23</sup> The dominance of this sector in the world economy was growing in the past decade. In 2000, over one third of the world total trade in goods and services were from this sector (WTO 2007). The service sector is now the largest and fastest-growing sector of the world economy, contributing more than 60 percent of global output and employing an even larger share of people in many countries (WTO 2007). The percentage in developed countries is even higher. In Australia, for example, the sector employs approximately 7.5 million people, which represent 82 percent of total employment and earn near 80 percent of gross domestic product (GDP) (Invest Australia 2007). In the US, the service sector accounts for three-quarters of the country's employment and GDP (RFF 2000). It is expected that job growth through the 21<sup>st</sup> century will be dominated by the service industries. It is thus argued that 'the importance of the service sector is emphasized by virtually any economic measure chosen' (Menor, Tatikonda & Sampson 2002, p. 135).

this unexplored area. This section aims at summarising the research findings and lessons learned from the available case studies that place a focus on the service sector. As the detailed information about the two Austrian case studies are available only in German<sup>24</sup>, only the two Australian case studies<sup>25</sup> are summarised for the purpose of this study. The summary will include the scope of environmental costs examined, perceived limitations of management accounting systems, suggested accounting changes and results of subsequent trials of the changes, and lessons learned from the two cases. The purpose of examining these cases is to provide valuable insights and experiences gained from the service sector.

### **3.7.1 SERVICES @ AMP DIVISION OF AMP LTD**

AMP Ltd is a financial services organisation operating in a number of countries, including Australia, New Zealand and the UK with approximately 14,500 employees. The case study as documented by Deegan (2003) focuses on the Services @ AMP division which provides a number of shared services to AMP in Australia.

#### **3.7.1.1 SCOPE OF ENVIRONMENTAL COSTS EXAMINED**

Costs analysed consist of energy, water, paper and waste, which were considered as having direct environmental impacts. Applying the USEPA cost scheme introduced previously, environmental costs investigated were strictly limited to conventional costs (Tier 1) and hidden costs (Tier 2). External costs were out of the scope. Lifecycle analysis was not undertaken, and there was no intent to apply full cost accounting in the case.

#### **3.7.1.2 LIMITATIONS OF MANAGEMENT ACCOUNTING SYSTEMS**

Two major limitations existed in the case – a bias towards monetary information and allocating costs to overhead accounts. The study found that physical environmental cost information was not provided under management accounting systems in use. For example, information relating to the quantities of energy used, water consumed or waste generated by individual buildings was not gathered, although costs by vendors were available. Further, building services costs, such as electricity, water, wastewater and waste charges, were accumulated in an overhead account, which was then allocated to cost centres on the basis of office space occupied.

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<sup>24</sup> This indeed supports the argument that the service sector has typically failed to be the focus of EMA study.

<sup>25</sup> The summary of the two cases in the following section is based on the report entitled *Environmental Management Accounting: An Introduction and Case Studies for Australia* by Deegan (2003).

### **3.7.1.3 SUGGESTIONS RELATED TO THE LIMITATIONS AND RESULTS OF SUBSEQUENT TRIALS**

It was identified that opportunities for Services @ AMP to reduce its environmental impacts lie in the modification of management accounting systems in use so that information on the costs and quantities associated with direct environmental impacts can be made available. It was suggested that additional fields be introduced in the management accounting systems to identify amounts spent on particular types of goods and services, and for recording quantities of particular goods and services being acquired. After trials, office stationery, paper and electricity were identified to be the highest costs associated with direct environmental impacts.

### **3.7.1.4 LESSONS LEARNED**

Environmental costs are among the costs incurred by business, but they are often hidden in other costs as indicated in this case study. For this reason, environmental costs should be managed and treated as part of the broader cost system if initiatives with respect to reducing environmental costs are expected to be successful.

Although environmental costs can be high, it might not be so on a relative basis for a service based company operating in an office environment. For Services @ AMP, environmental costs are relatively low in comparison to many other costs incurred, such as labour or information technology costs. Therefore, financial considerations alone do not constitute a strong incentive to motivate companies like AMP to adopt EMA. However, the absolute amounts of the environmental costs are still significant. Other incentives and drivers, such as enhanced company culture or employee morale, still are worth being considered in an attempt to build the business case for EMA.

## **3.7.2 METHODIST LADIES COLLEGE, PERTH, AUSTRALIA**

The College is located on the foreshore of the Swan River, Perth, enrolls about 1,000 students, and has over 240 employees. The study applies to the whole organisation. The scope of environmental costs investigated is the same as indicated in the AMP case.

### **3.7.2.1 LIMITATIONS OF MANAGEMENT ACCOUNTING SYSTEMS**

Major limitations found in this case were related to the use of overhead accounts and the lack of subsequent allocation to responsibility centres. For example, energy, paper, and waste management costs were not allocated to any specific responsibility centres, but instead were aggregated and treated as part of the ‘administrative and general’ overhead with waste

management expenses being reported under 'caretaking and cleaning' overhead. No further classification or analysis was conducted, and no form of responsibility accounting existed for these costs.

### **3.7.2.2 SUGGESTIONS RELATED TO THE LIMITATIONS AND RESULTS OF SUBSEQUENT TRIALS**

It was suggested that the classification system in the income and expenditure report be restructured, and further classification be introduced to improve the quality of management information. Several responsibility centres were established based on subject areas and activities, such as catering or boarding. Activity based costing (ABC) was suggested to be used for assigning costs because the case has a high level of environmental costs accumulated to overheads (e.g. 'administration and general' corresponding to 27.1 percent of total expenditure). Although still with limitations and drawbacks, cost drivers for environmental costs were identified and adopted. Results of trials showed that this basis of allocation does not directly influence profits, but by allocating the costs to responsibility centres, managers are assumed to have an increased motivation to control and even decrease the costs.

### **3.7.2.3 LESSONS LEARNED**

It becomes apparent that many costs with environmental implications are often effectively buried in overheads. As those costs are hidden, responsibilities for minimising the costs receive little attention. It is becoming clear that careful reviews of overhead accounts and the basis of subsequent allocations are critical for any initiatives aimed at managing environmental costs. For some costs, such as water and energy, it is not easy to find reasonable allocation bases with a clear cause and effect relationship. Searching for work that has been undertaken in the area by other organisations will help. For example, this case uses average water usage data supplied by Water Corporation, Western Australia.

### **3.7.3 A SUMMARY OF THE FINDINGS OF THE TWO CASES**

Evidence shows that the majority of managers within organisations (service organisations in particular) have little knowledge about environmental costs arising from their operations. According to Deegan (2003), this lack of knowledge is mainly due to deficiencies in the accounting systems. Some of the deficiencies are related to the common use of overhead accounts. As shown in the second case, overhead accounts represent a major hurdle to monitoring and managing environmental costs. The allocation bases related to overheads are also often questionable, for example some cleaner products or service processes effectively subsidising those with greater negative environmental implications. Waste management cost

is another major deficiency. The two cases introduced reflect that organisations generally ignore the acquisition costs associated with wasted resources, and instead restrict their recognition to the contract cost for having the waste removed or disposed of. Many cost saving opportunities are being missed or lost in large part due to a lack of knowledge.

Suggestions of the modifications to existing management accounting systems can be relatively inexpensive to be implemented. The two cases introduced emphasise this point. It is also clear that some accounting changes (e.g. the use of overheads, the way waste cost is recognised, and the incorporation of physical environmental cost information) can inform environmental strategies, assist decision-making, and result in financial benefits. From a financial perspective, the management decisions ignoring environmental costs would be relatively more costly in the long run. According to Deegan, 'given that stakeholders increasingly want to see that organisations are taking steps to reduce their environmental impacts and risks, the lessons learned from these case studies can ill afford to be ignored' (2003, p. 5).

### **3.8 CONCLUSION**

Increasing importance and interest in EMA can be seen not only in the activities or initiatives undertaken to promote EMA, but also in the several examples and case studies. The chapter has provided a review of EMA development as a subset of environmental accounting, introduced the two types of information (monetary and physical) included under EMA, and provided three environmental cost categorisation schemes that are more comprehensive in terms of environmental cost coverage. Various costing approaches have been introduced that can be used for the purpose of implementing EMA. Potential uses and applications of EMA have been discussed. Two EMA case studies with a focus on the service sector have also been highlighted. Although the two cases appear to support the use of EMA within the service sector, research and studies related to the service organisations are still limited. In view of the deficiency, the research attempts to fill the gap by doing EMA case studies on universities as part of the service sector.

It is clear that environmental management is becoming increasingly important to an organisation with direct environmental impacts. The discussion flowing through this chapter has demonstrated that EMA can be utilised to support environmental management, and create mutual benefits, both financially and environmentally, to an organisation. The next chapter will examine the current state of environmental management practices in the higher education sector leading to the potential uses and applications of EMA within universities.

## **CHAPTER FOUR**

### **ENVIRONMENTAL MANAGEMENT ACCOUNTING AND THE HIGHER EDUCATION SECTOR**

#### **4.1 INTRODUCTION**

The previous chapter has provided detailed discussion on environmental management accounting and introduced two service-based case studies that appear to support the uses and applications of EMA within the service sector. The purpose of this chapter is to extend their applicability to universities.

The major environmental impacts (both direct and indirect) of the higher education sector will be discussed, in particular from a financial perspective. The historical background of sustainable development and its relationship to the sector will be explored. The current state of environmental responsiveness by universities to achieve sustainability will also be discussed. Barriers encountered and drivers required to improve environmental management, in particular, will then be introduced. Their applicability and implications to EMA for universities will be discussed followed by a conclusion.

#### **4.2 MAJOR ENVIRONMENTAL IMPACTS OF THE SECTOR**

Universities are communities of people, including students, staff, administrators and researchers. Service activities are provided through the use of natural resources and the generation of solid or chemical wastes. Although they do not have the obvious direct environmental impacts of many manufacturing industries, they still have several significant environmental impacts – both direct and indirect. Indirect impacts include (but are not limited to) potential environmental behaviour changes through education and research. It is argued that ‘improving environmental performance on campuses offers a unique opportunity to raise awareness and instil knowledge about environmental issues in students’ (USEPA 2004). Direct impacts arise from the consumption of resources such as paper, but mainly from the need to provide facilities services and management, which place substantial demand on two environment-related resources in particular: energy and water, and produce large quantities of solid wastes (Bennett, Hopkinson & James 2006). According to Creighton (1998), universities use a considerable amount of paper, energy and water, and they can be the largest users in the community or region where they are located.

Today, operating and maintaining campus facilities can account for a significant amount of a university's annual budget, of which energy related costs constitute an important part (Bennett, Hopkinson & James 2006). In the US, for example, campus facilities management can account for more than 10 percent of a university's annual budget (USEPA 2003). In the UK, the higher education sector spends more than £300 million a year on energy and water, which corresponds to 1-3 percent of total operating expenditure in most universities (HEEPI 2005). It is also indicated that the UK higher education sector pays annual water and sewerage bills of over £100 million, which are as large as their heating bills in some water-intensive institutions (Bennett, Hopkinson & James 2006).

Indeed, energy management is reported as one of the most significant environmental challenges facing universities (Herremans & Allwright 2000). Identification of energy consumption, even for individual buildings, may be a cost-effective improvement opportunity (see Penn State Green Destiny Council 2001). The consumption of energy and water within universities has gained some attention (see HEEPI 2005). However, little is known about how much waste is generated or how much paper (part of which would become wasted) is used because very few universities collect data<sup>26</sup> (Bennett, Hopkinson & James 2006; HEEPI 2007c). Due to the lack of data, many cost saving opportunities have been ignored or lost. Creighton argues:

To date, no university or college community has completely understood and acted on the opportunities to save money, reduce risk, demonstrate new technologies, and increase student learning that a truly green university might offer. The progress toward that end will require the commitment of many individual people. It will involve rethinking some priorities, taking risks, making mistakes, and persevering (1998, p. 8).

Creighton's argument highlights the requirement of participation of many individuals with various management functions, and rethinking priorities to improve environmental management. Without their participation, the progress towards a 'truly green' university would be slow, or less likely, to be made.

### **4.3 SUSTAINABLE DEVELOPMENT AND THE SECTOR**

Sustainable development, according to Filho and Carpenter, is 'a process that is characterised by the use of existing natural resources in a way that they are available in the long term for future generations' (2006, p. 9). The role for the higher education sector to achieve sustainable development, which involves two issues, education itself and internal practices, was

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<sup>26</sup> However, the rising costs to manage and dispose of waste would justify the need for waste management in universities. For example, it is estimated that in the UK the cost to dispose of trade waste would increase from £21 in 2006 to a predicted £34 a tonne in 2008 due to the higher operating standards and increases in landfill tax (HEEPI 2007c).

recognised in the early 1970s<sup>27</sup>. It is also the time when environmental issues received attention in the environmental accounting literature. However, only after the 1992 Rio Earth Summit<sup>28</sup> was the term 'education for sustainable development' moved up to the management agenda in universities (Calder & Clugston 2002). *Agenda 21*<sup>29</sup> of the Rio Declaration called for broadening the environmental concerns to include the social and economic dimensions of sustainable development through the core areas of university life – research, teaching, outreach, and operations. Whilst educating students in relation to sustainable development is important, this research will be focusing on internal operations only.

Subsequent to *Agenda 21*, a series of internationally recognised declarations focused on 'higher education for sustainable development' made explicit the role of universities in fostering a sustainable future (Calder & Clugston 2002; Herremans & Allwright 2000; Thomas 2004; Wright 2002). To provide a historical context, some major declarations related to the higher education sector, before and after *Agenda 21*, are summarised in Table 4.1. A brief description of their importance for universities to achieve sustainable development is also provided.

Most of the declarations shown in Table 4.1 emphasise the education role<sup>30</sup> of universities. However, the theme of sustainable physical operations is identified by three declarations, namely the *Talloires Declaration*, the *Kyoto Declaration* and the *Swansea Declaration*. No practical action plans are offered to ensure sustainable physical operations, but the declarations do have some influences on how universities frame their environmental policies and how they implement their environmental commitment (Herremans & Allwright 2000; Wright 2002). For example, university signatories to the *Talloires Declaration* – the first declaration made by university top management of a commitment to sustainable development – are increasing<sup>31</sup>, and various environmental management initiatives have been undertaken to meet the commitment. The next section will provide a description of the environmental initiatives undertaken by universities for the purpose of environmental management.

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<sup>27</sup> The 1972 Stockholm Declaration (Declaration of the U.N. Conference on the Human Environment, June 16, 1972) extended environmental concerns to all societal sectors, including the education sector (Calder & Clugston 2002).

<sup>28</sup> The U.N. Conference on Environment and Development, having met at Rio de Janeiro from 3 to 14 June, 1992, produced the Rio Declaration, which reaffirmed the Stockholm Declaration.

<sup>29</sup> U.N. Conference on Environment and Development, *Agenda 21*, U.N. Doc. A/CONF.151.26 (1992) (hereinafter *Agenda 21*)

<sup>30</sup> Most of the declarations shown in Table 4.1 address the issue that universities have the ethical and moral responsibility to educate both the students and the wider community in which they reside to be ecologically literate (Wright 2002). It is the potential to train the coming generations of decision-makers that makes universities take on the leadership for promoting sustainable development (Eagan & Keniry 1998).

<sup>31</sup> See the Talloires Declaration Institutional Signatory List as shown in ULSF (2007).

**TABLE 4.1 UNIVERSITY-RELATED DECLARATIONS**

Year	Declaration	Importance
1972	Stockholm Declaration	In spite of little reference to the right of the environment, the Declaration recognises the fundamental interdependency between the human beings and the environment. The relationship between higher education and sustainable development is identified and the role of higher education for a sustainable future is also recognised.
1977	Tbilisi Declaration	The Intergovernmental Conference on Environmental Education in Tbilisi echoed the calls from the <i>Stockholm Declaration</i> for providing environmental education, and was considered one of the starting points for formal international environmental education initiatives.
1990	Talloires Declaration	It is the first declaration made by university top management of a commitment for universities to sustainable development. Up to March 2006, there are 328 university signatories to the Declaration all over the world, including 17 in Africa, 36 in Asia/South Pacific, 130 in Canada and the US, 110 in Latin America and Caribbean, 33 in Europe and Russia, and 2 in the Middle-East.
1991	Halifax Declaration	It is the first declaration with an action plan to implement specific frameworks for universities. The importance of environmentally sound campus operations is mentioned.
1992	Chapter 36 of Agenda 21	A leadership role of higher education is recognised in the implementation of sustainable development through education, public awareness and training.
1993	Kyoto <sup>32</sup> Declaration	The major contribution of the Declaration is a call for creating specific action plans in pursuing the goal of sustainable development, not only through environmental education but also physical operations of universities. Ethical obligation of universities to the environment is also stressed.
1993	Swansea <sup>33</sup> Declaration	A new dimension is added that stresses equality among countries as an important factor in achieving sustainable development.
1994	CRE Copernicus Charter <sup>34</sup>	The document explicitly states that universities have the responsibility to educate not only students but also employees so that environmentally responsible behaviour can be fostered within universities.
1997	Thessaloniki <sup>35</sup> Declaration	The Declaration reaffirms that environmental education could be used as a major way in education for sustainable development.

Source: Summarised from Samson (2004), Thomas (2004) and Wright (2002)

#### 4.4 ENVIRONMENTAL MANAGEMENT AND ENVIRONMENTAL ACCOUNTABILITY

As defined in Chapter Two, environmental management comprises environmental responsiveness (e.g. implementing environmental policies and strategies to minimise environmental impacts) by organisations to ensure effective management and improve environmental performance (Gray & Bebbington 2001). Environmental accountability, also defined in Chapter Two, requires organisations to provide accounts (both financial and non-financial) of their environmental responsiveness and associated performance (Burritt & Welch 1997). The following sections will discuss the current state of environmental responsiveness by universities, and the link between environmental management and accounting that is required to improve environmental accountability.

<sup>32</sup> The Declaration was developed by the Ninth International Association of Universities Round Table.

<sup>33</sup> The Declaration was developed by the Association of Commonwealth Universities' 15<sup>th</sup> Quinquennial Conference.

<sup>34</sup> The *Charter* was developed by the Conference of European Rectors (CRE), which is now called the Association of European Universities.

<sup>35</sup> The Declaration was developed by the International Conference on Environment and Society – Education and Public Awareness for Sustainability.

#### 4.4.1 CURRENT STATE OF ENVIRONMENTAL RESPONSIVENESS

The role of internal practices used by universities to achieve sustainable development has attracted limited attention. It is somewhat evident in the declarations previously mentioned. However, the acceptance of social responsibility (though more abstract and moral) constitutes another pressure for senior management in organisations, including universities, to minimise environmental impacts caused by their daily operations (Hoffman 2001). The *Kyoto Declaration* not only calls for creating specific action plans in pursuing sustainability, but also stresses the ethical obligation of universities to the environment. This has motivated some universities to undertake environmental initiatives and reduce environmental impacts, but progress is university specific.

An increasing number of universities have undertaken some form of environmental management to demonstrate that they are environmentally responsible. For example, some universities analyse their ecological footprint in light of sustainability principles (Flint 2001; Penn State Green Destiny Council 2001); some undertake initiatives to increase energy efficiency, recycle, and reduce wastes (Bekessy et al. 2002; Forum for the Future 2004; NWF 2007; Uhl & Anderson 2001); some conduct environmental audits to better understand environmental impacts (Creighton 1998; Delakowitz & Hoffmann 2000; Uhl et al. 1996); and some get certified under environmental management systems, such as ISO 14001 and EMAS (Arvidsson 2004; Simkins & Nolan 2004; von Oelreich 2004).

There are also a number of universities providing environmental reporting to demonstrate actions taken and progress made towards environmental sustainability. Some universities follow the guidelines by the Global Reporting Initiative<sup>36</sup> (GRI), but some provide environmental reports with different formats and contents. The University of Florida in the US is the first university reporting sustainability information based on the *GRI's Sustainability Reporting Guidelines*. Six universities<sup>37</sup> have now registered with the GRI for reporting sustainability information using the GRI guidelines (GRI 2007).

It seems that there are various forms of environmental responsiveness by universities. However, anecdotal evidence suggests that these environmental initiatives or programs are rarely carried out strategically. For example, Carpenter and Meehan (2002) indicate that

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<sup>36</sup> As a 'collaborating centre' of the United Nations Environment Programme, the GRI has a vision to promote the practice of reporting on economic, environmental, and social performance by all organisations as routine and comparable as financial reporting (GRI 2007). Its guidance – *Sustainability Reporting Guidelines* – is provided to achieve the goal and promote international harmonisation in reporting.

<sup>37</sup> They are Estudio Técnico Gallego SA (Spain), Fachhochschule für Wirtschaft Berlin (Germany), the University of Hong Kong (China), Turku Polytechnic (Finland), University de Santiago de Compostela (Spain) and Universität Graz (Austria).

environmental management has not yet been accepted as a mainstream business activity in Australian universities. Herremans and Allwright (2000) observe that most universities in North America that report environmental information are merely demonstrating what has been done on the campus, but do not provide further information on their environmental performance. Bennett, Hopkinson and James (2006) argue that environmental initiatives in the UK higher education sector only have limited impacts on improving environmental performance.

Indeed, university signatories to national and international environment-related declarations (e.g. the Talloires Declaration) are increasing around the world. However, Wright raises a question – ‘does an institution need to sign an international declaration to move along the continuum of sustainability?’ (2002, p. 213). Wright also argues that ‘being a signatory to a national or international agreement is not a valid indicator of an institution’s dedication to sustainability’ (2002, p. 213). If it is true that any national or international declarations signed should be viewed as institutional policies, then university signatories should strive to implement policies for the purpose of strategic environmental management. However, this is not always the case (e.g. Samson 2004).

Arguably, a lack of involvement from individuals with an accounting function explains part of the reason for the lack of environmental management being conducted strategically by universities. Epstein states that ‘both the accounting and environmental areas are concerned about how to measure, report, and manage environmental impacts’ (1996, p. xxvi). Bakker (1998) emphasises accounting as an important driving force for improvement in campus environmental management. Keniry (1995) suggests that changing accounting practices is one way to drive environmental accountability at universities. Without the involvement of individuals with an accounting function, environmental management might be ‘a patchwork of independent, autonomous functions (recycling departments, facility services, plant maintenance, etc.), that are not well coordinated, nor are they working toward a common goal’ (Herremans & Allwright 2000, p. 180). This gives rise to the need for a link between environmental management and accounting, or simply EMA for universities.

#### **4.4.2 THE LINK BETWEEN ENVIRONMENTAL MANAGEMENT AND ACCOUNTING – EMA**

Management accounting techniques can support environmental management to improve both environmental and financial performance, but a link between environmental management and accounting is required (Bartolomeo et al. 1999). A literature review reveals a lack of research that documents the current state of the link as it relates to universities. Further, the reason for this lack remains unexplored. In view of this absence, the research has two objectives –

understanding the current state of accounting practices for the purpose of environmental management, and exploring factors influencing EMA adoption within universities.

Experiences from the business world suggest:

... a linking of these systems [environmental management and accounting systems] and better communication and coordination among affected personnel is easily attained, with little financial or personnel costs, and has significant organizational benefits (Epstein 1996, p. 87).

Financial or resource constraints does not seem to be the only barrier to provide the linkage as suggested by Epstein (1996). There might be some other barriers. Given that environmental management is an essential part of EMA, barriers (or drivers) to implement environmental initiatives could be potential factors having influence on the uses and applications of EMA. Therefore, barriers (or drivers) to implement environmental management specific to universities need to be examined for the purpose of providing a basis for exploring factors that might impede, or assist in, the establishment of EMA within universities.

#### **4.5 BARRIERS AND DRIVERS TO IMPROVING ENVIRONMENTAL ACCOUNTABILITY**

A number of barriers encountered by universities in introducing environmental initiatives or programs are documented (e.g. Creighton 1998; Dahle & Neumayer 2001; Meyerson & Massy 1995; Nicolaides 2006; Sammalisto & Arvidsson 2005). Several drivers to the improvement of environmental management within universities are also suggested (e.g. Bennett, Hopkinson & James 2006; Shriberg 2002; Towns & Cocklin 2006). They are discussed in turn.

##### **4.5.1 BARRIERS**

Empirical studies suggest various barriers to implement environmental initiatives at universities. Earlier researchers identified some important barriers, for example a fundamental lack of interest and commitment among stakeholders of universities (e.g. administrators, staff and students) found by Creighton (1998), and long payback periods and a general lack of incentives and information on environmental issues by Meyerson and Massy (1995).

More recently, a UK London based survey suggests that a significant barrier is the lack of financial resources (Dahle & Neumayer 2001). Other barriers suggested by Dahle and Neumayer's study include a lack of environmental awareness, a non-environmental attitude prevailing at campus (i.e. a long list of competing priorities), and urban locations. They argue that the barrier 'is at least partly due to a lack of knowledge concerning how greening initiatives can save costs as well as an institutional reluctance to change' (Dahle & Neumayer 2001, p. 139). Nicolaides (2006) concurs that the resistance to change is a major obstacle to

implement environmental initiatives. A survey on environmental management in the Swedish higher education sector found that difficulties in collecting required data constitute a barrier to implement an environmental management system (Sammalisto & Arvidsson 2005). It seems that the argument of a lack of knowledge being a barrier to implement environmental initiatives by Dahle and Neumayer (2001) could be levelled at Swedish universities. Consider the following statement by Sammalisto and Arvidsson:

The work with EMS has created structures for this [the collection of required information] and some universities are also starting to experience savings due to reduced waste handling costs, etc. This is also a trend that can be expected to continue due to the more constrained economy in universities and the expected stricter legislation regarding, for example, waste generation and higher energy cost in the future (Sammalisto & Arvidsson 2005, pp. 29-30).

In general, the barriers found in the literature appear to be interrelated and combine to make implementation of environmental initiatives difficult. Co-convened by the US National Wildlife Federation's (NWF) Campus Ecology program and University Leaders for a Sustainable Future (ULSF), a higher-education stakeholder meeting was held in 2001 to discuss the barriers to and opportunities for continuing progress in elevating environmental sustainability as a central concern in universities and colleges. Five major categories of the barriers to environmental sustainability were identified (NWF & ULSF 2001). Various factors relating to the five categories were proposed, including those found by the above-mentioned researchers. Among them, some have important implications in accounting and could be addressed by EMA, which are summarised as follows:

- *Institutional and Management Barriers*: a lack of goals and goal-setting processes; bidding and other processes that do not take into consideration the full or life-cycle costs; insufficient incentives to minimise waste and incentives in general
- *Cultural Barriers*: The thought that 'somebody else should do it'; a lack of nurturing of leaders from the top down
- *Financial Barriers*: a lack of responsibility-centred budgeting (e.g. costs of waste management not borne by academic departments); a lack of budget line items for space, staffing, and other resources; bottom-line and short-term orientation
- *Informational Barriers*: a lack of data and information; a need for a common language

#### **4.5.2 DRIVERS**

Each campus environmental initiative arises from a unique combination of historical backgrounds, interests, and circumstances. This complexity makes the influence of various barriers vary on progress towards environmental sustainability at universities. Nevertheless, a literature review reveals that several stakeholder groups are particularly active and effective as change agents to influence the progress. A stakeholder can be defined as 'any human

agency that can be influenced by, or can itself influence, the activities of the organisation in question' (Gray, Owen & Adams 1996, p. 45). Arguably, everyone is a stakeholder of universities but with varied power (UNESCO 2005). For example, Lounsbury (2000) indicates that a position for a full-time committed staff recycling coordinator is the product of student activism. Shriberg (2002) points out that most appointed recycling coordinators are former students who are actually campus environmental leaders. However, student influence is limited. Shriberg argues that 'students often provide an initial spark or focus attention on certain issues, but do not typically have the power and time to institutionalise these initiatives' (2002, p. 60). Students can be change agents, but they are generally not the powerful stakeholders in driving changes.

The literature is consistent in shaping the need for at least an individual to be an environmental champion or leader in order to initiate environmental programs. According to Clugston and Calder (1999), the champions can be faculty or staff members, but they must be able to gain resources and provide incentives for participation by others. In other words, they should be powerful stakeholders in order to successfully implement an environmental initiative. For example, the provision of environmental reporting at Monash University (Australia) is attributed to the support from these champions (Towns & Cocklin 2006). As it is essential to engage staff and students in preparing environmental reports, the authority of these champions can be used to gain access to staff and, more importantly, information.

Towns and Cocklin state:

At Monash the ultimate 'champions' are the Chancellor and Vice-Chancellor. There is also a member of the senior executive staff (the Deputy Vice-Chancellor – Resources) who is responsible for overseeing the execution of these reports. There can be no doubt that the genuine support at these highest-level contributes to the success of the initiative at Monash (Towns & Cocklin 2006, p. 175).

There is little doubt that individuals can have some influences on campuses if their level of position and commitment is high. Indeed, there is a convergence in the literature and the practice that supports the involvement of top-level management in ensuring environmental advancement. Simpson states that 'green campus initiatives will thrive when members of your community know that your president is interested, on board, and involved' (1996, p. 41). While the support of top management is important in any campus activities, their support is particularly important to the complex issue of campus environmental sustainability.

Stakeholder pressure, leadership commitment and top management support as described above are key internal drivers to campus environmental initiatives. However, Cortese (1999, p.3) argues that 'without strong outside influence, higher education is not likely to change its direction far enough or fast enough' to make the transition toward sustainability possible. In

the UK, revisions to the *Building Regulations*<sup>38</sup> introduced in 2002 require sufficient meters in new buildings to enable at least 90% of the estimated annual energy consumption to be accounted for by buildings (Bennett, Hopkinson & James 2006). As a result, the number of universities embracing the metering technology is increasing (see HEEPI 2007b). The *European Energy Performance of Buildings Directive* also includes a requirement for buildings to be labelled so that visitors can see their energy efficiency rating. Although this part of the *Directive* has not been addressed in the UK's new 2006 building regulations, it appears that the higher education sector will be required to take the lead on this as the pressure from the Government would be increasing (HEEPI 2007b). Several case studies and best practices on energy efficiency at UK universities, as well as anecdotal evidence, suggest that the UK higher education sector is ahead in implementing environmental initiatives. Arguably, it is in large part due to the pressure from the Government, a powerful stakeholder.

The combined findings in the literature suggest that a successful environmental initiative requires support from individuals at lower levels in the organisational hierarchy (e.g. students and staff) and the top management (e.g. the Vice-Chancellor), and at least one champion. Government pressure is not necessarily a factor to the success of implementing environmental initiatives, but without such pressure, progress would be far slower.

The following section will relate the university-specific barriers/drivers suggested by the environmental management literature to EMA adoption within universities.

#### **4.6 IMPLICATIONS FOR ENVIRONMENTAL MANAGEMENT ACCOUNTING WITHIN UNIVERSITIES**

As discussed previously, the barriers to implement environmental initiatives within universities include the lack of environmental goals and goal-setting processes, responsibility-centred budgeting systems, required environmental data and information, and a common language. Further, the bottom-line and short-term considerations also impede the implementation of environmental initiatives. A large part of the barriers are applicable to the limitations in relation to management accounting practices, such as a bias towards monetary information and poor communication between managers with functions of accounting and environmental management. EMA can be utilised to provide the link between environmental management and management accounting, which in turn will help generate a 'common language' among people with different expertise required for strategic environmental

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<sup>38</sup> The *Regulations* implement part of the *European Energy Performance of Buildings Directive* (EPBD), which sets minimum requirements for the energy performance of all new buildings and large renovated buildings, and requires energy certification of all buildings and the display of information on energy consumption and carbon dioxide emissions of public buildings (HEEPI 2007b).

management. In addition, experiences gained in business organisations support the uses and applications of EMA in providing the relevant environmental information, creating incentives, and incorporating environmental management into ongoing business processes (Ditz, Ranganathan & Banks 1995). It seems reasonable to conclude that EMA is applicable to universities in terms of overcoming barriers currently encountered by universities. This is also supported by the two EMA cases introduced in Chapter Three, which appear to suggest the utilisation of EMA in the context of the service-based organisations like universities.

Given the fact that universities have direct and indirect environmental impacts that need to be managed, it is arguably required to extend the insights and lessons learned from the related EMA studies to a university setting. However, drivers such as stakeholder pressure, leadership commitment, and top management support (as suggested in the environmental management literature) would be needed for the diffusion of EMA practices within universities. A further examination into the suggested barriers/drivers would be necessary for the purpose of exploring factors influencing EMA adoption within universities.

#### **4.7 CONCLUSION**

From a financial perspective, this chapter has discussed major environmental impacts of universities that need to be managed. A historical background was given that describes the relationship between sustainable development and the internal practices of the higher education sector. The barriers/drivers of environmental management in relation to the sector were identified, which also have broader applicability to EMA adoption. They will be used as part of the basis to explore factors influencing the decision to adopt, or not to adopt, EMA by universities. In addition to the factors suggested in the literature, the following chapter will provide a theoretical framework for the purpose of providing theory-based explanations about EMA adoption within universities.

## CHAPTER FIVE

### A THEORETICAL FRAMEWORK FOR ENVIRONMENTAL MANAGEMENT ACCOUNTING

#### 5.1 INTRODUCTION

The previous chapter has provided examples of, and rationales for, the uses and applications of environmental management accounting in universities. However, a literature review reveals that few case studies relate EMA to the education sector. Factors relevant to EMA adoption remain less explored. To achieve the second research objective of this study, a theoretical framework is required to help understand what factors<sup>39</sup> influence the decision to adopt, or not to adopt, EMA within universities.

The purpose of this chapter is to review four theoretical perspectives suggested by the literature in relation to management accounting, environmental management or environmental accounting, which could in turn provide explanations on EMA adoption. The four theoretical perspectives are drawn from contingency theory, institutional theory, legitimacy theory and stakeholder theory respectively. The four theories will be discussed, and propositions will be formed to guide and inform the study. Finally, key areas of concern for further investigation and potential factors having impacts on EMA adoption will be suggested.

#### 5.2 JUSTIFICATION FOR THE THEORETICAL PERSPECTIVES

Despite the growing presence of EMA, a literature review reveals that most EMA studies focus on understanding and describing the current state of practices in manufacturing sectors. Few case studies relate EMA to the education sector, and related theory-based research is even less evident. Reasons for organisations to adopt, or not to adopt, EMA remain less explored. According to Rikhardsson et al.:

... to date there have been few studies which have addressed questions such as how widespread EMA actually is, which companies respectively adopt or do not adopt EMA, how fast EMA is spreading, what factors influence the speed of diffusion, and the processes by which it spreads. To date there has not been much research into these issues (2005b, p. 4).

However, if EMA is regarded as a new managerial technology as suggested by Rikhardsson et al. (2005b), two main categories of explanations can be found in the innovation diffusion literature that explains why organisations adopt certain technologies but not others – the *efficient choice* explanation and the *institutional* explanation (see Abrahamson 1991, 1996;

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<sup>39</sup> The factors include barriers and drivers that have impacts on EMA adoption.

Rogers 2003). Rikhardsson et al. explain:

The former stresses the efficiency of adopting something that in some way improves corporate performance, and the latter focuses on more sociological and psychological factors that determine the adoption or rejection of innovation (2005b, p. 4).

In the context of EMA, the *efficient choice* perspective seems to provide partial explanations. In the US, for example, some EMA tools or technologies were adopted because they were considered economically more efficient, offered measurable advantages, or helped achieve cost savings. According to Gray and Bebbington (2001), there is a strong economics focus on EMA development in this area. It is in large part due to the increasing environmental regulations in the US. As such, some organisations would apply some form of EMA simply for avoiding future liabilities and making profits by minimising environmental impacts.

However, for cases that fail to demonstrate an *efficient choice* explanation, other explanations would be required. In Japan, for example, EMA development is primarily directed and guided by the Government. A high percentage of companies reporting environmental information follow the guidelines provided by the Japanese Government (Kokubu & Nakajima 2004). In this case, the *institutional* perspective might offer a better explanation because government agencies demand certain information, or impose pressure, requiring the application of some EMA practices. The *efficient choice vs. institutional* explanation seems to provide a valuable direction for researchers to explore why EMA is adopted.

Among the researchers who explicitly apply the *efficient choice vs. institutional* perspective in explaining EMA adoption are Bouma and van der Veen (2002). They draw mainly from contingency theory (e.g. Chapman 1997; Langfield-Smith 1997) and institutional theory (e.g. Boons et al. 2000; DiMaggio & Powell 1983) to explain why EMA is adopted in a chemical company. Parallel to the *efficient choice vs. institutional* explanation, contingency theory emphasises efficiency as the reason to adopt EMA, but institutional theory stresses the influence of imitation processes and external groups<sup>40</sup> on EMA adoption. Researchers of the two theoretical perspectives suggest that contingency theory and institutional theory provide important explanations for EMA adoption (e.g. Bouma & van der Veen 2002; Osborn 2005; Parker 1997).

Contingency theory is referred to by a substantial body of research that focuses on the design of effective management accounting systems (for example, Chenhall 2003; Fisher 1998; Otley 1980; Waterhouse & Tiessen 1978). However, it is argued that *efficiency* might not always be the only criteria for organisational decision-making (Abrahamson 1991; DiMaggio & Powell

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<sup>40</sup> External groups could include, but are not limited to, government agencies and accounting professional bodies.

1983; Scott 2001). The decision to change accounting systems could depend on some other sociological or psychological factors which provide 'institutional' explanations (Rikhardsson et al. 2005a). Therefore, a second typology of explanations is suggested by studies that focus on institutional theory (e.g. Abrahamson 1991, 1996; Bouma & van der Veen 2002).

In contrast to the focus of contingency theory on technical environments, institutional theory highlights the impacts of institutional environments on organisations. Technical environments are defined as 'those within which a product or service is exchanged in a market such that organizations are rewarded for effective and efficient control of the work process' (Scott & Meyer 1983, p. 140). Modell (2002) explains that the technical environments mainly comprise factors related to production technologies (or service provision), and market conditions facing organisations. Institutional environments are 'characterized by the elaboration of rules and requirements to which individual organizations must conform if they are to receive support and legitimacy' (Scott & Meyer 1983, p. 149). Scott explains:

In contrast to the prevailing theories of organizational environments – such as contingency theory or resource dependence – that call attention primarily to technical requirements, resource streams, information flows, and influence relations, the new formulation stresses the role played by cultural elements – symbols, cognitive systems, normative beliefs – and the sources of such elements. Institutional elements of environments begin to be defined in contrast to technical elements, and this definition becomes more explicit and pronounced over time (1987, pp. 497-8).

Contingency theorists stress the growing complexities of technical environments as important variables driving changes in management accounting. Institutional theorists, on the other hand, argue that factors arising from the technical environments may affect the extent of conformity with institutionalised patterns of organisational behaviour in a totally different direction. Although the two theories approach the same phenomenon from different perspectives (the *efficient choice* vs. *institutional* considerations), it is useful to consider them as two separate theoretical perspectives. Modell suggests that 'the striving for legitimacy does not necessarily conflict with the achievement of economic efficiency through adjustment to competitive conditions and other technical prerequisites' (2002, p. 655).

In addition to the two theoretical perspectives, a review of environmental accounting literature reveals that legitimacy theory and stakeholder theory might be related to EMA studies. Legitimacy theory and stakeholder theory are among the most common theoretical perspectives being applied by environmental accounting researchers to explain why organisations elect to voluntarily disclose particular information to external parties (see Deegan 2002; Gray, Kouhy & Lavers 1995).

Legitimacy theory asserts that organisations continually seek to ensure that they are perceived as operating within the bounds and norms of the society, whereas stakeholder theory emphasises the power of stakeholders in influencing organisational management, with the power being a function of the stakeholder's degree of control over resources required by the organisation (Deegan & Blomquist 2006). According to Deegan and Blomquist, there is much overlap between the two theories and 'to treat them as sharply discrete theories would be wrong' (2006, p. 349).

It is argued that not only external, but also internal stakeholders, will influence management accounting practices. Schaltegger and Burritt state:

When internal accounting systems influence external returns, for example, by ignoring environmental impacts of company activities, investors need to be mindful of the need for improvement and may even try to influence internal changes. Although financial accounting standards are slowly changing, some additional environmentally oriented stakeholders, although having no effective power to tell managers how to organise their internal accounts, have substantially influenced management accounting practices so that environmental issues are now considered in greater depth (2000, p. 107).

Although EMA is primarily used to provide information for internal management, it is still within the broader 'environmental accounting' boundary. Legitimacy theory and stakeholder theory can be applied to provide predictions about EMA adoption. It is possible that organisations would have adopted EMA because it was regarded as a way to legitimise their internal practices, or to demonstrate that they appear to manage their environmental impacts in response to stakeholder pressure.

In an attempt to explore factors influencing EMA adoption, issues such as *efficiency*, *institutional pressure*, *legitimacy* and *stakeholder power* all seem to be relevant. The research will consider the four theoretical perspectives drawn respectively from contingency theory, institutional theory, legitimacy theory, and stakeholder theory. Clearly, other theoretical perspectives, or other theories, could also be applied to study aspects of EMA adoption. In view of EMA being a relatively new area of research and practices, with few related theory-based studies, this research will choose to focus on the four theories, which will be discussed in turn in the following.

### 5.3 THE CONTINGENCY THEORETICAL PERSPECTIVE

There is a frequent call from the academic literature and from the professional consultants for organisations to introduce sophisticated management accounting techniques<sup>41</sup> for the purpose of strategic management (Tillema 2005). However, as indicated by Tillema (2005), even perceived sophisticated management accounting techniques do not always guarantee the success of implementation. It is argued that the success of implementing a sophisticated management accounting technique may be contingent on the circumstances in which the technique is being used, or the environments in which an organisation operates (Gosselin 1997; Krumwiede 1998). Luft and Shields (2003) find that contingency theory of organisations is a major theory that has been applied by a substantial number of researchers to explain the complex relationships between the changes in management accounting and the factors that are both internal or external to an organisation<sup>42</sup>. A brief discussion about the contingency theory of organisations follows.

#### 5.3.1 CONTINGENCY THEORY OF ORGANISATIONS

The theory emerged in the 1960s via the pioneering researchers, such as Burns and Stalker (1961), Hage (1965), Lawrence and Lorsch (1967), Thompson (1967), and Woodward (1965). It suggests that the design of organisational structures depends upon the presence and influence of certain environmental contingencies (Rayburn & Rayburn 1991; Thomas 1991). A contingency is defined by Donaldson as ‘any variable that moderates the effect of an organizational characteristic on organizational performance’ (2001, p. 7). It can be any variable that is internal or external to an organisation. It is argued that the essence of the theory is that organisational effectiveness<sup>43</sup> rises from the fitting<sup>44</sup> between the organisational characteristics (e.g. the organisational structure) and the contingencies which reflect the situation of an organisation (Donaldson 2001). This fit-performance relationship is essential to the contingency theory paradigm. Management accounting researchers utilised the paradigm to develop contingency theory of management accounting.

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<sup>41</sup> Perhaps the most notable management accounting techniques are activity-based costing (see Kaplan & Cooper 1998) and balanced scorecard (see Kaplan & Norton 1996).

<sup>42</sup> Luft and Shields (2003) reviewed 275 articles in six leading journals, and summarised relationships between more than 500 theory-based and practice-based variables in nine maps. The major themes of relationships studied include causes and effects of budgeting at an organisation and its subunit levels, information for planning and control, implementing management accounting changes, and individual judgements and decisions. They find that contingency theory of organisations is a major theory from which some of the theory-based variables are derived, and four out of the nine maps are related to the theory.

<sup>43</sup> According to Donaldson, effectiveness can be broadly defined as ‘the ability of the organization to attain the goals set by itself, or by its ability to function well as a system, or by its ability to satisfy its stakeholders’ (2001, p. 6). Therefore, effectiveness may include efficiency, performance, profitability, employee satisfaction, or innovation rate.

<sup>44</sup> According to Donaldson, ‘there is a fit of some level of the organizational structure variable to each level of the contingency, which leads to higher performance, whereas misfit leads to lower performance’ (2001, p. 7).

### 5.3.2 CONTINGENCY THEORY OF MANAGEMENT ACCOUNTING

Contingency theory was applied to management accounting research in mid 1970s. Several seminal management accounting researchers suggest that a contingency paradigm may provide a holistic framework for the design of management accounting systems<sup>45</sup> (e.g. Gordon & Miller 1976; Hayes 1977; Waterhouse & Tiessen 1978).

Gordon and Miller (1976) suggest that the design of effective management accounting systems should be contingent on firm-specific factors<sup>46</sup>. To help measure the effectiveness of accounting systems, they propose a list of possible design characteristics, such as the amount of non-financial and environmental data provided, frequency of reporting, and tailoring of systems to suit subunit needs<sup>47</sup>. It should be noted that in their research of effective management accounting systems, the importance of non-financial and environmental data, communication of management information, and a system that meets subunit needs has been identified.

Hayes (1977) focuses on how management accounting practices vary across organisational subunits, and indicates that conventional management accounting fails to provide required information to assess organisational performance. Hayes (1977, p. 37) argues that 'cost data are not good surrogates' for the performance of organisational subunits, and the notion of responsibility and accountability is really broader than the costs incurred. According to Hayes (1977), the fact that subunit managers are only held accountable for performance over controllable costs really delimits the discharge of accountability.

Waterhouse and Tiessen (1978) refine contingency theory by indicating that the influence of contingencies on the subunits of an organisation varies, which in turn explains the differences in management accounting systems across organisations. It is argued that there is not a single accounting system that fits an organisation in all circumstances (Emmanuel, Otley & Merchant 1990; Rayburn & Rayburn 1991; Reid & Smith 2000). Otley explains:

... particular features of an appropriate accounting system will depend upon the specific circumstances in which an organisation finds itself. Thus a contingency theory must identify specific aspects of an accounting system which are associated with certain defined circumstances and demonstrate an appropriate matching (1980, p. 413).

Following the seminal research, a great number of contingency variables relevant to the

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<sup>45</sup> Management accounting systems refer to the systems that support managerial planning, evaluating, and controlling organisational activities. In a broader sense, these systems are used to facilitate strategic management (Horngren, Datar & Foster 2003).

<sup>46</sup> The factors include environmental, organisational, and decision style variables that could contribute to the understanding of management accounting systems.

<sup>47</sup> For a full list of the proposed possible design characteristics, see Macy and Arunachalam (1995).

design of effective management accounting systems have been proposed. Some can be related to EMA adoption, and they will be used to develop propositions for the purpose of the second research objective of this study. The next section will provide a brief overview of the contingency variables, leading to the development of propositions.

### **5.3.2.1 OVERVIEW OF THE CONTINGENCY VARIABLES RELEVANT TO THE DESIGN OF ACCOUNTING SYSTEMS**

Emmanuel, Otley and Merchant (1990) classify three groups of frequently mentioned contingency variables, namely environment, organisational structure, and technology. The three groups of variables appear in most studies on the contingency theory of management accounting (e.g. Chenhall 2003; Covin & Slevin 1989; Gilley, McGee & Rasheed 2004; Slater & Narver 1994). The role of business strategies in the design of accounting systems is another stream of contingency-based research (see Anderson & Lanen 1999; Chenhall & Langfield-Smith 1998; Langfield-Smith 1997; Lofsten & Lindelof 2005). There is also a substantial body of research that focuses on the contingency relationships between the design of accounting systems and organisational performance (e.g. Agbejule 2005; Chenhall 2003; Hoque 2005; Langfield-Smith 1997).

In particular, Thomas applies contingency theory to explain corporate financial reporting practices<sup>48</sup>, and argues that ‘management choice of corporate financial reporting practices is contingent upon the differing constraints on entities’ (1991, p. 41). Rayburn and Rayburn (1991) apply the theory to a hospital setting, and find that the ‘uncertainty’ created by the changes in accounting practices affect the role of accountants in this context. Uncertainty can be interpreted as the result of decision makers experiencing a lack of information about future events (Galbraith 1973; Lawrence & Lorsch 1967; Rayburn & Rayburn 1991). Various aspects of uncertainty<sup>49</sup> as a contingency variable are developed in the contingency theory literature (see Desarbo et al. 2005). They are generally referred to as ‘environmental uncertainty’.

According to Osborn (2005), environmental uncertainty seems to be a distinct variable that can be linked to EMA. However, he also indicates that ‘mainstream accounting and management conventions with respect to environmental uncertainty typically focus on environmental matters that exclude nature’ (2005, p. 81). As the research is focused on

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<sup>48</sup> The contingency variables included in Thomas’ study are societal variables, the environment, organisational attributes, and user characteristics. According to Thomas (1991), the societal variables can be related to the economic, legal and political systems where an organisation resides.

<sup>49</sup> This may include the degree of predictability of financial and capital markets, government regulation and intervention, actions of competitors or suppliers, and general conditions facing an organisation.

management accounting for the natural environment, particular interest and attention is placed on perceived environmental uncertainty<sup>50</sup> in the natural environment. For the purpose of this study, this uncertainty will be referred to as *physical environmental uncertainty* to be distinguishable from environmental uncertainty arising from the environment that typically excludes nature. The following section provides further discussion about physical environmental uncertainty.

### **5.3.2.2 PHYSICAL ENVIRONMENTAL UNCERTAINTY AS A VARIABLE RELEVANT TO EMA ADOPTION**

Osborn (2005) argues that the concerns over environmental impacts on the ecosystems might not be able to effectively compete with other environmental variables to influence accounting policies and practices. However, contrary evidence, although limited, supports that management concerns over the natural environment are sufficient to influence accounting practices and human behaviours (e.g. Lewis & Harvey 2001; Ozanne & Menguc 2000).

According to Lewis and Harvey (2001), a closely linked relationship existing among everything in the ecology makes the natural environment a significant source of uncertainty. Public policy makers, business organisations, consumers or pressure groups all face such uncertainty over a number of natural environment-related issues, such as global warming, which represents a threat to human beings (see IPCC 2007). It is this uncertainty in relation to the systemic and complex nature of the natural environment that constitutes a barrier for integrating the natural environment into strategic management (Lewis & Harvey 2001).

Consider the following statement:

Governments also face extreme uncertainty over a number of green issues, global warming being the best example. Should governments take action today and risk wasting money or should they 'wait and see' and risk more environmental damage? Weighing the benefits against the costs is extremely difficult and fraught with uncertainty (Cairncross, 1991). Where the green issues are much clearer, it is the speed and development of legislation that is causing confusion (Charter, 1992) (Lewis & Harvey 2001, p. 202).

It appears that physical environmental uncertainty could be a potential contingency variable affecting the decision to adopt, or not to adopt, EMA. To operationalise this contingency variable, Lewis and Harvey (2001) propose a scale to measure physical environmental uncertainty. The scale is an extension of Miller's (1993) scale and is grounded in the environmental management literature. It will be utilised by this study to measure physical environmental uncertainty.

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<sup>50</sup> According to Harrison (2003), environmental uncertainty is regarded as an objective concept, which arguably may not directly influence organisational decision and operations, because decision makers interpret this objective environmental uncertainty from their perspectives. Therefore, researchers have focused on 'perceived' rather than 'objective' environmental uncertainty.

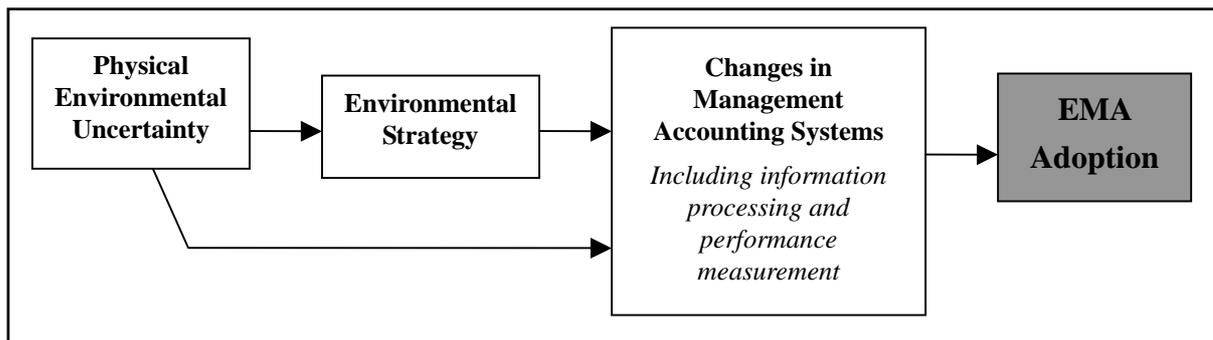
The seven dimensions considered in Lewis and Harvey's (2001, p. 227) scale include:

- government environmental policy,
- environmental resources and services used by the organisation,
- environmental products, markets and demand,
- green competition,
- environmental technology in the industry,
- the behaviour of environmental stakeholders in the organisation, and
- how major environmental issues are affecting the organisation.

### 5.3.2.3 A CONTINGENCY FRAMEWORK FOR THIS STUDY

Building from the previous discussion about the contingency variables, a simplified contingency framework for this study is given in Figure 5.1. The figure shows the relevant contingency variables, and how the variables would influence EMA adoption. The variables and associated contingency relationships will be used to develop propositions relating to contingency theory. The next section will provide further explanations.

**FIGURE 5.1 A CONTINGENCY FRAMEWORK FOR THIS STUDY**



### 5.3.3 THE DEVELOPMENT OF PROPOSITIONS RELATING TO CONTINGENCY THEORY

To guide the research, three propositions relating to contingency theory were developed. The propositions are based on the following:

- The influence of environmental strategy as a moderating variable,
- The influence of the contingency relationship between physical environmental uncertainty and information processing, and
- The influence of the contingency relationship between physical environmental uncertainty and environmental performance measurement.

The following sections will provide detailed discussion.

### 5.3.3.1 THE INFLUENCE OF ENVIRONMENTAL STRATEGY AS A MODERATING VARIABLE

The contingency relationship<sup>51</sup> between environmental uncertainty and business strategy is supported to have influence on the design of management accounting systems (for example, Gordon & Narayanan 1984; Lawrence & Lorsch 1967; Macy & Arunachalam 1995; Thompson 1967). A reasonable extension of this relationship is that changes in environmental strategy would induce modifications to the supporting management accounting systems in order to provide more relevant environmental cost information. The *environmental strategy* ‘refers to “a pattern in action over time” (Mintzberg, 1989: 27) intended to manage the interface between business and the natural environment’ (Sharma 2000, p. 682).

Environmental strategy can be classified along a continuum that ranges from reactive to proactive. For example, organisations might invest in cleaner technologies as a response to changes in environmental regulations or stakeholder pressure. This can be classified as a reactive strategy. However, some organisations might voluntarily choose to redesign their operations, processes, or products to reduce environmental impacts, or to prepare for future regulations. This can be seen as a proactive environmental strategy. Where organisations choose to adopt proactive environmental strategies, it is likely that they would modify, or innovate, the management accounting systems for an alignment of strategies taken and organisational accounting practices. However, where organisations prefer reactive environmental strategies, they might continue to rely on their systems currently in use. In other words, their management accounting systems are less likely to be innovated or changed. In this study, the environmental strategy is measured by outcomes in the form of actions that an organisation undertakes for regulatory compliance, and/or initiatives it voluntarily takes to minimise environmental impacts.

It is argued that if an organisation incorporates the ‘natural environment’ into its business strategic plan, and implements supporting environmental programs or initiatives, management accounting systems will be expected to innovate in order to provide more information (e.g. monetary and physical environmental cost information). There are an increasing number of universities becoming signatories to the environment-related declarations (e.g. the Talloires Declaration). This can be seen as environmental responsiveness by universities to the increasing environmental concerns. Therefore, two areas need to be investigated for the purpose of exploring factors relating to EMA adoption – the environmental strategy (i.e. how university signatories ensure compliance with the environmental commitments), and the role of management accounting in implementing the strategy. In other words, *current*

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<sup>51</sup> For discussion about this contingency relationship, see Macy and Arunachalam (1995).

*environmental management practices* constitute an area of concern for this study, and *environmental strategy* undertaken could be a factor relevant to EMA adoption. Therefore, it is proposed:

*P1. Universities that are signatories to environment-related agreements or declarations and strive to ensure compliance with the commitment would devote attention to minimise environmental impacts and/or manage environmental costs.*

### **5.3.3.2 THE INFLUENCE OF THE CONTINGENCY RELATIONSHIP BETWEEN PHYSICAL ENVIRONMENTAL UNCERTAINTY AND INFORMATION PROCESSING**

Information provision is an important function of management accounting. As the organisational environment becomes more unpredictable, decision makers would tend to process more relevant information to deal with the uncertainties (Gordon & Narayanan 1984; Parker 1997; Rayburn & Rayburn 1991). If the *natural environment* itself became a source of uncertainty as argued by Lewis and Harvey (2001), EMA would be of great importance in terms of the provision of environmental cost information. Parker (1997) concurs that there is a need to reclassify and reconfigure conventional management accounting systems in response to the increasing needs of environment cost information. It is argued that if an organisation experiences a high level of physical environmental uncertainty, it might innovate its accounting systems to provide more information. These innovated systems (if any) aim at providing environmental information to minimise environmental impacts and manage associated costs.

In general, it is the senior management who makes decisions and shapes the organisational culture. They are the actors constructing accounting practices; accounting practices and systems can then be shaped by their behaviours (Covaleski, Dirsmith & Samuel 1996). With such influence, senior management is able to determine whether accounting innovations are required, or what environmental information needs to be disclosed for establishing environmental credentials. Arguably, the driver to EMA adoption, in large part, lies in the support of senior management and their perceptions of physical environmental uncertainty. A high level of perceived physical environmental uncertainty would require an organisation to be able to respond rapidly to unforeseen changes. Therefore, senior management needs to be provided more information in order to reduce the uncertainty and make decisions. To explore factors influencing EMA adoption, *how environmental costs are accounted for and managed* represents a key area of concern for further investigation. *Physical environmental uncertainty* as experienced by senior management could be a factor driving accounting changes. Therefore, the following is proposed:

*P2. The greater (lower) the physical environmental uncertainty perceived by senior management, the more (less) likely an EMA system will be adopted to provide relevant environmental information to reduce perceived uncertainties.*

### **5.3.3.3 THE INFLUENCE OF THE CONTINGENCY RELATIONSHIP BETWEEN PHYSICAL ENVIRONMENTAL UNCERTAINTY AND ENVIRONMENTAL PERFORMANCE MEASUREMENT**

Govindarajan (1984) argues that increasing environmental uncertainty would make it more difficult to justify targets appropriate for performance measurement, and proposes:

Superiors of business units which perceive a higher environmental uncertainty would use a more subjective performance evaluation and reward system whereas superiors of business units which perceive lower environmental uncertainty would use a more formula-based performance evaluation and reward system (1984, p. 129).

This proposition was empirically tested and supported. It suggests that higher environmental uncertainty would create the need for managers to seek and process more and different information in order to adapt to and reduce the uncertainty. Earlier research by Thompson (1967) also indicates that as the cause and effect relationships are not clear under uncertain conditions, financial information alone may not be appropriate to evaluate management performance or efficiency. Extended from the above discussion, a higher level of physical environmental uncertainty would impose pressure on managers and create a need for processing environmental information in order to evaluate environmental performance. As EMA helps provide such information, an EMA system will be adopted when managers perceive a high level of physical environmental uncertainty.

However, it is argued that negative financial conditions would create pressure on managers to increase profitability, and thus discourage them from concentrating on improving and measuring non-financial performance (Hussain & Gunasekaran 2002). Although financial information alone may not provide sufficient evidence for efficiency, it seems that the decision to measure non-financial performance would also depend on the financial conditions of an organisation. This is also consistent with Osborn's (2005) argument that physical environmental uncertainty may not effectively compete with other contingency variables in influencing EMA adoption. Although EMA has the potential to improve both financial and environmental performance, it will be less emphasised when an organisation is facing negative financial conditions. That is to say, *environmental performance measurement* could be an area of concern for this study, but *efficiency or financial considerations* need to be taken as a potential factor having impacts on EMA adoption. The discussion provides a rationale for the next proposition:

*P3. Negative financial conditions increase the pressure on universities to improve financial performance, and therefore an EMA system that incorporates environmental cost information as part of performance measurement would be relatively less emphasised.*

### **5.3.4 A SUMMARY OF THE CONTINGENCY THEORETICAL PERSPECTIVE**

For the purpose of exploring factors influencing EMA adoption, three propositions were developed. Several areas of concern were identified that require further investigation. Some potential factors also emerged from the process of developing propositions. The identified areas of concern include: *current environmental management practices; how environmental costs are accounted for and managed; and, environmental performance measurement.* Building from the areas of concern, three propositions were formed which support *environmental strategy, physical environmental uncertainty (PEU) and efficiency or financial considerations* to be factors impeding, or assisting, EMA adoption. The next section will discuss the institutional theoretical perspective.

## **5.4 THE INSTITUTIONAL THEORETICAL PERSPECTIVE**

Different from the contingency theoretical perspective, the institutional theoretical perspective stresses the effects of extra-organisational institutions (social, economic and political) on organisational practices, and offers the benefit of analysing research phenomena at a macro level (Bouma & van der Veen 2002). For this study, the institutional theoretical perspective is drawn mainly from institutional theory, which is discussed in the next section.

### **5.4.1 INSTITUTIONAL THEORY**

In an attempt to explore factors influencing EMA adoption, institutional theory is relevant and suitable for the phenomena of this study. The use of institutional theory is supported by other EMA researchers (e.g. Bouma & van der Veen 2002; Rikhardsson et al. 2005a). It is argued that changes in the institutional environments of organisations may result in homogeneity, which in turn stimulates or hinders adoption of new organisational practices, including accounting.

Institutional theorists are concerned with understanding why organisations are similar, and why there is homogeneity in organisational forms and practices (e.g. DiMaggio & Powell 1983; Meyer & Rowan 1977; Powell & DiMaggio 1991). DiMaggio and Powell (1983) indicate that varieties exist in organisational forms and practices in the early stages of the life

cycle of an organisational field<sup>52</sup>, but homogeneity will eventually occur once a field is established. The process of becoming homogeneous is called *isomorphism*, which is described as ‘a constraining process that forces a unit in a population to resemble other units that face the same set of environmental conditions’ (Hawley 1968, as cited in DiMaggio & Powell 1983). As the process of isomorphism occurs, institutional pressures are exerted on organisations, which cause organisational changes towards homogeneity (Meyer & Rowan 1977; Scott & Meyer 1994).

DiMaggio and Powell (1983) observe that there are two typologies of isomorphism, namely competitive and institutional. Hannan and Freeman (1977; 1989) support competitive isomorphism, and emphasise the influence of market competition, niche change, and fitness measures on organisational changes. However, DiMaggio and Powell argue that competitive isomorphism may explain the early adoption of innovations, but fails to provide a holistic explanation about organisational changes by stating:

As an innovation spreads, a threshold is reached beyond which adoption provides legitimacy rather than improves performance (Meyer and Rowan, 1977). Strategies that are rational for individual organizations may not be rational if adopted by large numbers (1983, p. 148).

Organisational changes may not be driven solely by the need to compete and be efficient, but rather by the need to gain legitimacy and enhance survival (DiMaggio & Powell 1983; Meyer & Rowan 1977). For example, a number of studies demonstrate that accounting techniques or practices are used to legitimise organisational operations and secure their survival (e.g. Burchell et al. 1980; Carruthers 1995; Covalleski, Dirsmith & Samuel 1996; Markus & Pfeffer 1983; Miller 1994). For capturing an adequate picture of modern organisations, an institutional view on isomorphism is arguably required to be used to supplement competitive isomorphism (DiMaggio & Powell 1983). This is supported by the following statements:

Organizations compete not just for resources and customers, but for political power and institutional legitimacy, for social as well as economic fitness. The concept of institutional isomorphism is a useful tool for understanding the politics and ceremony that pervade much modern organizational life (DiMaggio & Powell 1983, p. 150).

... individual organizations exhibiting culturally approved forms and activities (including strategies), receiving support from normative authorities, and having approval from legal bodies are more likely to survive than organizations lacking these evaluations. Legitimacy exerts an influence on organizational viability independent of its performance or other attributes or connections (Scott 2001, p. 158).

The best-known classification scheme for identifying processes that lead to institutional isomorphism (or organisational homogenisation) is perhaps the one developed by DiMaggio and Powell (1983). They suggest coercive, mimetic, and normative as three mechanisms

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<sup>52</sup> By an organisational field DiMaggio and Powell mean ‘those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resources and product consumers, regulatory agencies, and other organizations that produce similar services or products’ (1983, p. 148).

through which organisational changes can occur:

1) coercive isomorphism that stems from political influences and the problem of legitimacy; 2) mimetic isomorphism resulting from standard response to uncertainty; and 3) normative isomorphism, associated with professionalisation (DiMaggio & Powell 1983, p. 150).

Coercive isomorphism stems from pressures exerted on organisations by other organisations upon which they are dependent for resources or support, and also by cultural expectations of society where they operate (DiMaggio & Powell 1983). Several examples of these pressures are given:

Such pressures may be felt as force, as persuasion, or as invitations to join in collusion. In some circumstances, organizational change is a direct response to government mandate: manufacturers adopt new pollution control technologies to conform to environmental regulations; non-profits maintain accounts, and hire accountants; and organizations employ affirmative-action officers to fend off allegations of discrimination (DiMaggio & Powell 1983, p. 150).

An example particularly relevant to universities is that governmental schools tend to conform with government's policies, or regulatory requirements, because they are dependent on funding support from their government for survival (see DiMaggio & Powell 1983; Meyer & Rowan 1977; Morgan 1990). For example, a university may change management control systems to comply with government policy to gain legitimacy, and ensure funding support if the management control systems are perceived to be rational control mechanisms (e.g. Moll 2003).

Mimetic isomorphism occurs when organisations imitate, or copy, other organisations in facing uncertain conditions. Under uncertain environments, organisations tend to imitate other organisations perceived to be legitimate, or successful, so that legitimacy can be maintained, or uncertainty can be reduced at less cost (DiMaggio & Powell 1983). According to DiMaggio and Powell (1983), similar organisational arrangements prevail because of the mimetic process, rather than the need to increase efficiency. A typical example of the mimetic isomorphism is that the public sector applied the concept of 'zero-based budgeting' developed from the private sector during the Carter administration in the US (Abernathy & Chua 1996).

Normative isomorphism stems mainly from professionalisation, which is defined by DiMaggio and Powell as:

... the collective struggle of members of an occupation to define the conditions and methods of their work, to control 'the production of producers' (Larson, 1977:49-52), and to establish a cognitive base and legitimation for their occupational autonomy (1983, p. 152).

Hines (1991) explains that the accounting profession being involved in conceptual framework projects is a means to provide social legitimacy to the profession. According to DiMaggio and Powell (1983), professionalisation can occur through formal education, or the creation of professional associations, which are the two major vehicles driving changes in organisational

practices and professional behaviours.

The three mechanisms of institutional isomorphism have been documented in the accounting literature, with one or the other dominating at a particular point in time. According to Modell (2002), it could be difficult to make a sharp distinction among them for analytical purposes. Oliver proposes that organisational responses, or behaviour changes, to institutional pressures vary from 'passive conformity to active resistance' (1991, p. 146), depending on the nature and context of the pressures themselves (coercive in nature, or voluntary diffusion under normative or mimetic pressures). Therefore, the three types of isomorphism are not mutually exclusive, and they may co-exist in some circumstances.

A number of studies have found that institutional theory provides useful and valuable insights to inform accounting, or sustainability, related research. For example, Moll (2003) adopts the theory to explain accounting changes in response to the public sector reform by an Australian university. Jennings and Zandbergen (1995) use the theory to describe how sustainability related programs or practices are created and adopted by organisations. Their study suggests a number of hypotheses to explain the diffusion of values and practices for sustainability, including accounting for sustainability. Modell (2002) attempts to integrate the institutional influence on cost allocation practices into an analytical framework. He argues that there is growing evidence supporting the influence of institutional factors on cost allocation practices in organisations. It is suggested that:

Irrespective of the research approach adopted, more systematic empirical studies of how isomorphic pressures interact with intra-organizational and technical factors would seem a promising means of furthering our theoretical understanding of the widely publicized issues of why and how organizations allocate indirect costs (Modell 2002, p. 673).

Bansal and Roth (2000) conduct a qualitative study on the motivations and contextual factors that induce organisational ecological responsiveness. Three motivations are found: competitiveness, legitimation, and ecological responsibility. Their study recognises that motivations for adopting 'green' initiatives are complex and mixed, but they are influenced by constituents within the organisational field, in which an organisation operates.

Having discussed institutional theory, the following sections will provide further explanations about the influence of institutional isomorphism on EMA adoption, through the three mechanisms: coercive, mimetic, and normative. Building from institutional theory, three propositions will be developed to guide the study in exploring factors influencing EMA adoption.

## **5.4.2 THE INFLUENCE OF INSTITUTIONAL ISOMORPHISM**

Institutional theory can be applied to inform EMA adoption through the three suggested mechanisms. The pressure to adopt an EMA system may be one type of institutional pressure. Organisations may react to this pressure, and adopt some form of EMA. On the contrary, if there were no such institutional pressure, EMA might not be adopted, in particular when benefits deriving from adopting EMA are not readily visible. A lack of institutional pressure, therefore, could explain why EMA is not adopted. For example, perhaps organisations are not experiencing any threats of government fund withdrawal for not providing environmental information (coercive). Perhaps they do not have the motivation to change current accounting practices, because EMA has not become a norm within the organisational field (mimetic). Perhaps accounting professional bodies pay less attention on the potential of service organisations adopting some form of EMA, and universities feel ‘safe’ for not being under the spotlight (normative). Regardless of the types of pressure, arguably organisations are less likely to adopt EMA without institutional pressure.

### **5.4.2.1 THE IMPACT OF COERCIVE PRESSURE**

Coercive pressure reflects the regulative and enforcing aspects of certain institutions, and represents an important determinant of the structure and function of organisations. The pressure forces organisations to change their practices to be consistent with the mandates of institutions (Granlund & Lukka 1998). A literature review reveals that government agencies are the most visible stakeholders or drivers to affect corporate environmental practices (e.g. Delmas & Toffel 2004; Hoffman 2001). According to Delmas (2002), ISO14001 certification is more popular in Europe than in the US primarily because of more incentives provided by various governments in Europe. Likewise, as mentioned in Chapter Three, driven mainly by the promotion of Japanese Government, environmental accounting and reporting practices are adopted by an increasing number of companies in Japan. Chapter Four also indicates that the UK Government’s building regulations drive changes in the higher education sector to embrace metering technology and account for their energy consumption. It seems that organisations conform to the formal mechanisms imposed by governments in order to survive or grow as argued by DiMaggio and Powell (1983), or to receive support and legitimacy as explained by Scott and Meyer (1994).

In the context of universities, government funding represents a major financial sources at universities (Moll 2003). Universities are required to demonstrate to government that they are financially sustainable. However, as universities are typically not assessed on environmental performance, providing an account of environmental resources used or waste generated tends

to be less emphasised. For example, few universities collect data about how much paper is consumed, and how much waste is generated (Bennett, Hopkinson & James 2006; HEEPI 2007c). This makes accountability less feasible as accountability requires data. Without governments establishing laws and regulations that bind universities to certain accounting practices and procedures, accounting for environmental costs attracts little attention within universities. Government pressure would be required for obligating universities to be accountable for funds received, including funds used for paying environmental costs incurred. Therefore, *coercive pressure of accounting for the environment* is an area of concern and *government pressure* could be an important factor influencing EMA adoption. Therefore, it is proposed:

*P4. The greater (lower) the government pressure on universities to provide an environmental account in relation to the use of funds, the greater (lower) the likelihood that universities would put in place an EMA system to account for environmental costs.*

#### **5.4.2.2 THE IMPACT OF MIMETIC PRESSURE**

Organisations tend to copy or imitate each other as well as other institutions in society (DiMaggio & Powell 1983). In other words, if a practice has some recognised value, or is believed to be a new industry standard, organisations could simply imitate rather than questioning the value of this practice. This can be regarded as a mimetic process resulting from standard responses to environmental uncertainty.

Some best environmental management practices in business organisations are brought into universities, such as appointing an energy manager, implementing an office automation system, and adopting energy reduction or resource recycling programs (see Shriberg 2002). There are also an increasing number of universities providing sustainability reports based on the GRI guidelines. However, few universities are known to be implementing environmental initiatives strategically. Various forms of environmental management are conducted, but the effectiveness in improving environmental performance has sometimes been challenged. Arguably it is in large part due to a lack of integrating the environment into strategic decision making or planning.

EMA systems are designed to assist environmental management, and they are useful for managing environmental costs. Their importance gains increasing attention in manufacturing organisations, but tends to be less emphasised within universities. It could be due to the mistaken belief that environmental costs generated by universities are not significant enough to be managed, in particular from a financial perspective. Lessons learned from the case

studies on manufacturing organisations reveal that managing environmental costs can help minimise environmental impacts and generate financial benefits, especially when more and stricter environmental regulations are imposed. In the UK, an increasing number of environmental regulations in the higher education sector were introduced (see HEEPI 2007a). Various environmental initiatives or environmental programs are undertaken to manage environmental costs (e.g. energy and waste) by universities in the UK. This could have impacts on universities in and outside the UK. However, it is argued that the decision to manage environmental costs depends upon the importance of these costs being recognised in the organisational field of universities. Without environmental costs being considered significant, the decision to manage environmental costs would not be made. Further, if senior managers are not exposed to the benefits that embracing EMA can deliver, EMA is less likely to be adopted for the purpose of managing environmental costs. In this circumstance, good stories about managing environmental costs would not be told, and best management practices would not be diffused and then imitated by other universities. Arguably, mimetic pressure would not occur. Therefore, *recognition of the importance of environmental costs* within the organisational field of universities plays an important role in promoting EMA. It could be an area of concern for EMA adoption, and *mimetic pressure* could be a relevant EMA factor. The discussion leads to the following proposition:

*P5. The decision to mimic best practice for managing environmental costs is contingent upon the recognition of the importance of environmental costs within the organisational field of universities. If the importance of environmental costs were not recognised in the organisational field, mimetic pressure would not be present, and it would be less likely that a university would adopt an EMA system to manage environmental costs.*

#### **5.4.2.3 THE IMPACT OF NORMATIVE PRESSURE**

Normative pressure stems mainly from professionalisation, which can occur through either formal education or creation of professional associations (DiMaggio & Powell 1983). The two aspects of professionalisation are major drivers for changes in organisational practices and professional behaviours.

A literature review highlights that success of implementing environmental management initiatives in great part relies on cooperation and communication between individuals involved in different functions (e.g. Hoffman 2001). With the strong focus on environmental management and management accounting, EMA adoption requires the support from individuals directly involved in functions of environmental management and management accounting. Delmas (2002) indicates that managers tend to rely on their routines, and choose

what is conceived as appropriate when the information they need for decision-making is not readily available, or when getting that information is not cost effective. The application of EMA within universities may represent such a case. Given that EMA is a relatively new management tool, its costs and potential benefits may be quite unclear for first-time adopters. Further, formal education influences the way individuals act and manage different issues. Individuals with different education backgrounds tend to have different opinions on how environmental performance can and should be managed, which directly impacts EMA adoption. For example:

Existing initiatives therefore have at best a mixed record of success in stimulating environmental improvement. Anecdotal evidence suggests that one reason for this has been their 'top-down' or 'externally-driven' nature, and that whilst these approaches can have the advantage of engaging senior management and of bringing new ideas into the sector, they can often appear as idealistic and impractical to those people (typically professionals in estates management and other operational functions in universities) who are responsible for their implementation (Bennett, Hopkinson & James 2006, p. 413).

Therefore, a collective support from individuals directly involved in the decision process of managing environmental performance is vital to the success of EMA adoption. Without this support, EMA is less likely to be adopted. Therefore, *collaboration and communication between individuals involved in functions of environmental management and management accounting* would be an area requiring further investigation.

The creation of professional associations represents another vehicle driving accounting changes. Several organisations are involved in developing environmental performance indicators, such as GRI, ISO, Electricity Association (UK), the OECD and Environment Australia (see Deegan 2003 for more information). There are also some professional accounting bodies undertaking research to promote EMA, including IFAC, CIMA, the European Federation of Accountants, and the Association of Chartered Certified Accountants. An increasing number of organisations, including for-profit and not-for-profit, voluntarily choose to follow the guidelines provided by GRI or ISO to report their sustainability information. Various EMA initiatives were also adopted by referring to the EMA guidelines or documents, such as the EMA document published by IFAC. The promotion of EMA in professional associations and accounting bodies has created some normative pressure for organisations to provide environmental reporting, or adopt some form of EMA. However, this pressure tends to be imposed on manufacturing industries rather than service-based organisations. For example, the majority of available EMA studies are based on manufacturing industries. Further, the available EMA guidelines or documents were developed with the focus on organisations within a manufacturing context (e.g. IFAC 2005; Ministry of the Environment 2005). The normative pressure created so far appears to only have limited influence on EMA adoption within the service sector, in particular universities.

Being ignored in EMA promotion by professional associations, universities are less likely to put EMA in place. A lack of *normative pressure* could impede EMA adoption in universities, and it represents a relevant EMA factor. Therefore, it is proposed:

*P6. The greater (lower) the normative pressure imposed on key managers within universities to account for the environment, the greater (less) the likelihood that a university would put in place an EMA system for the purpose of managing environmental costs.*

#### **5.4.2.4 A SUMMARY OF THE INFLUENCE OF INSTITUTIONAL ISOMORPHISM**

The discussion about the influence of institutional isomorphism on EMA adoption leads to the development of three propositions. *Government pressure*, *mimetic pressure*, and *normative pressure* were suggested as potential factors motivating, or discouraging, EMA adoption. Three key areas of concern were identified for further investigation, including:

- (i) *coercive pressure of accounting for the environment*,
- (ii) *recognition of the importance of environmental costs*, and
- (iii) *collaboration and communication between individuals involved in functions of environmental management and management accounting.*

The next two sections will introduce the legitimacy theoretical perspective and stakeholder theoretical perspective.

#### **5.4.3 THE LEGITIMACY THEORETICAL PERSPECTIVE**

The theoretical perspective provided by legitimacy theory assumes there is a relationship between an organisation and the society in which it operates. Pfeffer and Salancik (1978) explain that organisations consume the society's resources, and society evaluates them on the usefulness and legitimacy of their operations. Organisations subject to the evaluation may attempt to achieve 'congruence between the social values associated with or implied by their activities and the norms of acceptable behaviour in the larger social system of which they are part' (Dowling & Pfeffer 1975, p. 112). The congruence, if achieved, between the perceived social values and norms may justify to society an organisation's right to continue to operate. This is the process of legitimation. However, when 'an actual or potential disparity exists between the two value systems, there will exist a threat to organizational legitimacy' (Dowling & Pfeffer 1975, p. 122). A threat may mean the cancellation of an implicit social contract under which organisations gain their licence to operate. The social contract is described by Shocker and Sethi as:

Any social institution – and business is no exception – operates in society via a social contract, expressed or implied, whereby its survival and growth are based on:

- 1) The delivery of some socially desirable ends to society in general and
- 2) The distribution of economic, social or political benefits to groups from which it derives its power (1973, p. 97).

In order to reduce the likelihood of the threat, organisations will demonstrate that they are legitimate, and have fulfilled their obligations in terms of the social contract. The concept of legitimacy, or legitimation<sup>53</sup>, and the notion of a social contract have been applied in the environmental disclosure and reporting literature (see Deegan 2002). Deegan, Rankin and Tobin note:

Legitimacy theory relies upon the notion of a social contract and on the maintained assumption that managers will adopt strategies, inclusive of disclosure strategies, that show society that the organisation is attempting to comply with society's expectations (as incorporated within the social contract) (2002, pp. 318-9).

The reporting of environmental information could be used to demonstrate that an organisation is acting responsibly with the implicit objective of influencing the public or community. For example:

According to legitimacy theory, the disclosures might be made to show that the organisation is conforming with community expectations, or alternatively, they might be made to alter societal expectations. Of course, studies which argue that disclosures can change, or perhaps are perceived to change, community perceptions (many such studies being grounded in legitimacy theory) are based upon an assumption that corporate disclosures, such as those in annual reports, do actually impact community concerns. This assumption is consistent with the views held by senior managers interviewed by O'Donovan (1999) who, when interviewed, responded that annual report disclosures are used as a strategy to change perceptions about the organisation (Deegan, Rankin & Tobin 2002, p. 320).

Legitimacy theory suggests that whenever managers consider that the supply of particular resource or information is crucial to organisational survival, then they will pursue strategies to ensure the continued supply of that information to gain or maintain legitimacy (Deegan 2002).

O'Donovan explains:

... the status of a corporation's legitimacy may be difficult to establish, given that a corporation's legitimacy is based on social perceptions and values which can and do change over time. In order to manage legitimacy, corporations need to know how legitimacy can be gained, maintained or lost (2002, p. 347).

Pfeffer and Salancik argue that 'legitimacy is conferred when stakeholders – that is, the internal and external audience affected by organizational outcomes – endorse and support an organization's goals and activities' (1978, p. 194). Therefore, to be perceived as legitimate, an organisation has to undertake actions or activities that are congruent with acceptable social norms and values. Dowling and Pfeffer propose three strategies an organisation can undertake

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<sup>53</sup> Lindblom (1994) argues that there is a need to distinguish between legitimacy and legitimation. Legitimacy is described as a condition that exists when the two value systems of organisations and society in general coincide. Legitimation is considered as the process that leads to the state of legitimacy.

to become legitimate:

First, the organization can adapt its outputs, goals and methods of operation to conform to prevailing definitions of legitimacy. Second, the organization can attempt, through communication, to alter the definition of social legitimacy so that it conforms to the organization's present practices, output, and values. Finally, the organization can attempt, again through communication, to become identified with symbols, values or institutions where have a strong base of social legitimacy (1975, p. 127).

The three strategies have been used to explain why organisations voluntarily choose to report certain environmental information to external parties, but there are few empirical studies that relate legitimacy explicitly to EMA, which has a focus on internal management. To explore the applicability of the concept of legitimacy to EMA, the literature in environmental management, on which EMA has a strong focus, is examined.

According to Hoffman (2001), social activists constitute a visible driver to changes in organisational environmental practices, including accounting. In addition to institutional considerations provided by institutional theory, the reason for organisations to incorporate environmental concerns into accounting practices may comprise cultural components<sup>54</sup>, which can be explained by legitimacy theory. In other words, social responsibility could be an important motive to drive accounting changes. Florida and Davison (2001) investigate why organisations choose to adopt environmental management systems, and institutionalise pollution prevention programs. They find a positive correlation of the adoption/institutionalisation to active engagement with community stakeholders. Building from the results of a survey of ISO14001 certified companies across 15 countries, it is suggested that the desire to be a good neighbour is one of the strongest motivators for companies to pursue certification (Raines 2002). Delmas and Toffel concur that 'company decisions to adopt environmental management practices are influenced by the desire to improve or maintain relations with their communities' (2004, p. 213). Prakash (2001) indicates that voluntary (or beyond-compliance) environmental strategies are associated with a broader consideration of the wider community. In other words, environmental strategies could be adopted by an organisation in an attempt to manage external pressures from the wider community (i.e. to appear socially responsible). It appears that legitimacy is a means to justify internal management and practices of organisations.

In the frame of social responsibility, whether a university is operating in an environmentally responsible way could be institutionally defined in terms of its environmental impacts. As the

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<sup>54</sup> Suchman (1995) indicates that there are two approaches to gain legitimacy – an institutional approach and a strategic approach. The former can be explained by institutional theory, and the latter by legitimacy theory. According to institutional theory, organisations in an organisational field adjust themselves to appear legitimate in response to institutional pressure. According to legitimacy theory, organisations adopt forms and practices so as to manage external pressure, including the pressure from institutions.

importance of the service sector in the world economy is growing, direct and indirect environmental impacts caused by universities (as part of the service sector) will become significant. The society, or the community, would expect universities to act in an environmentally responsible way, and justify their internal practices (in addition to the provision of quality environmental education). Universities would respond to the expectation, and try to legitimise their internal practices. Their accounting information systems, important for providing the justification and achieving legitimacy, would also be innovated and changed. For this study, *strategies taken to gain or maintain legitimacy* could be an area of concern, and *legitimacy considerations* could have impacts on EMA adoption. Therefore, it is proposed:

*P7. The greater (lower) the community concerns on environmental impacts caused by universities, the greater (lower) the likelihood that universities would put in place an EMA system to manage the wider community and gain legitimacy.*

#### **5.4.4 THE STAKEHOLDER THEORETICAL PERSPECTIVE**

Apart from issues relating to the attempt to appear legitimate, another view reflected in the literature is that organisations will respond to the demands of the stakeholder groups that control resources required for their operations (i.e. powerful or influential stakeholders), and will tend to ignore the concerns of the groups without power (Belal & Owen 2007; Deegan & Blomquist 2006). This theoretical perspective adopted for this study is mainly based on stakeholder theory. There are many different views on stakeholders. For example, stakeholders can be seen as ‘any group or individual who can affect, or is affected by, the achievement of a corporation’s purpose’ (Freeman 1984, p. vi). However, it is suggested:

... a concern over threats to organisational legitimacy, and hence a perceived need to improve corporate image, is largely driving the reporting process, rather than any desire on the part of corporate management to be transparent or socially accountable per se. In particular, an emphasis is placed on managing the expectations of powerful stakeholders, notably capital providers, and offering the appearance of being responsive to “public pressure” (Adams, 2002) and the concerns of influential lobbying groups (Deegan and Blomquist, 2006) (Belal & Owen 2007, p. 474).

It should be noted that this study is focused on the economically powerful stakeholders, such as fund providers. Indeed, stakeholder theory is a ‘troublesome label’ and has many interpretations (Hasnas 1998, p. 26). Hasnas states:

Stakeholder theory is somewhat of a troublesome label because it is used to refer to both an empirical theory of management and a normative theory of business ethics, often without clearly distinguishing between the two (1998, p. 26).

Deegan (2006) explains that many researchers have claimed that they have used stakeholder theory, but in fact they have employed different theories with different aims and

assumptions – yet these different theories have all been labelled as stakeholder theory. According to Wilmshurst (2003), these different theories are not theories, but interpretations of how part of the theories might be interpreted in some contexts. However, the interpretations offer guidance on why an organisation responds in a given way, or how it should respond to stakeholders.

Two branches of stakeholder theory appear evident – ethical (or normative) and managerial (or positive) branches (Deegan 2002). Most interpretations of the theory can fit into one of the two branches. The managerial branch stresses the need to manage powerful stakeholder groups, whereas the ethical branch is interested primarily in balancing various stakeholder interests because all stakeholders have the right to be treated ethically, regardless of their respective power, and because it is the ‘right thing to do<sup>55</sup>’. The two branches of stakeholder theory both emphasise the need to report information. Some environmental accounting researchers argue that reporting to stakeholders would be the result of the perceived dependence of an organisation on stakeholders. It implies that a failure to report might impact financial success or survival (managerial branch), or reporting is simply regarded as a right thing to do (ethical branch<sup>56</sup>). Therefore, the information disclosure can be used to gain or maintain the support of particular stakeholder groups. For example, if a particularly powerful or influential stakeholder group is concerned about the environmental impacts caused by an organisation, then that organisation might perceive a need to disclose information about efforts or initiatives that have been undertaken, or are about to be implemented, so as to alleviate some of the concerns held by the powerful stakeholders (Deegan & Blomquist 2006).

Bansal and Roth (2000) conducted a survey on 53 firms in the UK and Japan of the motivations for adopting initiatives to mitigate their environmental impacts. The results support that ‘firms motivated by legitimation were focused on the stakeholders most influential in prescribing or articulating legitimacy concerns’ (Bansal & Roth 2000, p. 727). Legitimation, as shown in their findings, includes legislation compliance, establishing an environmental committee or appointing an environmental manager, conducting environmental audits, and aligning the firm with environmental advocates. Therefore, it is argued that putting an EMA system in place might be a means to legitimise a university’s internal practices, if the pressure from ‘influential’ or ‘powerful’ stakeholders exists. For the purpose of this study,

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<sup>55</sup> Legitimacy theorists also embrace the concept of stakeholders, but in a different way from the stakeholder theorists. Legitimacy theory adopts a general view of the stakeholders in terms of the society, the community or the ‘relevant publics’.

<sup>56</sup> Legitimacy theory would suggest that environmental information supplied should be sufficient to justify to the stakeholders (and thus society) that operations and activities of an organisation are acceptable and meeting the requirements of the implicit social contract.

*actions from the powerful stakeholders* of universities could be an area of concern, and *stakeholder power* could be a factor having impacts on EMA adoption. It is proposed:

*P8. The greater (lower) the concern of powerful stakeholders about the environmental impacts of a university, the greater (lower) the likelihood that a university would put in place an EMA system as a means to legitimise its internal practices.*

#### **5.4.5 A FURTHER DISCUSSION ON OVERLAPPING THEORIES**

The above discussion reveals that institutional theory, legitimacy theory and stakeholder theory are overlapping in terms of issues relating to *legitimacy considerations* and *stakeholder power*. Centred on the two issues, propositions four, seven and eight appear, also, to be overlapping.

In terms of *legitimacy considerations*, institutional theory suggests that organisations adjust themselves to achieve legitimacy in response to institutional pressure. Legitimacy theory stresses that organisations can strategically manage pressures (including those from institutions), or threats, to their legitimacy. Stakeholder theory focuses on the influence of powerful stakeholders on organisations to appear legitimate. In terms of *stakeholder power*, institutional theory explains the desire to appear legitimate to institutions, such as government, a powerful stakeholder. Legitimacy theory emphasises the need to appear legitimate to the wider community, an ethical stakeholder with less power. Stakeholder theory highlights the desire to be legitimate, in particular to powerful stakeholders. Therefore, there are strong links among the three theories. For example:

Whilst implied within legitimacy theory, stakeholder theory explicitly refers to issues 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 & Blomquist 2006, p. 350).

As the government appears to be a powerful stakeholder in the university-related environmental management literature, proposition four appears similar to proposition eight. Proposition four has a focus on the influence of pressure from the government as a powerful stakeholder on organisational accounting practices. Proposition eight stresses the concern of powerful stakeholders, which also refers to the government, about changes in accounting systems. In terms of the desire to be legitimate, propositions four, seven and eight all propose that universities would change accounting practices to appear legitimate, but to different stakeholders. Therefore, the three propositions seem to be related not just to one theory. As there is no developed theoretical precedent for research in the EMA area, a joint consideration of the three theories is believed to provide valuable insights, and enables the provision of a richer explanation about the decision to adopt, or reject, EMA.

## 5.5 AREAS OF CONCERN AND FACTORS SUGGESTED BY THE THEORETICAL FRAMEWORK TO EXPLAIN EMA ADOPTION

Four theoretical perspectives are adopted in this study – contingency theory, institutional theory, legitimacy theory and stakeholder theory. Through the discussion of the theories, key areas of concern for further investigation become apparent. Eight propositions were developed, and together they form the basis to predict EMA adoption. Important factors potentially having influence on EMA adoption were also suggested by this theoretical framework.

The institutional theoretical perspective is employed to explore the effects of the institutional environments on management accounting practices. However, not every organisation responds to the same pressure in the same manner, as Scott indicates:

Although all organizations within a given institutional field or sector are subject to the effects of institutional processes within the context, all do not experience them in the same way or respond in the same manner (2001, p. 161).

A different theoretical perspective, the contingency theoretical perspective, helps answer the question – why some accounting practices are adopted by some organisations, but not by others in the ‘same’ environment. The two different theoretical perspectives, with complementary emphases (e.g. technical vs. institutional environments, and efficiency vs. institutional pressure), should provide more holistic explanations about why EMA is adopted, or rejected, especially as this research is exploratory in nature. Two other theoretical perspectives (provided by legitimacy theory and stakeholder theory respectively) relating to the institutional theoretical perspective (in terms of legitimacy considerations and stakeholder power) are also considered.

The table at the end of this chapter summarises key areas of concern, and factors suggested by the four theoretical perspectives via the eight propositions. It should be noted that the areas of concern and suggested factors are not intended to be all-inclusive, but serve as a starting point for this study in an attempt to explain EMA adoption within universities. Contingency theory proposes *environmental strategy*, *physical environmental uncertainty* and *efficiency or financial considerations*, whereas institutional theory suggests *government pressure*, *mimetic pressure*, and *normative pressure* as relevant EMA factors. While *legitimacy considerations* and *stakeholder power* are highlighted by legitimacy theory and stakeholder theory as influential factors.

## **5.6 CONCLUSION**

This chapter has reviewed the literature surrounding the four theoretical perspectives formulated from four theories, namely contingency theory, institutional theory, legitimacy theory and stakeholder theory. Eight propositions were formed, and they will be used to guide the research directions to make the research more focused. The key areas of concern and potential factors suggested by the proposed theoretical framework will serve as a starting point for investigating the drivers, or barriers, to EMA adoption within universities.

Given the exploratory nature of this study, empirical testing remains difficult. Rather than testing hypotheses, the research will focus on reviewing multiple cases to understand current management accounting practices for managing the major environmental costs, which is the first research objective of this study. The proposed theoretical framework will then be used to explore factors influencing EMA adoption, which is the second objective of this research. Once the understanding is established, factors relating to EMA adoption could be linked to the decision-making processes, on which the effects of technical and institutional variables will have impacts. The following chapter will explain how the two objectives of this study can be achieved through appropriate research methodology and the design of research methods.

**TABLE 5.1 PROPOSITIONS, AREAS OF CONCERN, AND POTENTIAL FACTORS TO EXPLAIN EMA ADOPTION**

Propositions	Areas of Concern	Relevant EMA Factors
P1. Universities that are signatories to environment-related agreements or declarations and strive to ensure compliance with the commitment would devote attention to minimise environmental impacts and/or manage environmental costs.	Current environmental management practices	<i>Environmental Strategy</i>
P2. The greater (lower) the physical environmental uncertainty perceived by senior management, the more (less) likely an EMA system will be adopted to provide relevant environmental information to reduce perceived uncertainties.	How environmental costs are accounted for and managed	<i>Physical environmental uncertainty</i>
P3. Negative financial conditions increase the pressure on universities to improve financial performance, and therefore an EMA system that incorporates environmental cost information as part of performance measurement would be relatively less emphasised.	Environmental performance measurement	<i>Efficiency or financial considerations</i>
P4. The greater (lower) the government pressure on universities to provide an environmental account in relation to the use of funds, the greater (lower) the likelihood that universities would put in place an EMA system to account for environmental costs.	Coercive pressure of accounting for the environment	<i>Government pressure</i>
P5. The decision to mimic best practice for managing environmental costs is contingent upon the recognition of the importance of environmental costs within the organisational field of universities. If the importance of environmental costs were not recognised in the organisational field, mimetic pressure would not be present, and it would be less likely that a university would adopt an EMA system to manage environmental costs.	Recognition of the importance of environmental costs	<i>Mimetic pressure</i>
P6. The greater (lower) the normative pressure imposed on key managers within universities to account for the environment, the greater (less) the likelihood that a university would put in place an EMA system for the purpose of managing environmental costs.	Collaboration & communication between individuals involved in functions of environmental management & management accounting	<i>Normative pressure</i>
P7. The greater (lower) the community concerns on environmental impacts caused by universities, the greater (lower) the likelihood that universities would put in place an EMA system to manage the wider community and gain legitimacy.	Strategies taken to gain or maintain legitimacy	<i>Legitimacy considerations</i>
P8. The greater (lower) the concern of powerful stakeholders about the environmental impacts of a university, the greater (lower) the likelihood that a university would put in place an EMA system as a means to legitimise its internal practices.	Actions from the powerful stakeholders	<i>Stakeholder power</i>

## **CHAPTER SIX**

### **RESEARCH METHODOLOGY AND METHODS**

#### **6.1 INTRODUCTION**

The previous chapters have provided a literature review of environmental management accounting, explained the applicability of EMA to the higher education sector, and proposed a theoretical framework for exploring factors influencing EMA adoption.

This chapter will outline and explain the research methodology and methods used during this research project. It begins with justifying the adoption of qualitative research, which suggests a case study as the research strategy and in-depth interviews as the main data collection method. It then moves to the research design hierarchy, which introduces the research objectives, scope of the study, research questions, and propositions and questionnaire design for the in-depth interviews. The next two sections explain how the research was conducted, and how data were analysed. Research limitations are also recognised, and suggestions are made to minimise these limitations via validity and reliability checks.

#### **6.2 JUSTIFICATION OF QUALITATIVE RESEARCH ADOPTION**

Although some universities have started to report environmental cost information in their annual reports, or provided separate environmental reports, few universities were identified as applying environmental cost information for the purpose of management accounting or EMA. A literature review brings to light that service organisations in general, and universities in particular, fail to be the focus of EMA-related research and case studies. Further, few theory-based EMA studies are available to explain why EMA is adopted, or rejected. Due to the deficiency, little is known about the circumstances in which EMA would be adopted, and the relevant variables, or factors, that impact EMA adoption remain less explored. It appears that qualitative research is suitable for this study that is exploratory in nature, and which seeks to understand participants' perceptions and experiences about the potential of EMA adoption. Marshall and Rossman emphasise the strengths of qualitative methodology, and support the use of exploratory approaches in such a study:

For a study focusing on individuals' lived experience, the researcher could also argue that human actions cannot be understood unless the meaning that humans assign to them is understood. Because thoughts, feelings, beliefs, values, and assumptive worlds are involved, the researcher needs to understand the deeper perspectives that can be captured through face-to-face interaction (2006, p. 53).

As such, this study will adopt a qualitative research method, which helps address the research issues in a natural setting using exploratory approaches. According to Cooper and Emory

(1995), a research design can be classified as exploratory by the degree of structure and/or the research objectives. Typically an exploratory study is less structured, and aims at discovering important factors, or relationships, and clarifying concepts and priorities. In particular, it is helpful in shaping, or defining, key issues, and developing theories, or hypotheses, for future study. To conduct this exploratory qualitative research, the study will adopt a case study approach and in-depth interviews as the main method of data collection.

### **6.2.1 CASE STUDY AS THE RESEARCH STRATEGY**

In general, an exploratory study relies greatly on qualitative research techniques, such as case studies (Cooper & Emory 1995; Yin 2003a, 2003b). Yin explains:

In general, case studies are the preferred strategy when ‘how’ or ‘what’ questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context (2003b, p. 1).

A case study approach is deemed to be appropriate for this research because it allows flexibility to help the researcher uncover important factors and issues arising from a real-life context which cannot be manipulated directly. A multiple-case design is chosen as it is argued that evidences from multiple case studies are often regarded as more compelling, which in turn makes the overall study more robust (Herriott & Firestone 1983; Yin 2003b).

### **6.2.2 IN-DEPTH INTERVIEWS AS THE MAIN METHOD OF DATA COLLECTION**

It is suggested that three main sources of data collection for qualitative research methods are in-depth, open-ended interviews, direct observation and written documents (Patton 2002; Yin 2003b). Johnson (2001) indicates that in-depth interviews allow deep information and knowledge to be sought, with this information usually being related to personal matters, such as values and decisions, cultural knowledge or perspective. Easterby-Smith, Thorpe and Lowe (2002) concur that in-depth interviews are appropriate methods when it is necessary to understand the constructs that the interviewees use as a basis for their opinions and beliefs, and when it aims at developing an understanding of the interviewees’ world.

Further, in-depth interviews minimise the chances to report on researchers’ own perceptions; whereas direct observations and documentary evidence would require researchers to place far more of their perceptions into the interpretation of data sources. Marshall and Rossman (2006) indicate that in-depth interviews can be used as one strategy, or part of an overall strategy in a research design. Johnson (2001) suggests that in-depth interviews be used in conjunction with data gathered through such avenues as informal interviewing and documentary records. For this study, in-depth interviews will be used as the primary source of data collection, but they will be coupled with informal interviews with people familiar with the research issues and

with analysis of additional documentation, either provided by participating universities, or available on their websites.

Having justified the qualitative research method adopted, which suggests a case study as the research strategy and in-depth interviews as the method of data collection, it is suitable to move on to the research design and hierarchy that explain how this study will be conducted.

### **6.3 RESEARCH DESIGN AND HIERARCHY**

Cooper and Emory suggest a 'hierarchy of questions' (1995, p. 56) to approach the research process by stating the basic problem that prompts the research. Their approach begins with a statement of a management problem followed by breaking down the original problem into more specific ones. This hierarchical concept will be used to describe the research design, but with some specific tailoring.

The research began with the EMA problem outlined in Chapter One. From this problem statement, two main research objectives were established. Research questions and propositions were then developed to accomplish the two research objectives. Key terms were also defined for the purpose of this study.

The following sections will describe the two research objectives, research questions and propositions formulated from the proposed theoretical framework, interview themes, and interview questions used. They will be presented in a way that allows a clear traceability from the research objectives to the interview questions.

#### **6.3.1 RESEARCH OBJECTIVES**

The role of environmental management accounting in improving both environmental and financial performance through enhanced accountability is attracting increasing recognition. Various industries have been included in the related research and case studies, but service organisations, in particular universities, fail to be the focus of EMA studies. A literature review highlights a lack of considerations being given to environmental costs and potential cost savings within universities. Further, the influences of factors arising from the institutional or technical environment on EMA adoption have not yet been examined within a university setting, and hence are not yet understood. Therefore, the two main research objectives of this study are:

- Understanding current accounting practices for managing the major environmental costs within universities, and
- Identifying factors influencing EMA adoption within universities.

### **6.3.2 SCOPE OF THE STUDY**

Deegan (2003) suggests that the scope of environmental costs considered in the early phases of an EMA project be reasonably limited. In view of the infancy of EMA within universities, the scope of environmental costs considered in this study is limited. The environmental costs considered were restricted to private costs only. In particular, four costs were selected that are typically chosen for organisations implementing EMA, and are especially important for environmental management in a university setting, as suggested in Chapter Four. They are costs related to the consumption of energy, water and paper, as well as waste management, all of which are termed ‘major’ environmental costs for the purpose of this study. Thus, the first research objective is mainly focused on describing the practices used in accounting for the major environmental costs. For the second research objective, management accounting practices examined will include the use of the four major environmental costs in supporting external environmental reporting, and internal applications of these costs in capital budgeting, cost allocation and performance measurement.

### **6.3.3 RESEARCH QUESTIONS AND PROPOSITIONS**

Within the scope of this study, four research questions were posed to achieve the two main research objectives. They are listed as follows.

- R1. Are specific types of the major environmental costs separately identified and measured? If yes, what are they? If not, why not?
- R2. How are the major environmental costs, both physical and monetary, being captured (if at all) within the current accounting systems?
- R3. How are the major environmental costs used in supporting external environmental reporting and internal environmental management?
- R4. What factors (both internal and external) would influence EMA adoption within universities?

The purpose of the research questions, together with the eight propositions<sup>57</sup> developed in Chapter Five, is to inform the research and guide data collection. Marshall and Rossman (2006) stress the importance of developing propositions, or guiding hypotheses<sup>58</sup>, in helping

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<sup>57</sup> A list of the propositions is shown in Table 5.1 on Page 93.

<sup>58</sup> No agreement has been reached about the meanings of the terms, proposition and hypothesis, in the literature (Cooper & Emory 1995). Maxwell points out that ‘many qualitative researchers explicitly state their ideas about what is going on as part of the process of theorizing and data analysis’ (2005, p.69), which may be called ‘propositions’ rather than hypotheses, such as in Miles and Huberman (1994, p.75). According to Maxwell, they serve the same function, and the difference is that hypotheses in qualitative research are typically developed ‘after the researcher has begun the study; they are “grounded” (Glaser & Strauss, 1967) in the data and are developed and tested in interaction with them, rather than being prior ideas that are simply tested against the

guide and focus the research efforts, but suggest that they be used only as a guide to retain flexibility. For example:

In some cases, the literature review yields cogent and useful definitions, constructs, concepts, and even data collection strategies. These may fruitfully result in a set of preliminary guiding hypotheses. Using the term *guiding hypothesis* may assist readers accustomed to more traditional proposals. It is essential, however, that the researcher explain that guiding hypotheses are tools used to generate questions and to search for patterns; they may be discarded when the researcher gets into the field and finds other exciting patterns of phenomena. This approach retains the flexibility needed to allow the precise focus of the research to evolve. By avoiding precise hypotheses, the researcher retains her right to explore and *generate* questions. The guiding hypotheses illustrate for the reader some possible directions the researcher may follow, but the researcher is still free to discover and pursue other patterns (Marshall & Rossman 2006, p. 47).

Creswell (1994) states that research questions are typically written into qualitative research in the form of grand tour questions, or guiding hypotheses, as this methodology allows flexibility and does not unnecessarily limit the inquiry. Yin supports theory development before data collection in doing case studies, and states that:

Rather, the simple goal is to have a sufficient blueprint for your study, and this requires theoretical propositions.... Then, the complete research design will provide surprisingly strong guidance in determining what data to collect and the strategies for analysing the data. For this reason, theory development prior to the collection of any case study data is an essential step in doing case studies (2003b, p. 29).

However, Scapens notes that:

Every researcher will be influenced by his/her past experience, previous research, papers read, and so on. Thus, in any case study there will be considerable prior theory, even if it is only implicit. To make the research meaningful to others, the researcher should make explicit, and as comprehensive as possible, the theory which shapes the case study. In addition to a preparatory review of prior theory, additional theory may be introduced as the case proceeds and new theories are developed. The researcher should be sufficiently flexible to allow such developments to take place (1990, p. 274).

As Maxwell puts it:

'Fishing' for possible answers to your questions is perfectly appropriate in qualitative research, as long as these answers are then *tested* against new evidence and possible validity threats (2005, p. 69).

This research design seeks to focus attention on issues that should be examined within the scope of the study, and retain much of the flexibility described above through propositions, or the so-called guiding hypotheses. The descriptive aspect of this research, particularly the research objective one, is studied mainly with research questions (R1, R2 and R3), and the first proposition (P1). The primary evaluation of the second research objective is addressed with both research questions (R4 and R5), and propositions (P2 to P9). The next section will explain the questionnaire design for the interviews.

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data' (2005, p.69). Following Miles and Huberman (1994), this study used the term, proposition, to describe the eight statements made in Chapter Five.

### 6.3.4 QUESTIONNAIRE DESIGN FOR THE INTERVIEWS

The interview questions for the questionnaire were mainly derived from the research questions, the propositions, and two questionnaires designed particularly for EMA studies. Several interview questions for accomplishing the first research objective were taken, and modified from the questionnaire designed for a survey among eighty European companies (see Bartolomeo et al. 1999), and the company project questionnaire for the Environmental Management Accounting for South-East Asia (EMA-SEA) program<sup>59</sup> (see InWEnt 2006). Although the higher education sector is not the focus of either the survey of the European companies or the EMA-SEA program, the two questionnaires just mentioned provide useful insights and directions for this study.

Tables 6.1 and 6.2 provide the interview questions<sup>60</sup> for accomplishing research objective one and two respectively. They are presented in a way highlighting the logic linking the interview questions to the research questions and guiding propositions through the research themes suggested by the proposed theoretical framework (e.g. the areas of concern) and the related literature. Some of the themes are concerned with the aspects of management and accounting for the major environmental costs, and some themes with the views and attitudes of key players in that process. The suggested research themes are:

- management and accounting for the major environmental costs,
- physical environmental uncertainty,
- environmental accountability,
- institutional pressure on management accounting for the major environmental costs,
- management's attitude to and views on EMA adoption, and
- stakeholder involvement or pressure.

Tables 6.1 and 6.2, which provide the interview questions, are presented on the following pages.

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<sup>59</sup> The questionnaire is used in a large-scale project funded by the Capacity Building International, Cologne, Germany, which aims at providing the practice-oriented training for implementing EMA, especially for the small to medium-sized enterprises in South-East Asia.

<sup>60</sup> Key terms, such as environmental cost and EMA, used in the interview questions were explained to the participants while conducting the interviews. The issue will be revisited in a later section that describes the selection of research participants.

**TABLE 6.1 INTERVIEW QUESTIONS FOR ACCOMPLISHING RESEARCH OBJECTIVE ONE<sup>61</sup>**

Research Themes	Interview Questions	Research Questions	Guiding Propositions
<b>Management for the major environmental costs</b>	<i>Questions for participants with an environmental management function</i>		
	1. What are the university's main environmental challenges?	<b>R1 R2 R3</b>	<b>P1 P6</b>
	2. What has the university already done about the challenges? (Please mention recent projects.)		
	3. Do you think those projects mentioned are undertaken on a strategic basis? If yes, what makes you think so? If not, why not?		
	4. Does the university have an environmental policy?		
	5. Does the university have a procedure to assess the university's environmental performance? If yes, please describe.		
	6. Does the university have any form of environmental reporting? If yes, what is reported? Is it including the major environmental costs? At what level are the major environmental costs reported (if any)?		
	7. Are there barriers (either technical or political) in the provision of such environmental reporting? If yes, please explain.		
	8. Does the university trace any of the major environmental costs (either physical or monetary)? If yes, what are they and how are they categorised?		
	9. On what basis are the major environmental costs traced and recorded? Or are they considered more generally (such as university wide)? What is the purpose of tracing and recording?		
	10. Does the university issue any internal report on environmental performance? If yes, at what level is the environmental performance assessed?		
	11. What are the motivations for issuing such a report? If the university does not issue any internal report, why not (e.g. not mandatory, not a normal practice in universities, or not cost effective)?		
12. Are there any impediments, either technical and/or political, to provide an internal report on environmental performance to related parties?			
<b>Accounting for the major environmental costs</b>	<i>Questions for participants with a management accounting function</i>		
	1. How does the university account for the major environmental costs? Are they separately identified, or assigned to an overhead account? Please explain.	<b>R1 R2 R3</b>	<b>P2 P6</b>
	2. Do you think the allocation bases used make sense in terms of controlling environmental costs?		
	3. Please indicate if any of the major environmental costs are considered for inclusion in the financial analysis of a proposed capital project. If yes, how?		
	4. Are the major environmental costs included in one single budget pool and allocated to responsibility centres as a lump sum? If not, please describe.		
	5. At what level is the university's environmental performance assessed? What are the key performance indices used, if any?		
6. In the university, is there anyone who has ever requested any environmental cost information from you?			

<sup>61</sup> This questionnaire is designed for the key managers with functions of either environmental management or management accounting.

**TABLE 6.2 INTERVIEW QUESTIONS FOR ACCOMPLISHING RESEARCH OBJECTIVE TWO<sup>62</sup>**

<b>Research Themes</b>	<b>Interview Questions</b>	<b>Research Questions</b>	<b>Guiding Propositions</b>
<b>Physical environmental uncertainty</b>	1. Are you aware of any compulsory regulations, or requirements, on universities to control, or reduce, their major environmental costs? If yes, what are they? If no, do you think the government will impose compulsory regulations on universities to control, or reduce, their major environmental costs?	<b>R4</b>	<b>P2</b>
	2. Are any internal pressures forcing the university to account for any of its impacts on the environment? Who imposes the pressure? How does the university react to the pressure and what are the actions taken?		
	3. Are you aware of any environment-related regional or international agreements, or declarations, signed by the university? If yes, what are they and do you think the university is able to ensure the compliance and meet the requirement?		
	4. Do you think it should be an important issue for universities to control their major environmental costs? Is it an important issue for the university now?		
<b>Environmental accountability</b>	1. Who is currently held accountable for the major environmental costs incurred? How are they held accountable?	<b>R3</b> <b>R4</b>	<b>P3</b> <b>P4</b> <b>P7</b> <b>P8</b>
	2. Have you ever requested any environmental cost information from accounting, or environmental management related administrative divisions? If yes, what is the purpose of requesting such information? If not, why not?		
	3. In terms of managing environmental costs, to whom or for what do you feel the university is accountable to/for?		
	4. Who do you think should be held accountable for reducing environmental costs, individuals, administrative divisions, or academic schools? Are they held accountable now? If yes, how? If not, why not?		
	5. Are you personally held accountable for any of the major environmental costs? If not, do you think you should be held accountable?		
	6. Does the university issue any internal report on environmental performance? If yes, at what level is the environmental performance assessed and what is the purpose of issuing this report? If not, why not (e.g. not mandatory, not a normal practice in universities, or not cost effective)? Are there any impediments, either technical or political, to provide an internal report on environmental performance?		
<b>Institutional pressure</b>	1. What would trigger the university to consider the major environmental costs when making management decisions?	<b>R3</b> <b>R4</b>	<b>P4</b> <b>P5</b> <b>P6</b>
	2. Are any external pressures forcing the university to account for any of its impacts on the environment? Who imposes the pressure? How does the university react to the pressure and what are the actions taken?		

(To be continued)

<sup>62</sup> This questionnaire is designed for all of the participants.

<b>Management's Attitude to and views on EMA adoption</b>	1. Do you think it would/wouldn't benefit the university to bring the major environmental costs to the attention of the decision makers, both academic schools and administrative divisions? What makes you think so?	<b>R3 R4</b>	<b>P2 P3 P6</b>
	2. Do you think the university has provided enough incentives to motivate academic schools or administrative divisions to control, or reduce, environmental costs?		
	3. How do you see the potential use of EMA practices in providing such incentives?		
	4. Do you think the university should provide major environmental cost information as a means to increase environmental awareness and encourage behaviour change? If not, why not? If so, whom do you think should be provided with this information (consider in your answer both academic schools and administrative divisions)? What do you think would be the major barriers (either technical or political) to the provision of such information to heads of schools or internal managers?		
	5. What type of environmental cost information, physical and/or monetary, should be provided? Why do you think so? What are your views on internal use of such information in the future?		
	6. Do you, within your role in the university, think management accounting is of importance in managing the major environmental costs? Please explain your answer, either if yes or no, based on the three management accounting functions, namely capital budgeting, cost allocation and performance measurement.		
	7. What is your opinion on the separate identification and allocation of the major environmental costs? Is it possible for the university to do so? Why?		
	8. What is your opinion on key managers being held accountable for the major environmental costs incurred? Is it possible for the university to do so? Why?		
	9. What is your opinion on key managers being given environmental KPIs against which their performance is assessed? Is it possible for the university to do so? Why?		
<b>Stakeholder involvement or pressure</b>	1. Do you think stakeholders of the university care about what the university has done, or will do, to manage its major environmental costs, for example the wider community, students, faculties, media, pressure groups, or the government? If yes, who are they?	<b>R4 R5</b>	<b>P4 P7 P8</b>
	2. Do the stakeholders who care about what the university has done, or will do, have the power to force the university to change its current management or accounting practices to manage environmental costs? What makes you think so?		

The purpose of dividing the interview questions into research themes is to ensure comprehensive and consistent coverage in each theme under study, as suggested by Brenner, Brown and Canter (1985), McCracken (1988) and Yin (2003b). Through the research themes, the questionnaire enables existing theories and the guiding propositions to act as a blueprint, yet it also allows participants to elaborate on issues that they think are relevant to this study. This design is required to allow specific questions and directions of the interviews to evolve contextually (Cooper & Emory 1995; Gillham 2000). It also helps lay a solid foundation to facilitate data collection and analysis for this study. The next section will explain how the study was conducted.

#### **6.4 CONDUCT OF THE RESEARCH**

A methodological issue, which needs to be addressed, is the use of deduction and induction in the preparation for data collection and data analysis of this study. The in-depth interviews are guided by the propositions developed from theories, but at the same time allow participants to speak freely, which is evident from the open-ended interview questions. This approach is both deductive and inductive, and enables new perspectives to be discovered. Naturally, the analysis of interview data also follows the same approach. Theories are applied when possible, but new findings are also reported without being bound by previous theories. Parkhe (1993, p. 256) argues that the process of ongoing theory advancement needs ‘continuous interplay’ between extremes. Cavaye explains:

Case research can be carried out taking a positivist or an interpretivist stance, can take a deductive or an inductive approach, can use qualitative and quantitative methods, can investigate one or multiple cases. Case research can be a highly structured, positivist, deductive investigation of multiple cases; it can also be an unstructured, interpretative, inductive investigation of one case; lastly, it can be anything in between these two extremes in almost any combination (1996, pp. 227-8).

The research was conducted in three phases. Phase one is to select universities and participants from each chosen university. Phase two describes data collection via in-depth interviews with key personnel in each of the participating universities. Phase three involves transcribing and translating interviews.

##### **6.4.1 PHASE ONE – SELECTION OF RESEARCH PARTICIPANTS**

Access, time and cost considerations<sup>63</sup> associated with the collection of qualitative data limit the choices of participating universities to two countries – Australia and Taiwan. Eight universities (four in Australia and Taiwan, respectively) were initially approached. Five out of the eight agreed to participate. Interviews were carried out with the participants from two

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<sup>63</sup> Access is the key concern. This study requires the participants to explain current accounting practices for managing major environmental costs. Without a higher degree of access, this objective would not be achieved.

Australian universities (RMIT University and an anonymous university located in Victoria, Australia), and three Taiwanese universities (Transworld Institute of Technology, Nanhua University, and National University of Kaohsiung). The university requesting anonymity is named 'AUS University' for the purpose of this study.

The first research objective requires an understanding of how the participating universities account for the major environmental costs, and how management accounting plays, or could play, a part in managing the costs. Both management accounting and environmental management are of special interest and concern to this study. In accordance with this dual interest, it is required that at least one participant from the accounting division and the resources/facilities management division of each university could participate. All the five participating universities meet this criterion<sup>64</sup>.

The second research objective is to explore factors influencing EMA adoption. Miles and Huberman argue that 'how you see life depends, in part, on your role' (1994, p. 122). An analysis involving different management roles would be useful in identifying the potential factors (Hoffman 2001; Parker 1997). A role, as defined by Miles and Huberman, is 'a complex of expectations and behaviours that make up what you do, and should do, as a certain type of actor in a setting' (1994, p. 122). Four different types of management roles are included in this study to address the second research objective – senior management<sup>65</sup>, heads/deans of academic schools, middle management directly involved in an environmental management function<sup>66</sup>, and accounting managers<sup>67</sup>.

These critical features of the study design, as mentioned previously, limit the number of participating universities. Eisenhardt states that 'a number between 4 and 10 cases usually works well' (1989, p. 545). Patton (2002) explains that there are no universal rules for determining the appropriate number of cases. A size of five participating universities is deemed to be appropriate in this research context.

Although the five universities agreed to participate, the degree of access varied with the number of participants from each chosen university ranging from two to eleven. The first point of contact was the heads of a group of administrative divisions generally in charge of contracting for, managing, and allocating the use of resources in universities of the two

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<sup>64</sup> As mentioned previously, three out of the eight universities that were initially approached did not participate in this study, the main reason being that they did not meet this selection criterion.

<sup>65</sup> 'Senior management' refers to participants who are members of the vice chancellor and president's executive team.

<sup>66</sup> This group of participants are generally in charge of contracting for, managing, and allocating the use of resources.

<sup>67</sup> This group of participants are generally charged with accounting for the use of resources.

countries. They are the Vice President/Principal, Resources for Australian universities and the Director, General Affairs for Taiwanese universities. This point was selected partly because of the dual interest of this study (environmental management and management accounting), but primarily in view of few universities having applied, or implemented, any form of EMA. Typically, environment-related issues are considered to be part of the business of this group in charge of campus facilities management.

The intent and purpose of this study were explained first before the matter was passed onto the potential participants within the four selected management functions<sup>68</sup>. AUS University in Australia limited the degree of access; therefore, only four key persons were contacted, but they all agreed to participate in this research. For the other four universities, the researcher then wrote emails to invite key persons with any of the four selected management functions to participate in the research. Attached with the emails were a consent form<sup>69</sup> to participate in this study, and a plain language statement that explains the research. In particular, the statement details the research purpose, interview themes, and definitions of key terms, such as environmental cost, EMA, and examples of EMA practices. The four major environmental costs are specified, which include costs relating to the consumption of energy, water and paper, as well as the generation of waste. Those who finally agreed to participate replied to the email within one week. Follow-up contacts were then made to confirm the time, date, and mode of interviews. Table 6.3 provides a schedule of the participants, their positions and management functions, and interview mode.

#### **6.4.2 PHASE TWO – DATA COLLECTION**

In-depth interviews, as explained previously, are the major data collection method to capture the perceptions of key participants about the two research objectives of this study. Interviews were held over the period of April – December 2006. The participants were informed that the interview would be no longer than two hours in length<sup>70</sup>, and that it could be confidential if required or requested. Five of the twenty-seven participants requested their names, or identities, not to be used<sup>71</sup>. They are all Australian participants – two are participants from RMIT University, and the other three are from AUS University. Participants were also informed that during the interview they could refuse to answer any question or cease the interview at their request.

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<sup>68</sup> Again, the four selected management functions are *senior management, academic school, environmental management and management accounting*.

<sup>69</sup> A consent form for each participant is required for ethics purpose.

<sup>70</sup> The interview times varied from thirty minutes to one and a half hours.

<sup>71</sup> The issue of anonymity and various degree of access were being considered during the stage of case study design, and therefore were incorporated into the considerations for data analysis and interpretation, which will be discussed in greater detail in the section of data analysis.

**TABLE 6.3 PARTICIPANTS AND INTERVIEW INFORMATION**

Country	University	Participant	Position	Management Function	Mode
Australia	RMIT University	Margaret Gardner	Vice-Chancellor and President	Senior Management	In person
		Chris Whitaker	Pro Vice-Chancellor Business	Senior Management	In person
		Stephen Somogyi	Vice-President Resources	Senior Management	In person
		Joyce Kirk	Pro Vice-Chancellor Students	Senior Management	In person
		Anonym (R1)	Pro Vice-Chancellor	Senior Management	In person
		Chris White	Executive Director, Property Services	Environmental Management	In person
		Graham Bell	General Manager, Facilities Services	Environmental Management	In person
		Paul Stockwell	Senior Accountant, Property Services	Environmental Management	In person
		Wayne Poole	Associate Director, Business Advisory	Management Accounting	In person
		Anne Stewart	Associate Director, Budget & Financial Performance Management	Management Accounting	In person
	Anonym (R2)	Head of School	Academic School	In person	
	AUS University	Anonym (V1)	Vice-President Resources	Senior Management	By telephone
		Anonym (V2)	Executive Director, Property Services	Environmental Management	In person
		Anonym (V3)	Manager, Property Services	Environmental Management	In person
Anonym (V4)		Chief Accountant	Management Accounting	In person	
Taiwan	Transworld Institute of Technology	Shu-Hsiang Hsu	President	Senior Management	In person
		Chih-Cheng Chang	Director, General Affairs	Senior Management & Environmental Management <sup>72</sup>	In person
		Feng-Shuai Wu	Director, Research & Development	Senior Management	In person
		Hsia-Ching Weng	Senior Accountant, Accounting & Finance Division	Management Accounting	In person
		Yu-Chuan Pang	Head of Department of Accounting	Academic School	In person
	Nanhua University	Miao-Sheng Chen	President	Senior Management	In person
		Jen-Wei Wei	Director, General Affairs	Senior Management & Environmental Management	In person
		Meng-She Chen	Chief Accountant, Accounting & Finance Division	Management Accounting	In person
		Chung-Chiang Chen	Dean, School of Management	Academic School	In person
		Chih-Wen Ding	Head, Department of Accounting	Academic School	In person
	National University of Kaohsiung	Chien-Jung Huang	Director, General Affairs	Senior Management & Environmental management	In person
		Chu-Ying Lien	Director, Accounting & Finance Division	Management Accounting	By telephone

<sup>72</sup> For participants with dual functions (senior management and environmental management), the two questionnaires (as shown in Tables 6.2 and 6.3) were both used to collect data from them.

For the purpose of this study, two questionnaires with interview questions were designed to meet the two research objectives. The questionnaire designed for the first research objective, which is in Table 6.1, was used only to collect data from participants directly involved in either an environmental management function, or a management accounting function. The questionnaire designed for the second research objective, which is in Table 6.2, was for all the participants. The interviews were of an open-ended nature. The information gathered was also used as the basis for further inquiry, as some other sources of evidence emerged through the interviews.

All participants were asked if they would object to the interview being recorded, and whether any information from the interview could be used in this thesis, or any other publications, stemming from it. All participants agreed to be recorded. It should be noted that with participants of the three universities in Taiwan, interviews were conducted in Mandarin rather than English. Related issues with transcribing and translating are addressed below.

#### **6.4.3 PHASE THREE – TRANSCRIBING AND TRANSLATING DATA**

Marshall and Rossman argue that neither transcribing or translating text is ‘merely technical task’ and ‘both entail judgement and interpretation’ (2006, p. 110). They explain that once interview data have been transcribed or translated, they are not raw data any more, but become ‘processed data’. Marshall and Rossman (2006) suggest that care be exercised and strategies be provided for handling the judgements and interpretations inherent in this process.

An independent person was involved in transcribing the interviews conducted in English. The transcriptions are full records of the interviews. When the interviews were transcribed, they were listened to, and checked by the researcher to ensure the accuracy of the transcriptions. For interviews conducted in Mandarin, the researcher herself (rather than an independent translator) transcribed and translated the interviews. Although Temple and Young (2004) raise the concern about whether it matters if the researcher is also the translator, Marshall and Rossman (2006, p. 112) argue that more interpretation issues appear when ‘someone other than the researcher’ performs the translations, and they indicate that ‘the researcher being the translator’ is not problematic. As the researcher’s first language is Mandarin, being both the researcher and translator posed no real problems for this research, but offered the advantage of constructing the meaning in a consistent way.

Transcribing and translating both depend substantially on the researcher to draw inferences and offer interpretations of the data. To cope with the inherent limitations and allow readers to consider not only the potential explanations the researcher has suggested, but also other

alternative explanations, it is recommended to provide detailed replication of quotes<sup>73</sup> to reflect what participants have said<sup>74</sup> (Ferreira & Merchant 1992). Easterby-Smith, Thorpe and Lowe (2002, p. 119) state:

However tackled, the method should allow the researcher to draw key features out of the data, whilst at the same time allowing the richness of some of the material to remain so it can be used to evidence the conclusions drawn and help to 'let the data speak' for itself.

Deegan and Blomquist indicate that direct quotes also help 'guard, at least to some extent, against the authors providing their own, potentially biased, perspective of what interviewees were saying' (2006, p. 255). For the purpose of quoting, the quotes that typically represent the views of the interviewees will be used. The next section will describe data analysis for this study.

## **6.5 DATA ANALYSIS**

The main source of data, information from the interviews, was coded according to a set of prerequisite codes that are either literature or theory based. To derive valid constructs for the codes and to measure the codes consistently, relevant dimensions that help distinguish among the codes were identified. The coded data were first analysed via a within-case approach, and then cross-case analysis was performed. According to Eisenhardt (1989), a within-case approach typically involves detailed descriptions for each case, but it is essential to the generation of insights; whereas a cross-case analysis involves searching for patterns. The two approaches were used to analyse the coded data to achieve the goal of going beyond initial impressions and to improve the accuracy and reliability of results. Before going further, it is useful to define the unit of analysis.

### **6.5.1 UNIT OF ANALYSIS**

Neuendorf (2002) defines the unit in a research study as the individual thing that is the subject of study, and the unit of analysis as the element on which data are analysed and for which findings are reported. Yin (2003b) states that how the unit of analysis, or the case, is defined depends on the initial research questions proposed. The first research objective of this study has a focus on understanding current accounting practices for managing the major environmental costs within universities. Three research questions (R1, R2 and R3) were developed to achieve this objective. The research questions help define the unit of analysis being the 'university' itself.

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<sup>73</sup> All participants in this research have given permission to quote extensively.

<sup>74</sup> Patton explains that 'direct quotations are a basic source of raw data in qualitative inquiry, revealing respondents' depth of emotion, the ways they have organized their world, their thoughts about what is happening, their experiences, and their basic perceptions' (2002, p. 21).

However, the purpose of the second research objective is to identify factors impeding, or assisting, universities in implementing some form of EMA. It is the participants' personal attitude, view, or perception, which would be used to address this objective. Therefore, the unit of analysis is the individual 'participant' from the five universities. The next section will describe how content analysis was used for the purpose of coding interview data.

### 6.5.2 CONTENT ANALYSIS AS MAINLY QUALITATIVE

The method employed to analyse the collected data is content analysis. Neuendorf indicates that content analysis is a message-centred scientific research methodology, and provides a definition as follows:

Content analysis is a summarizing, quantitative analysis of messages that relies on the scientific method (including attention to objectivity-intersubjectivity, a priori design, reliability, validity, generalizability, replicability, and hypothesis testing) and is not limited as to the types of variables that may be measured or the context in which the messages are created or presented (2002, p. 10).

Neuendorf (2002) also notes that the focus of 'content analysis as qualitative' is different from 'content analysis as quantitative'. Content analysis as quantitative is a numerical process to produce counts of key categories and amounts of variables; while content analysis as qualitative emphasises the capability of providing a highly valid source of detailed, or deep, information about a text. Patton explains:

More generally, however, content analysis is used to refer to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings. Case studies, for example, can be content analysed.... The core meanings found through content analysis are often called patterns or themes. Alternatively, the process of searching for patterns or themes may be distinguished, respectively, as pattern analysis or theme analysis (2002, p. 453).

For the purpose of this study, content analysis is regarded as a research method that utilises a set of scientific procedures to make valid inferences from data collected, as defined by Weber (1990). The process to identify, code, and categorise primary patterns, or themes<sup>75</sup>, in the text was used to reduce the collected data. This study focused on summarising primary patterns and themes rather than reporting all details concerning a text, but counts of key themes were performed to demonstrate the relative importance of primary themes identified. The following section describes the coding process in search for the patterns and themes in the text.

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<sup>75</sup> Patton explains that 'the term *pattern* usually refers to a descriptive finding, for example, "Almost all participants reported feeling fear when they rappelled down the cliff," while a theme takes a more categorical or topical form: *Fear*' (2002, p. 453).

### 6.5.3 CODING THE DATA

Miles and Huberman (1994) suggest that researchers have some literature-based codes in mind as they begin coding, adding to the codes as the process unfolds. Neuendorf concurs that ‘a lot of exploratory work can and should be done before a final coding scheme is “set in stone”’ (2002, pp. 11-2). A literature review and the proposed theoretical framework help generate a list of initial codes for the purpose of coding the data. This coding process can be viewed as a combination of induction and deduction. It is in line with the adopted research methodology where a mix of both deductive and inductive reasoning is desired.

The initial codes represent subcategories of the research themes that were used to group interview questions. They were either ‘substantive’ or ‘theoretical’, which ‘implicitly make some sort of claim about the topic being studied... rather than simply being conceptual boxes for holding data’ (Maxwell 2005, p. 97). Maxwell (2005) explains that substantive categories are mainly for describing participants’ concepts and beliefs, and in a broad sense do not imply a more abstract theory, whereas theoretical categories put the coded data into a more general or theoretical framework, and usually correspond to the researcher’s concepts rather than representing participants’ own concepts. The more the data is collected, the more important it will be to create new substantive categories, especially for information that does not fit into existing categories. Such information could be lost if they could not be captured in an explicit category. Table 6.4 provides a list of initial codes, including both substantive and theoretical categories, for addressing the two research objectives of this study.

For construct validity, the initial codes (both substantive and theoretical) were defined. The definitions were either derived from the relevant literature, or based on a particular theory from which each code was developed. Table 6.5 summarises the definitions, sources, and a limited number of illustrative quotes to show how they were applied for the purpose of coding. Table 6.4, the initial coding structure, and Table 6.5, the measurements for the codes, are provided on the following pages.

**TABLE 6.4 THE INITIAL CODING STRUCTURE**

Hierarchy		Codes		Purpose
		Substantive	Theoretical	
<b>Management accounting for the major environmental costs</b>				To address the first research objective, which is to understand current accounting practices for managing the major environmental costs
	<i>How the major environmental costs are accounted for within accounting systems</i>			
	RMIT University	X		
	AUS University	X		
	Transworld Institute of Technology	X		
	Nanhua University	X		
	National University of Kaohsiung	X		
	<i>How the major environmental costs are managed</i> <sup>76</sup>			
	Capital budgeting	X		
	Cost allocation	X		
	Environmental performance measurement	X		
	Environmental reporting	X		
<b>Factors influencing EMA adoption</b> <sup>77</sup>				
	Environmental strategy		X	
	Physical environmental uncertainty		X	
	Efficiency or financial considerations		X	
	Government pressure		X	
	Mimetic pressure		X	
	Normative pressure		X	
	Legitimacy considerations		X	
	Stakeholder power		X	
	Leadership commitment and support	X		

**Note:** ‘X’ indicates the nature of codes that are either substantive or theoretical.

<sup>76</sup> Four areas are of special concern to this study for understanding how the major environmental costs are managed. *Capital budgeting*, *cost allocation*, and *performance measurement* are the three major functions of management accounting, whereas *environmental reporting* requires the data generated by supporting management accounting systems. Therefore, the four areas are relevant to this study. It should be noted again that the study only focuses on the environmental aspect of these areas.

<sup>77</sup> Eight of the factors were derived from the theoretical framework proposed in Chapter Five. *Environmental strategy*, *physical environmental uncertainty* and *efficiency or financial considerations* are related to contingency theory, while *legitimacy considerations* and *stakeholder power* are related to legitimacy theory and stakeholder theory, respectively. *Government pressure*, *mimetic pressure* and *normative pressure* are related to institutional theory. The last factor, *leadership commitment and support*, was suggested by the literature relating to environmental management, as explained in Chapter Four.

**TABLE 6.5 MEASUREMENTS FOR THE CODES<sup>78</sup>**

Code	Source	Measurement	Illustrative Quote
Environmental strategy	Contingency theory	The study looks at a university's strategic plan and environmental policy (if any) as the indicator of its strategic position about environmental issues. Associated environmental strategy is measured by outcomes in the form of the actions that it undertakes for regulatory compliance, and the initiatives it voluntarily takes to meet external environmental commitments.	<ul style="list-style-type: none"> <li>• So we run the same risk with an environmental policy, you can promulgate it, but will anybody do anything about it? So you have to have an implementation strategy as well, that's all I'd say, you've updated it, great, but what's the implementation plan (Pro Vice-Chancellor/RMIT)?</li> <li>• If we had a formal environmental policy there, we could have done much better (Director, Research &amp; Development/TIT).</li> </ul>
Physical environmental uncertainty	Contingency theory	Physical environmental uncertainty is determined by the seven dimensions: government environmental policy; environmental resources and services used; environmental products, markets and demand; green competition; environmental technology in the industry; behaviour of environmental stakeholders in the organisation; and, how major environmental issues are affecting the organisation.	<ul style="list-style-type: none"> <li>• The universities are tied to certain degree with the Government, but again in this particular corner of Australia, where there's cheap brown coal, I don't know if it'll be around – the imperative is going to come out over ten years (General Manager, Facilities Services/RMIT).</li> <li>• No, it's not that obvious at this point in time. There's no legislative requirement other than compliance to existing laws, but there's no pressure that has forced this issue into a higher order, and I think that's going to come as a result of the global warming debate that's currently on within the community (Vice-President Resources/AUS).</li> </ul>
Efficiency or financial considerations	Contingency theory	The code stresses the efficiency of adopting EMA that in some way may improve organisational performance. The considerations may include (but are not limited to) whether EMA is economically more efficient, whether EMA offers measurable advantages, or whether EMA helps achieve cost savings or financial benefits.	<ul style="list-style-type: none"> <li>• There is no reason why we couldn't do it ourselves. To be honest, there is no good reason why RMIT couldn't fund that money, but that's probably needing the convincing that it [EMA] actually leads to benefits (Pro Vice-Chancellor Business/RMIT).</li> <li>• What about costs and benefits? Are the benefits generated from adopting any EMA practice greater than the costs to implement the practice? I doubt it (Head of School/TIT).</li> </ul>
Government pressure	Institutional theory	Government pressure captures comments relating to the government imposing pressure for accounting changes, in particular EMA practices. The pressure may be in the form of a government process (e.g. reporting requirement), a government agency and/or a desire to appear legitimate specifically to the government.	<ul style="list-style-type: none"> <li>• But I think it'll be like external government pressure or industry wide pressure that will lead to some changes (Senior Accountant, Property Services/RMIT).</li> <li>• Well, as a university, we should practice what we preach. For example, should we use recycled paper although it's more expensive? When I say expensive, I mean it from our point of view, but in terms of social cost, I believe it's cheaper. It's not possible to ask everyone to pay more just for the reason of being socially responsible. There should be some sort of mechanisms existing to provide the incentives required to motivate people for being environmentally responsible. Our Government should have been playing an important role here, but unfortunately, it didn't (President/Nanhua).</li> </ul>

(To be continued)

<sup>78</sup> Eight of the nine initial codes, which were used for the purpose of exploring factors influencing EMA adoption, were derived from the theoretical framework proposed in Chapter Five. The last code in this table was suggested by the literature relating to environmental management within the higher education sector.

Mimetic pressure	Institutional theory	If EMA has some recognised value, or is believed to be a new management standard, universities would not question the value of EMA, but simply copy best practices. Mimetic pressure is the code to capture evidence relating to whether such pressure exists in the organisational field of universities.	<ul style="list-style-type: none"> <li>I guess what other universities do. If other universities put more in their reports here and there, if there's some sort of public scrutiny of it, if something gets in the papers ... something like that, then that would put a focus on it.... (Associate Director, Budget &amp; Financial Performance Management/RMIT).</li> <li>Can you name any university that provides environmental cost information to its staff (Dean, School of Management/Nanhua)?</li> </ul>
Normative pressure	Institutional theory	The code captures information on the influence of individual manager's education background and/or the pressure from professional associations (either accounting or environmental management) on EMA adoption within universities.	<ul style="list-style-type: none"> <li>I am also the director of TEFMA. We have been working with the Australian Green Building Council to develop a green star tool for educational buildings. That will be piloted and then become available next year (Executive Director, Property Services/RMIT).</li> <li>So if there were a standard, an accounting standard on that [environmental cost], then it would obviously influence the university. If government and the accounting body... yes that's right, if there was that sort of accountability (Head of School/RMIT).</li> </ul>
Legitimacy considerations	Legitimacy theory	The code, legitimacy considerations, is used to capture information on legitimacy issues in relation to pressures stemming from society as a whole, institutions, and/or other stakeholders as a factor impeding, or assisting, EMA adoption.	<ul style="list-style-type: none"> <li>If we do something that's really good and really successful, we want the good news to be run outside to the people. You know before we practice we preach. So within the boundary we can do it, because we still financially have to be very careful. What would be motivated is actually to say this is something we have achieved and link it into the public side (Associate Director, Budget &amp; Financial Performance Management/RMIT).</li> <li>I guess because we are doing a number of things, they feel a little bit comfortable than if we were being pointed out by the public saying you're doing nothing... I think that takes the pressure of them a little bit from that (Executive Director, Property Services/AUS).</li> </ul>
Stakeholder power	Stakeholder theory	Stakeholder power stresses the influence of the power of stakeholders on organisational practices and initiatives, such as EMA adoption.	<ul style="list-style-type: none"> <li>There are a few, but they are not particularly visible... Well, we've got Global Sustainability. They worry about these things... But I have to be brutally honest and say if it's not in the senior level, it's not having a significant impact (Pro Vice-Chancellor Business/RMIT).</li> <li>Well, clearly the governments think they are key stakeholders, but in my view the most important stakeholders are the students and the researchers, and we need to be driven to some extent by what they think are the key priorities (Vice-resident Resources/RMIT).</li> </ul>
Leadership commitment and support	Higher education related environmental management literature	The code captures comments about commitment and support from the university leadership in relation to EMA-related issues.	<ul style="list-style-type: none"> <li>... We've different accounts. So we think, 'ok, how can we capture costs properly?' You know, at the end of the day, what is management interested in? They're interested in how much we spend on travel and how much we spend on consumables. So would they ask how much we spend on the environment? ... They never have, or it hasn't come through to me... They may discuss it at different forums. But it would be very hard to measure (Associate Director, Budget &amp; Financial Performance Management/RMIT).</li> <li>But we are just accountants, and we won't be able to do it [accounting for the environment] without strong support from the senior management (Chief Accountant/Nanhua).</li> </ul>

To assist with the coding, emergence of potential substantive categories, and management of interview transcripts, the qualitative research software package NVivo7<sup>79</sup> was used. NVivo7 is primarily oriented to studies with detailed mark-up, retrieval, and description of textual content. It is based on the organisation of coded text via a system of concept nodes, such as logical connections or relationships. These codes can stand-alone or be grouped hierarchically in a tree structure. The system allows texts to be coded by words, sentences or paragraphs, and then easily sorted within that particular code. For this study, the advantages of using NVivo7 include creating new codes, moving coding data, and merging codes during the coding process.

As mentioned, more substantive categories, which represent potential barriers to EMA adoption, would emerge during the coding process. When it occurred, a new code category was created. As this process continued, further data of a similar nature was coded under that new code category. Codes were named to best represent the meaning of the data contained within these new code categories. At the end of the coding process, codes were checked and sorted into sets and subsets. Two main sets that match with the two research objectives were used to sort the codes that relate to management accounting for the major environmental costs, and describe the barriers to EMA adoption. Table 6.6 on the following page provides the final hierarchical coding structure.

The first set comprises three subsets: how the major environmental costs are accounted for within accounting systems, how the major environmental costs are managed, and suggestions for EMA adoption and implementation. The second set consists of five subsets: attitudinal, financial, informational, institutional, and management barriers, which are the patterns that emerged from the final coded data. These codes, subsets, sets, and their data were stored in the database as a project created in NVivo7. The section following Table 6.6 will provide a discussion on the data display.

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<sup>79</sup> NVivo7 is the qualitative research software developed by Qualitative Solutions and Research (QSR) International Pty Ltd. Visit [http://www.qsrinternational.com/products/productoverview/NVivo\\_7.htm](http://www.qsrinternational.com/products/productoverview/NVivo_7.htm) for more information.

**TABLE 6.6 THE FINAL CODING STRUCTURE**

Hierarchy		Purpose
<b>Management accounting for the major environmental costs</b>		
	<i>How the major environmental costs are accounted for within accounting systems</i>	To address the first research objective, which is to understand current accounting practices for managing the major environmental costs
	RMIT University	
	AUS University	
	Transworld Institute of Technology	
	Nanhua University	
	National University of Kaohsiung	
	<i>How the major environmental costs are managed</i>	
	Capital budgeting	
	Cost allocation	
	Environmental performance measurement	
	Environmental reporting	
	<i>Suggestions for EMA adoption and implementation*</i>	
<b>Factors influencing EMA adoption</b>		
	<i>Attitudinal barriers</i>	To address the second research objective, which is to identify factors influencing EMA adoption within universities
	Low priority of accounting for environmental costs*	
	Resistance to change*	
	<i>Financial barriers</i>	
	Efficiency or financial considerations	
	Environmental costs are not considered significant*	
	Resource constraints*	
	<i>Informational barriers</i>	
	Difficulties in collecting or allocating environmental costs*	
	Low physical environmental uncertainty	
	<i>Institutional barriers</i>	
	Lack of institutional pressure <sup>80</sup>	
	Legitimacy considerations	
	Stakeholder power	
	<i>Management barriers</i>	
	Few incentives provided to manage environmental costs*	
	Lack of advocacy from the university leadership	
	Lack of environmental responsibility & accountability*	
	Lack of integrating the environment into strategic planning <sup>81</sup>	

\* Codes that emerged from the coding process

<sup>80</sup> The code was created to accommodate *government pressure*, *mimetic pressure* and *normative pressure*, which were suggested in the initial coding structure in Table 6.4. Consistent with Modell (2002), the study found that the three types of isomorphism are not mutually exclusive, and they may co-exist in some circumstances. Therefore, *institutional pressure* is used to represent the three types of pressure in the final coding structure.

<sup>81</sup> The code captured comments about *environmental strategy* that were included in the initial coding structure in Table 6.4. *Environmental strategy* was renamed as *lack of integrating the environment into strategic planning* in the final coding structure to better reflect comments made by participants about environmental strategies undertaken by their universities in managing environmental costs.

#### 6.5.4 STRUCTURED DISPLAY OF THE CODED DATA

It is argued that structured data displays are essential for qualitative data analysis (Lillis 1999; Miles & Huberman 1994). Structured data displays use reduced data, keep precise records of the criteria and decision rules used, and are parallel with the nature and types of the research questions. They are focused to allow a viewing of a full data set, and are systematically arranged to answer the research questions.

For this study, structured role-ordered displays were used, which mainly focus on patterns in the data that are driven by participant roles (Miles & Huberman 1994). A role-ordered matrix sorts data in its rows and columns that have been collected from a certain set of participants in different roles, and the collected data reflect their views (Burger & Luckman 1966, cited in Neuendorf 2002). Applications of these techniques to this study resulted in a matrix-form data display. Table 6.7 presents an example of the matrix for data display.

**TABLE 6.7 AN EXAMPLE OF THE MATRIX FOR DATA DISPLAY**

Code			
Name: Set\ Category\Code			
<Participating University>			
Participant	Management Function	Quotation <sup>82</sup>	Interpretation <sup>83</sup>

The matrices for all data displays were developed and completed in a series of steps. The purpose is to maintain an audit trail. The steps are outlined as follows:

Step 1: Transcripts were coded using NVivo7, as described previously. Each coded paragraph, either related to one or more prerequisite codes, was given an automatically generated paragraph number in NVivo7. In this way, the coded data remain readily auditable back to the transcripts even when taken out of their original context. The initial hierarchical coding structure provided in Table 6.4 lists the codes used to categorise text. The coding was a thematic grouping of text paragraphs rather than a scoring process, and there was minimal potential for bias.

<sup>82</sup> Coded data is contained in this column.

<sup>83</sup> This column represents some data interpretations in the researcher's own words, and is specifically for meeting the purpose of the first research objective that is to understand current accounting practices for managing the major environmental costs. The interpretations facilitate the summary of current practices for each university.

Step 2: Nvivo7 generated a data sheet for each code with coded data, which could be audited back to a particular transcript using the identifying paragraph numbers. Each code was then summarised manually, and then reported in the matrix as shown in Table 6.7. The summary includes quotations and interpretations in the researcher's own words and thus reflects some data interpretations.

Step 3: The content of the matrices was built up and organised in the same order as shown in the final hierarchical coding structure (see Table 6.6). A full record of the coded data is shown in the appendixes<sup>84</sup>. Codes classified to be the barriers to EMA adoption were further organised into sets that best represent themes or patterns that emerged from them. Five sets of barriers were found – *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers.

Step 4: Counts of codes representing barriers to EMA adoption were then performed to demonstrate their relative importance, which allow the observations of views from participants with different management functions. Counts of references made by each participant expressing his/her views on each particular code were then summarised to show the total number of participants who referred to that particular code.

With a traceable audit trail, the systematic approach just described to the analysis of qualitative data helps to convey a sense of rigour and discipline in the analysis. Not only did the matrices appear to be an effective method to display and then analyse the coded data, but they also became another checking device for coding accuracy – once displayed, the data could be checked for validity and completeness of coding.

## **6.6 REVISITING THE RESEARCH METHODS**

Although the research design, as explained in previous sections, helps achieve the two research objectives, the study also suffers inherent limitations, such as researcher-related problems or fundamental design limitations. Two issues are of relevance to this study – subjectivity and generalisation.

### **6.6.1 SUBJECTIVITY**

In-depth interviewing is the primary inquiry method for this study. The picture emerged from the data collected is a snapshot in time, and it does not necessarily follow that these findings are accurate reflections of reality. However, as the classic work, *The Social Construction of*

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<sup>84</sup> Appendix A provides the coded data relating to management accounting for the major environmental costs, and Appendix B provides the coded data describing the factors impeding EMA adoption.

*Reality*, points out that ‘there is no such thing as true objectivity – “knowledge” and “fact” are what are socially agreed on’ (Neuendorf 2002, p. 12). Subjectivity is inherent in all human inquiries and interpretations. The study is subject to this subjectivity limitation during the interview and analytical stages. In spite of this, the elaborated responses from participants provide a description of the ‘how’ and ‘why’ features of the phenomena under investigation, and thus provide a richer and contextualised snapshot than would be obtained from other data collection method, such as a survey. Further, the researcher not only documented carefully the research and analytical procedures employed in this study, but also strived to ensure consistency in conducting interviews to decrease the level of subjectivity.

### **6.6.2 GENERALISATION**

Neuendorf states that ‘the generalizability of findings is the extent to which they may be applied to other cases’ (2003b, p. 32). A concern for this study is that case studies provide little basis for ‘statistical generalisation’. However, Yin (2003b, p.10) argues that cases are not ‘sampling units’, but rather they should be considered like multiple experiments upon which scientific facts are drawn. Yin explains:

... case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a ‘sample’, and in doing a case study, your goal will be to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization) (2003b, p. 33).

According to Yin (2003b), in analytic generalisation the role of existing theories can be regarded as a template with which to compare the findings of the case study. If two or more cases are found to support the same theory, replication may be claimed. Yin’s point of generalisability is applicable to this study. For example, the research employed a theoretical framework to study the case of RMIT University in depth, and then four other cases were examined to see whether the pattern found matched that in the RMIT case. The process will be discussed in detail in Chapter Nine.

Although the research has inherent limitations, efforts have been undertaken to overcome the limitations, and ensure the quality of the research. The following section provides the discussion.

### **6.7 VALIDITY AND RELIABILITY CHECKS**

To judge and ensure the quality of this research, four criteria were considered. The four criteria are construct validity, internal validity, external validity and reliability (Yin 2003b). Construct validity is a measure of whether consistent operational measures for the concepts being studied are established. Internal validity is a measure that indicates whether casual

relationships found, or inferences made, are logical. External validity is a measure used to indicate whether a study's findings can be generalised. Reliability demonstrates that the operations, or procedures, of a study can be repeated, and its results can be replicated. Table 6.8 on the following page provides a description of the tactics used by this research to achieve validity and reliability.

## **6.8 CONCLUSION**

The chapter has explained the research methodology used to accomplish the two research objectives of this study. The methodology employed a case study strategy. Participants were interviewed as a main form of data collection. The discussion on the research design hierarchy facilitated the trace from research objectives to interview questions via the research questions and guiding propositions. In particular, the research design combined both deductive and inductive research methods. The interview questions were used flexibly to allow for other possibilities to emerge from the interview processes. Research tactics were used to achieve internal, external and construct validity as well as reliability. The next chapter will present results and findings of the in-depth case study on RMIT University in Australia. The subsequent chapter (Chapter Eight) will then summarise for the other four cases.

**TABLE 6.8 A DESCRIPTION OF THE TACTICS USED TO ACHIEVE VALIDITY AND RELIABILITY**

Tests	Tactics Used	Descriptions
Construct Validity	Use multiple sources of evidence	For this study, related information was collected from the available resources, such as the annual reports and strategic plans. In particular, RMIT University has a sustainability committee, which oversees and coordinates the implementation and further development of the university's environmental and sustainability policies, projects and external commitments. Although the committee has ceased to operate since 2005, the researcher attended some of the committee meetings before that time. By attending the meetings, reviews of related background documents and records and observations of discussions among key players were made possible.
	Triangulation by theories	Building from four theories, eight guiding propositions were developed. The propositions were used to inform the questionnaire design.
	Review the transcripts	The researcher read each transcript at least twice (once with and once without the voice files running) to ensure the accuracy of the transcriptions.
	Establish a chain of evidence	An audit trail was maintained by the use of NVivo7. Transcripts were coded using NVivo7. Each coded paragraph, either relating to one or more prerequisite categories, was given a paragraph number in NVivo7. In this way, the coded data remain readily auditable back to the transcripts even when taken out of their original context.
	Have key informants review a draft copy of their transcription	Three participants reviewed their transcriptions (i.e. three of the four anonymous participants from AUS University). The Vice-Chancellor and President of RMIT University requested to review her quotations used in the final report. It was not deemed a problem for the remainder of the participants' transcripts as they were double checked by the researcher.
Internal Validity	Within-case and then cross-case analysis	The coded data were first analysed via a within-case approach, and then cross-case analysis was performed. A within-case approach assisted in analysing each case from a single case perspective for the generation of insight; while a cross-case approach involved searching for patterns among the four distinct groups classified by their types of management roles within universities. This meant the data source had changed from data provided by a particular case to data provided by the overall perspective of the four groups with different types of management roles. The comparisons allowed the confirmation of research results and findings.
External Validity	Use replication logic in multiple cases	The study selected two Australian universities and three Taiwanese universities for seeking either a literal replication (predicting similar results), or a theoretical replication (predicting contrasting results but for predictable reasons). The logic for the selection was that cases selected for this study were predicted to have similar accounting practices for managing their major environmental costs. Some contrasting results, or practices, might be found, but the reasons were predictable based upon factoring arising from the theoretical framework developed in Chapter Five. The theoretical framework was provided, which comprised four theories and was literature-based. It served as a vehicle for generalising to new cases.
Reliability	Research design hierarchy	The research design hierarchy was explained step by step to describe how the interview data were analysed.
	Develop a case study database	A separate case study database was created and maintained in NVivo7. It was distinct from the case study report. The database has made it easier to trace conclusions drawn from the case study report to their sources, which were the transcripts stored in the database. A unique paragraph identifying number (automatically generated in Nvivo7) was used to facilitate the traceability.

The first two columns of the table are adapted from Yin (2003), Eisenhardt (1989), Miles and Huberman (1994), Parkhe (1993), and Patton (2002) and the third column is used to describe the researcher's actions taken in response to their suggestions.

## CHAPTER SEVEN

### RESULTS AND FINDINGS – THE CASE OF RMIT UNIVERSITY

#### 7.1 INTRODUCTION

This chapter will present the results and findings from the interviews held with eleven RMIT participants. As described in Chapter Six, the data were coded using several prerequisite categories and other codes that emerged during the process. The process delivered two sets of coded data that matched the study's two research objectives – one relating to management accounting for the major environmental costs, and the other describing the factors impeding EMA adoption.

The first set of coded data, which is provided in Appendix A, comprises three subsets: (i) how the major environmental costs are accounted for within the accounting systems, (ii) how the major environmental costs are managed, and (iii) suggestions from participants for adopting some form of EMA. This set of coded data was captured mainly to describe participants' concepts, ideas, and opinions on these topics. Together, the contributions form the basis for addressing the first research objective of this study.

As provided in Appendix B, the second set consists of five subsets: *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers. They represent five key themes, or patterns, that emerged from the final coded data. Each key barrier contains two to four factors that provide further explanations on how the barrier potentially influences EMA adoption. The five key barriers and associated factors were mainly for addressing the second research objective of this study.

This chapter will present the results and findings pertaining to RMIT University, with the other four universities presented in the next chapter. Due to greater access, RMIT University was studied in greater depth than the other four cases. More information was collected and will be provided about RMIT. This was deliberate, since direct comparisons between universities are not always useful given various scales and differences in regional contexts. The role of the four case universities being presented in the next chapter was to demonstrate some common problems with, or significant differences (if any) in, current accounting practices in managing the major environmental costs. Direct comparisons were deemed unsuitable for this study, again due to the differences in the degree of access and the number of participants. However, examples from the four non-RMIT universities helped to support findings and arguments advanced in relation to RMIT University.

The chapter will begin with a general description and an overview of the apparent environmental responsiveness of RMIT University. Results of the two research objectives will then be addressed and discussed in turn. RMIT's current management accounting practices for the major environmental costs, EMA suggestions made by this study, and factors potentially impeding EMA adoption will all be covered. Towards the end of this chapter, a summary of the five key barriers and their associated factors will be given for the purpose of presenting findings across all participants and by their management roles.

All interviews for this case were conducted in 2006. Also note that the frequency of the references, or comments, made cannot be determined by the quotes contained in this chapter. The quotes are provided mainly to support the researcher's interpretations of the results. A full record of the coded data is shown in Appendixes A and B<sup>85</sup>.

## **7.2 GENERAL DESCRIPTION OF RMIT UNIVERSITY**

Founded as the Working Men's College in 1887, RMIT was granted university status in 1992. Today, RMIT University is one of the largest universities in Australia, with over 57,000 students enrolled and over 3,300 staff as of 2005. With major campuses in the Melbourne central business district and the City's northern suburbs, RMIT University offers TAFE<sup>86</sup> and higher education programs in 27 schools across three academic portfolios, which are *Business*, *Design & Social Context*, and *Science, Engineering & Technology*.

### **7.2.1 ENVIRONMENTAL RESPONSIVENESS OF THE UNIVERSITY**

The University committed to an environmental policy in 1994. Since then, the University has participated in environmental sustainability commitments at both international and domestic levels. For example, RMIT became a signatory to the Talloires Declaration<sup>87</sup> in 1995, and the Commonwealth Greenhouse Challenge<sup>88</sup> in 2000. Some internal environmental policies and initiatives have also been developed and adopted. Of particular note is that RMIT is

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<sup>85</sup> Appendix A provides the coded data relating to current accounting practices for managing the major environmental costs. Appendix B provides the coded data that describe factors influencing EMA adoption.

<sup>86</sup> Technical and Further Education (TAFE) institutions are a type of adult education organisations in Australia. TAFEs offer a wide range of predominantly vocational tertiary education courses. In contrast to the higher education sector mainly funded by the Commonwealth Government, TAFEs are owned, operated and financed by various State and Territory Governments.

<sup>87</sup> As of 2006, ten Australian universities are signatories to the Declaration, including RMIT University (ULSF 2007).

<sup>88</sup> Greenhouse Challenge is an Australian Government's initiative to deal with global warming and climate change, which has been recognised as a real threat to the world economy and environment (Australian Greenhouse Office 2007). The program is managed by the Australian Greenhouse Office. Participating organisations are encouraged to set their own schedules and objectives within the guidelines of the program for continuous improvement in greenhouse gas emissions. Although the participation is voluntary, it is subject to independent verification, and participants are required to prepare an account of greenhouse gas emissions and provide annual reporting of the greenhouse gas inventory.

recognised as the first university to establish a Global Sustainability Institute<sup>89</sup> in Australia. The Institute has been involved in developing new concepts and methods relating to global sustainability in practical ways so that they can be applied to the work of RMIT itself, and to organisations in the private and public sectors. The Institute is one of the main vehicles driving environmental sustainability across the University.

As for external reporting, RMIT started to report environmental sustainability information in its annual report in 2000. In 2001, the University adopted a *Triple Bottom Line Plus One* (environmental, social and cultural, economic, and governance) reporting system to provide an insight into its sustainability practices. Table 7.1 provides the results of a content analysis on environmental sustainability information published in RMIT's annual reports from the years 2000 to 2006.

As shown, there was a shift in 2005. Information on environmental indicators is replaced by commentaries on improvement to infrastructure and facilities in less than a half-page. Given that RMIT is required to prepare an account of greenhouse gas emissions and provide annual reporting of the greenhouse gas inventory by the Greenhouse Challenge, it would have implications for EMA adoption within the University. While conducting interviews with RMIT participants, related issues were taken into consideration, for example changes in reporting practice, environmental strategies undertaken, and implementation plans to meet the requirements of various environmental sustainability agreements.

Having provided a general description of the University and an overview of its apparent environmental responsiveness, it is useful to present results and findings pertaining to RMIT University for the first research objective.

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<sup>89</sup> Now in the State of Victoria, Australia, Swinburne University of Technology, Monash University and Victoria University of Technology have also established similar centres.

**TABLE 7.1 ENVIRONMENTAL SUSTAINABILITY REPORTING BY RMIT UNIVERSITY**

Annual Report	Reported Environmental Indicators	Type of Information	Level of Information	Remarks
2000	<ul style="list-style-type: none"> <li>✓ Waste produced</li> <li>✓ Electricity consumed</li> <li>✓ Gas consumed</li> <li>✓ Greenhouse gas produced</li> <li>✓ Water consumed</li> </ul>	<ul style="list-style-type: none"> <li>■ Total quantity</li> </ul>	At a whole university level	Information is reported in a table titled ‘environmental indicators for all RMIT sites and campuses in Melbourne’.
2001	None	Not Applicable (N/A)	N/A	A suggested <i>Triple Bottom Line Plus One</i> reporting system was adopted in the annual report. A <i>two-page</i> highlights environment-related initiatives in three areas: teaching and learning, research and development, and operations.
2002	<ul style="list-style-type: none"> <li>✓ Waste produced</li> <li>✓ Electricity consumed</li> <li>✓ Gas consumed</li> <li>✓ Greenhouse gas produced</li> <li>✓ Water consumed</li> </ul>	<ul style="list-style-type: none"> <li>■ Total quantity</li> <li>■ Quantity per equivalent full-time student unit (EFTSU)</li> </ul>	At a whole university level	Both a table of the environmental indicators and commentaries on environmental sustainability are provided in a <i>one-page</i> .
2003	<ul style="list-style-type: none"> <li>✓ Electricity consumed</li> <li>✓ Gas consumed</li> <li>✓ Greenhouse gas produced</li> <li>✓ Water consumed</li> </ul> <p><i>(No waste produced)</i></p>	<ul style="list-style-type: none"> <li>■ Total quantity</li> <li>■ Quantity per EFTSU</li> <li>■ Quantity per m<sup>2</sup> of gross floor area (GFA) serviced</li> <li>■ Three-year trend data</li> </ul>	At a whole university level	Both a table of the environmental indicators and commentaries on environmental sustainability are provided in a <i>one-page</i> .
2004	<ul style="list-style-type: none"> <li>✓ Electricity consumed</li> <li>✓ Gas consumed</li> <li>✓ Greenhouse gas produced</li> </ul> <p><i>(No waste produced)</i> <i>(No water consumed)</i></p>	<ul style="list-style-type: none"> <li>■ Total quantity</li> <li>■ Quantity per EFTSU</li> <li>■ Quantity per m<sup>2</sup> of GFA serviced</li> <li>■ Three-year trend data</li> </ul>	At a whole university level	Both a table of the environmental indicators and commentaries on environmental sustainability are provided in a <i>one-page</i> , but the commentaries are getting less comprehensive.
2005	None	N/A	N/A	Information on environmental indicators is replaced by commentaries on improvement to the infrastructure and facilities in less than a <i>half-page</i> .
2006	<ul style="list-style-type: none"> <li>✓ Energy consumed</li> <li>✓ Water consumed</li> <li>✓ Greenhouse gas produced</li> </ul> <p><i>(No waste produced)</i></p>	<ul style="list-style-type: none"> <li>■ Quantity per equivalent full-time student unit (EFTSU)</li> <li>■ Four-year trend data</li> </ul>	At a whole university level	Information on building and campus environment is reported in a <i>two-page</i> highlighting infrastructure plan, teaching, research and student facilities, and commitment to environmental sustainability and building statistics.

### **7.3 RESULTS AND DISCUSSION FOR THE FIRST RESEARCH OBJECTIVE**

The first research objective is to understand current accounting practices for managing the major environmental costs (these being paper, electricity, water and waste management). The study found that the current level<sup>90</sup> of EMA application is low in the University. There is a general lack of providing environmental cost information for the purpose of internal management. This reduces the chance to improve environmental accountability, which is important in driving behaviour change. Behaviour or cultural change seems to be an issue for RMIT, for example:

Without active cultural change agents working within the organisation, people become complacent. They're just blasé about how they treat the facilities and power consumption.... At the end of the day, people have to be responsible for themselves.... If people were aware with all to start off with, the lights wouldn't be left on in the first place. It's something that management really can't control. It's a culture change issue. It's an individual discipline issue (General Manager, Facilities Services/RMIT University).

To address the first research objective, the following discussion will be divided into two main sections. The first section is to describe the University's current accounting practices for managing the major environmental costs. The second section is to provide EMA suggestions made by this study for the University.

#### **7.3.1 CURRENT ACCOUNTING PRACTICES FOR MANAGING ENVIRONMENTAL COSTS**

The four major environmental costs were examined to determine how they are managed and accounted for within the accounting system. Their absolute amount (if available) and relative scale are also provided.

##### **7.3.1.1 ACCOUNTING FOR THE MAJOR ENVIRONMENTAL COSTS**

RMIT uses a standard SAP accounting information system for the purposes of both financial and management accounting. A review and analysis of the system (general ledger) and processes indicated the following:

- The general ledger allows for the automatic generation of total costs for electricity and water, but uses a combined 'stationery and printing' account for paper cost, and a 'service contract' account to include waste cost. Waste cost is recognised as including the cost incurred in having waste removed from the University.

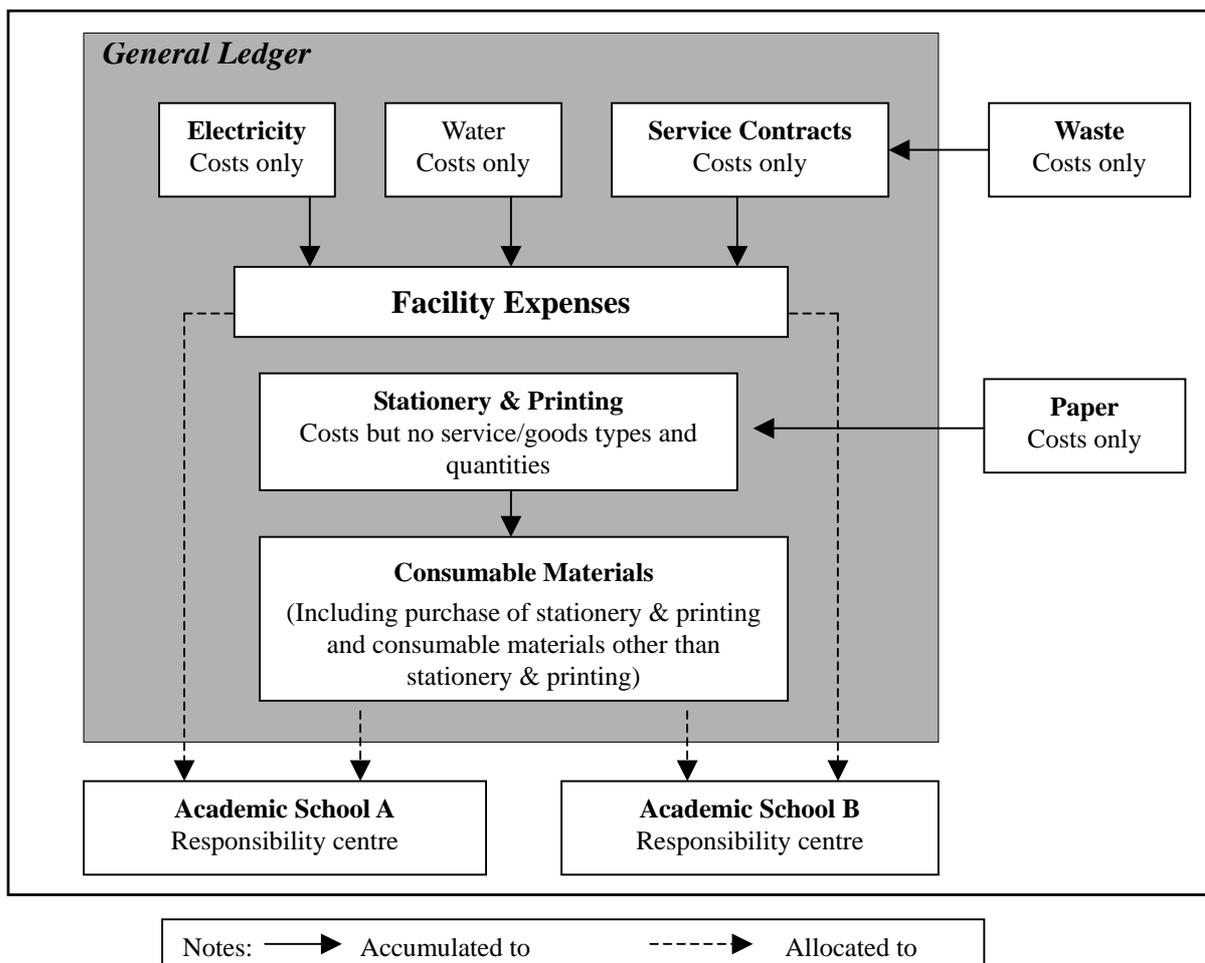
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<sup>90</sup> As discussed in Chapter Three, EMA can be applied to support decision-making, performance measurement and external environmental reporting. It also helps improve environmental accountability. The levels of EMA implementation range from the provision of environmental cost information for internal management to the adoption of a more comprehensive accounting system that integrates monetary and physical information systems.

- For the major environmental costs (e.g. electricity and water) captured within the system, only monetary information is provided. Physical information on the type or quantity of goods or services procured is not currently available within the system.
- The major environmental costs (including electricity, water, and waste removal) are combined as part of the ‘facility expenses’ overhead for the whole university. The overhead is allocated to responsibility centres as a single occupancy charge on the basis of floor space occupied.
- RMIT pays invoices for paper ordered separately by academic schools. Costs for paper purchases are accumulated in ‘consumable materials’ account, which is subsequently allocated to academic schools as a whole.

The following figure depicts current treatment of the major environmental costs in the accounting system (general ledger) of RMIT University.

**FIGURE 7.1 CURRENT TREATMENT OF THE MAJOR ENVIRONMENTAL COSTS**



As shown, only monetary environmental costs are captured. Costs for electricity and water can be separately identified from the general ledger, but they are accumulated in the ‘facility expenses’ account and allocated to responsibility centres as a whole. Waste cost is included as

part of the cost paid for service contracts. Paper cost cannot be separately identified, and it is included as part of the 'consumable materials' account. Available evidence also suggested that there is a lack of links between systems for collecting physical and monetary environmental cost information. This issue will be addressed in the next section.

### **7.3.1.2 LACK OF LINKS BETWEEN SYSTEMS FOR COLLECTING PHYSICAL AND MONETARY DATA**

A link between the systems for collecting physical and monetary environmental cost data is required for minimising environmental impacts and managing associated costs. This link does not seem to exist within the University. The General Manager of Facilities Services is responsible for monitoring and controlling the consumption of resources (e.g. energy and water) for the whole university. The General Manager collects related information, which is mainly physical data, for the purpose of environmental management. However, the physical data already collected is not included in the accounting system.

As the University is a member of the Australasian Tertiary Education Facilities Management Association<sup>91</sup> (TEFMA), the General Manager has to compile the required information to report for the purpose of environmental benchmarking by TEFMA. Both physical and monetary information is required for the reporting. The General Manager has physical information, but requires assistance from accountants to access monetary information provided by the accounting system. When asked if it would benefit the University to link systems for collecting physical and monetary information, the General Manager said:

I would think that would be valuable, because right now we spend a lot of time with our benchmarking data. We look at the global picture for our particular area of the facilities. I don't think our finance people look at these. They're bottom line people (General Manager, Facilities Services/RMIT University).

It seems that the General Manager doubted whether accountants are interested in building the link, or helping analyse environmental cost information. With the role of environmental management, the General Manager focuses on improving the efficient use of resources by controlling the consumption to reduce costs. However, managers, with the role of management accounting, tend to be constrained to thinking within the existing chart of accounts, and pay less attention to environmental costs. For example:

No one has ever come to me and said, 'tell me the environmental cost of what we do'. So the whole chart of accounts is not set up to record anything that way. We account for projects, but unless I knew of a project in Property Services or in a Portfolio, I wouldn't go and pick it out and say, 'here is our environmental cost' (Associate Director, Budget & Financial Performance Management/RMIT University).

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<sup>91</sup> TEFMA requires member universities to report facilities management related information (including the major environmental costs) each year to the Association for benchmarking purpose.

It seems that the two divisions, environmental management and accounting, do not communicate, or collaborate, for managing environmental costs. Apart from the problems associated with a lack of communication, opportunities for reducing environmental costs could be lost. Without key managers with the two functions collaborating, chances are low to build the link between systems for collecting physical and monetary environmental cost information.

Having described how the major environmental costs are accounted for, and having discussed the lack of links between physical and monetary information systems, the next section will examine how the major environmental costs are managed within the University.

### **7.3.1.3 MANAGEMENT FOR THE MAJOR ENVIRONMENTAL COSTS**

A monthly management report is produced by Financial Services<sup>92</sup> for reviewing current operations and assessing performance against budget. The General Manager of Property Services<sup>93</sup> indicated:

We get that money [budget], and we will spend it as responsibly as we can between the 1st of January and the 31st of December. The accountability is hitting the budget on the bar – if we're too far under, that doesn't help anyone; if we're too far over, obviously it costs the University money. We're just trying to have a soft landing and that would be the best way to describe it (General Manager, Facilities Services/RMIT University).

The General Manager is held responsible and accountable for the electricity, water and waste disposal costs, because he is in control of the budget. However, he is not the only or major party who incurs the costs, but no heads of academic schools, or other key managers, are held responsible for any of the major environmental costs incurred. Consider the following statement:

So for the academic areas, they will receive overhead costs for Financial Services and Property Services. They have a breakdown on what makes up those costs, so they will be able to see, 'Ok, Property Services, it's costing us X'. But it doesn't really go down to the level of all the electricity, electricity costing you such and such amount.... From that perspective, our Property Services (a little bit selfish) has all those electricity costs in their budget. It's up to them to manage, not really up to us (Senior Accountant, Property Services/RMIT University).

Academic schools are allocated a certain amount of the major environmental costs (through the allocation of facility expenses). However, they are not provided with detailed breakdown on what the costs are. Without information, managing the costs does not seem to attract attention. The main reason for this is that there has been no prior focus on the need for

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<sup>92</sup> The branches within Financial Services are responsible for financial management, reporting and advice, budget development and management, financial evaluation and financial planning, strategic procurement, and corporate financial administration information system.

<sup>93</sup> Property Services is in charge of contracting for, managing, and allocating the consumption of resources within the University.

environmental cost information. Except for the Vice-President of Resources<sup>94</sup>, senior management across the University would not know the extent of environmental costs – however, it is not clear that the senior management would monitor such information. If environmental costs are not considered significant, the answer might be ‘no’. The following section will show the extent of the major environment costs incurred by the University.

#### **7.3.1.4 EXTENT OF THE MAJOR ENVIRONMENTAL COSTS**

As shown in the Australian EMA case studies by Deegan (2003), environmental costs are relatively low compared to some other costs. The study acknowledged the same limitation for RMIT. For example, energy and water together is about 2% of total operating expenditure. According to HEEPI (2005), however, it is one of the largest items of controllable cost. In terms of the quantities of resources consumed and associated costs in dollar amounts, energy and water could have significant impact. RMIT spends over AU\$6,000,000 a year on energy and water. Costs in relation to waste management and paper purchases are not separately identified. Rather, they are included in ‘service contracts’ and ‘stationery & printing’, which explain 1% and 1.6% of total operating expenditure respectively.

#### **7.3.1.5 A SUMMARY OF CURRENT ACCOUNTING PRACTICES FOR MANAGING THE MAJOR ENVIRONMENTAL COSTS**

The previous sections have described current accounting practices for managing the major environmental costs for the University. The description reflects the following limitations pertaining to the University’s current practices:

- RMIT’s current accounting practices have a bias towards monetary environmental costs. The importance of physical environmental cost information for the purpose of environmental management tends to be ignored, in particular by managers in the accounting division.
- There is no link between systems for collecting monetary and physical environmental cost information. There appears to be only limited communication and collaboration between the two divisions responsible for environmental management and management accounting in terms of environmental issues.
- The major environmental costs (these being electricity, water and waste costs) are accumulated in the overhead account of Property Services. The overhead is allocated to responsibility centres as a single occupancy charge on the basis of floor space occupied. There are limitations to the use of floor space occupied as the

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<sup>94</sup> Both Property Services and Financial Services report to the Vice-President of Resources.

allocation basis. If there is a reduction in electricity usage by a centre, there will not be a corresponding reduction in the cost allocated to that centre because of the allocation basis. This could discourage managers from actively managing environmental costs.

- Only the cost paid for waste collection and removal is recognised as waste cost. Hence waste cost is understated (and therefore largely unaccounted for), because there is no explicit consideration given to the costs of bought in resources that end in waste.
- There is limited environmental accountability. Academic schools and other administrative divisions are allocated occupancy charges from Property Services, but they are not provided with breakdown information on the major environmental costs that are included in the charges. Except for Property Services, no heads of academic schools, or key managers, are held responsible and accountable for the major environmental costs incurred. This could reduce the opportunities for managing and minimising environmental costs.

The above-mentioned limitations are not specific to RMIT, but rather they could be common to many organisations, as mentioned in Chapter Two. However, the limitations have impacts on improving environmental and financial performance of the University. During the interviews, a number of participants provided suggestions that RMIT might consider for the purpose of managing the major environmental costs. Taken into consideration the suggestions from the participants, and lessons learned from the two service-based EMA case studies introduced in Chapter Three, the study advanced two suggestions for RMIT. The suggestions, if implemented, can be extended to put in place an EMA system for the University.

### **7.3.2 SUGGESTIONS FOR EMA ADOPTION**

Suggestions for implementing some form of EMA include restructuring the accounting system, and allocating the major environmental costs to responsibility centres. They are discussed in turn.

#### **7.3.2.1 RESTRUCTURING THE ACCOUNTING SYSTEM**

One of the key opportunities to link physical and monetary information relates to some changes to the accounting system of RMIT University. For example, an additional field of a non-financial nature could be introduced into the system. The purpose is to record the quantitative information in relation to the purchase of goods (e.g. electricity, water and paper) and services (e.g. waste disposal). This physical information can be used to supplement

financial information in dollar amounts. It is particularly useful where costs for goods or services purchased do not directly correlate with quantities used, or are different between buildings. At RMIT, the General Manager noticed a significant difference in the electricity consumption between buildings:

The energy audit that we did last year with the chemical engineering students from Bundoora on Building 223, which is that big line of aged buildings, that uses in excess of \$1,000 electricity per day, a lot of money. I mean your Building 108 uses about the same amount of power and is one that runs about 5,000 students. This runs a couple of hundred students (General Manager, Facilities Services/RMIT University).

The inclusion of an additional field for providing physical information would enable RMIT to monitor the resource consumption between buildings, and identify potential cost saving opportunities. Electricity and paper would be recommended as priorities for the trial to be recorded by both costs and usages. Electricity represents RMIT's highest environmental cost, and it is currently separately identified (as shown in Figure 7.1). Paper is recommended because universities are usually big paper consumers. As RMIT has one preferred supplier, it is highly possible that a separate ordering and billing system can be set up by negotiation with this supplier. Given the purchasing power of RMIT, the supplier would also be willing to break down invoices into a format requested by RMIT. Although paper is accumulated in 'consumable materials' account at present, it would not be difficult to separately identify the purchase cost and quantities, with the assistance from the preferred paper supplier.

Waste cost is also an area requiring attention, and it is suitable for the trial. RMIT is now conducting waste audits on major buildings. However, a management mechanism would be needed to ensure the data collected is used effectively. As the Pro Vice-Chancellor Business stressed:

... What's actually more important is what then you do with that information, which you actually use for management purpose, which I think is an issue for RMIT (Pro Vice-Chancellor Business/RMIT University).

The inclusion of physical information in the accounting system would help to ensure data (quantities and/or volumes of waste generated) collected through waste audits is taken into account. It could also be a starting point for benchmarking and performance improvement. An immediate benefit to RMIT in general, and Property Services in particular, is the information would be used as inputs for environmental reporting, such as TEFMA report (if this physical information could be automatically generated by the accounting system).

It is clear that the introduction of an additional field for providing physical information delivers benefits for environmental management and environmental reporting. This could also be used to support an extension to adopt EMA, which focuses on both physical and monetary environmental cost information. When asked how much it would cost to have an additional

field in the accounting system, the Associate Director of Business Advisory, Financial Services replied:

It would be possible to augment the accounting system to have a notional general ledger, so non-values [or physical information]. I've got my invoice from AGL. I would input kilo-watt/hours used and the value, so then I could report upon that. If it would be a system change, it wouldn't be a huge system change (Associate Director, Business Advisory/RMIT University).

### **7.3.2.2 ALLOCATING THE MAJOR ENVIRONMENTAL COSTS TO RESPONSIBILITY CENTRES**

The 'facility expenses' is the overhead for the collective facilities services (including electricity, water and waste disposal) provided by Property Services. It is allocated to academic schools as a single occupancy charge on the basis of floor space occupied<sup>95</sup>. According to the senior accountant interviewed, the purpose of the allocation is to encourage academic schools to share spaces where rooms would otherwise be empty. This might ultimately help improve the efficient use of rooms and save costs on building new facilities to house students and staff. However, if there is a reduction in electricity usage by a particular school, there will be no corresponding reduction in costs allocated to that school because of the allocation basis. This would discourage schools from actively managing their electricity cost.

RMIT seems to be aware of the limitations associated with allocating facility expenses on the basis of floor space occupied. A few years ago, activity based costing (ABC) was introduced as part of the solution at RMIT. However, due to the increasing complexity of the tasks and resource constraints, ABC has not been implemented for the purpose of cost allocation. Consequently, a change to the accounting system to charge schools on a basis that more closely reflects their actual usages is, at this point, deemed to be administratively burdensome and therefore not financially feasible. It was indicated:

Not to say we couldn't get into environmental [costs], because there is something the University, the community, the participants would like to see to make money. We're here to survive financially. But if we could be capturing that and aiming to do better, then yes, we could use ABC for that. We're just not there yet. It's just not a priority right now, which it doesn't mean we're neglecting it or we are not interested in that cost (Associate Director, Budget & Financial Performance Measurement/RMIT University).

It should be noted that the application of ABC for allocating costs could be done on a smaller scale rather than on a whole university basis at the beginning stage. Alternatively, environmental audits already undertaken by Property Services (e.g. energy and waste audits) could be used to identify a target building, or school, for the trial of cost allocation. The audits could also provide RMIT with the data to be able to allocate energy, or waste, by the cost drivers that better reflect actual usages by the occupants. By applying ABC to allocate

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<sup>95</sup> Likewise, the AMP case, introduced in Chapter Three, allocated costs for electricity, water and waste to responsibility centres as a single office service charge on the basis of office space occupied.

environmental costs at a building level, or on a school basis, RMIT could reduce the complexity of ABC and minimise the resource constraints. Results of the smaller-scale trial could then justify whether a larger scale of trial would be financially feasible<sup>96</sup> (in terms of cost savings).

Another option could be to investigate if the major environmental costs could be highlighted as separate items when they were allocated to schools. This could also be done at a building level, or on a school basis. The option would enable schools (or building occupants) to see their environmental costs and potential cost savings. Bringing the environmental costs to the attention of managers would encourage changes in behaviour to reduce environmental costs. Their actions would then influence the overall environmental and financial performance.

RMIT could also set reasonable environmental targets, compare environmental performance of different buildings or schools, and identify if and where opportunities to reduce environmental costs may exist. Environmental costs would then be more efficiently managed. The point was supported by the following comments from RMIT participants:

Well I think if we set reasonable targets for all of us to meet and we measure it on a regular basis as part of our monthly management reports, then usually what gets measured, gets managed (Vice-President Resources/RMIT University).

Personally I mean however you go about it, if you build it in as a key performance indicator, then you're going to get action (Member of the Vice-Chancellor's executive team/RMIT University).

But I think you could really increase the performance, the sustainability dimension, by actually putting it in financial categories, which means we got the information and we got the benefit from doing it. It's not that hard (Pro Vice-Chancellor Business/RMIT University).

### **7.3.2.3 A SUMMARY OF THE SUGGESTIONS FOR EMA ADOPTION**

As part of addressing the first research objective, two suggestions have been advanced and explained for RMIT to adopt some form of EMA. Given the University's apparent environmental responsiveness, the suggestions could be implemented with little cost. However, the interviews held with RMIT participants revealed that chances to implement the suggestions are low at present. Cost is not necessarily the only consideration. There could be some other factors that would impede the implementation. The next section will address the second research objective of this study and provide further discussion on factors potentially impeding EMA adoption within RMIT University.

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<sup>96</sup> A waste audit at one of AMP's main Sydney offices revealed many cost saving opportunities, which if implemented, could directly impact on the financial bottom line (see the AMP case in Deegan 2003).

## 7.4 RESULTS AND DISCUSSION FOR THE SECOND RESEARCH OBJECTIVE

The second research objective of this study is to identify factors influencing EMA adoption. As mentioned, there are five key barriers that emerged from the final coded data. They are *attitudinal, financial, informational, institutional, and management* barriers. Each barrier comprises some potential factors that are either based on theories (theoretical categories) or reflect participants' own concepts (substantive categories). The following discussion will highlight various factors of the five key barriers being identified to be influential on EMA adoption by the eleven participants across four different management roles at RMIT University.

### 7.4.1 ATTITUDINAL BARRIERS

Two coding categories<sup>97</sup> were grouped under the attitudinal barriers, which include a *low priority of accounting for environmental costs* and *resistance to change*. The following table shows the number of participants<sup>98</sup> who made references to each factor and the frequency of references. As shown, a *low priority of accounting for environmental costs* appears to be a strong<sup>99</sup> factor in explaining a lack of EMA adoption in terms of the number of participants making references (ten out of the eleven participants).

**TABLE 7.2 FACTORS IN RELATION TO THE ATTITUDINAL BARRIERS**

Attitudinal Barriers	Number of Participants*	Frequency of References
<i>Low priority of accounting for environmental costs</i>	10	30
<i>Resistance to change</i>	8	17

\* On the basis of eleven participants

#### 7.4.1.1 LOW PRIORITY OF ACCOUNTING FOR ENVIRONMENTAL COSTS<sup>100</sup>

The factor is considered a strong barrier to EMA adoption. Ten RMIT participants made a total of thirty references that reflect a low priority of accounting for environmental costs within the University. The financial manager in charge of the financial administration information system, which is SAP for the University, made the following comment:

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<sup>97</sup> As mentioned in Chapter Six, the codes that show the same theme were grouped together to simplify the coding structure. Two coding categories emerged during the coding process and were grouped under the attitudinal barriers at the end of the process. Each category represents a factor that potentially influences EMA adoption.

<sup>98</sup> Totally, there are eleven RMIT participants in this study.

<sup>99</sup> Whether a factor is a strong barrier to EMA adoption is determined mainly by considering the number of participants speaking about that factor. If there are at least nine participants speaking about a particular factor, that factor will be considered as a strong factor to explain EMA adoption.

<sup>100</sup> This category contains the opinions, views and concepts of participants on accounting for environmental costs within universities.

But no one has ever come to me and said, 'tell me the environmental cost of what we do'. So the whole chart of accounts is not set up to record anything that way. We account for projects but unless I knew of a project in Property Services or in a Portfolio, I wouldn't go and pick it out and say, 'here's our environmental cost'. So it's one thing that we've never been requested, even though it's not a new concept. We've never been requested to provide specific information about it. So from what I see, not that I see everything, it maintains a low profile (Associate Director, Budget & Financial Performance Management/RMIT University).

Accounting for environmental costs seems to attract little attention. Although RMIT has apparent environmental responsiveness in reducing environmental impacts (as evidenced by the various environmental initiatives and programs undertaken), the University does not lead the way in this area. Professor Gardner, the Vice-Chancellor and President, explained:

It's not that I wouldn't go to that more detailed look at indirect costs, but of the many things I have to worry about of indirect costs, this is not the first priority in terms of looking at the indirect costs of schools. If you ask me in terms of the efficiency of our infrastructure, where I think we need to be investing, then yes, this is a priority, and we have to invest in it. And by doing that, if we get it right, we lower the overall energy cost, and we do have targets on that. That's our first priority, because that is based on a judgement that our biggest problem is that at this stage (Vice-Chancellor and President/RMIT University).

The Vice-Chancellor and President also expressed the concern that academic schools do not have much control over some environmental costs, such as energy and water. It seems more important to improve overall efficiency in terms of resources consumption than individuals being held responsible for the environmental costs incurred. The following quote highlighted the Vice-Chancellor's concern:

It's certainly important that we manage that overall.... Well, our first priority in management is all I'm concerned about, so once you get the basic systems under control, then you go, and you have your next look, and you say, 'okay, now what can we do?' That will take us to the next stage. But until you've got what I call an efficient base, there's no point, well, there is a point around paper, things that you can get direct control over. But I'm talking here about the big ones, like energy and water, all the major improvements are not necessarily in the control of the individuals.... So do I want my schools worrying about their overall energy costs, when in fact, a lot of what will affect those is our infrastructure? So if it's not in their control, why shouldn't I be concentrating on the work that reduces the overall costs around energy or water and the likes by improving our infrastructure, which is the priority, and where we're spending a lot of money on, or should I be attempting to send a signal to someone who's actually got very little control over it. And even if everybody did turn off the lights, it would make almost no difference. I think it's important that I send appropriate signals. You only want to send big signals on things where people's behaviour would make a major difference (Vice-Chancellor and President/RMIT University).

The Associate Director of Business Advisory from Financial Services approached the issue from the education role of universities:

They're [environmental issues] aspirational issues.... Our primary focus must be the delivery of high quality of education and research, because that's what we are as a university – we're a centre for those two products (Associate Director, Business Advisory/RMIT University).

It seems that accounting for environmental costs attracts little interest because the University tends to focus more on education itself, rather than internal practices. There is little doubt about the focus of universities being on education and research, but a neglected fact is that universities are 'producing' graduates. From a business point of view, universities should put

out as many quality graduates as possible at the least operating cost, of which environmental costs are part.

It is also true that technical solutions make significant differences in resources efficiency, and the decision to bring in technical solutions is not in the control of academic schools. However, the saying, 'what gets measured gets managed', seems to be ignored. RMIT includes the major environmental costs in overhead accounts, and the responsibility to manage the costs is mainly on the division in charge of facilities management. The General Manager of Facilities Services said:

It's asked recently that, 'should the Health and Safety be their responsibilities?' But I think environmental responsibility... they may believe that they're working at it. But I can tell you that they haven't phoned me up and asked me for what their electricity bill was... if they knew what that was, then they'd get a pretty good idea what it costs the University to make that facility available to them.... They presently don't do that sort of analysis (General Manager, Facilities Services/RMIT University).

Academic schools are not expected to worry about environmental costs as indicated by the Vice-Chancellor. Further, they are not assessed on environmental performance. It is natural and reasonable that they do not seem to be interested in environmental costs. The following quotes provide explanations from the perspective of academic schools and portfolios in the issue of accounting for and managing environmental costs:

I mean clearly they've got a bottom line effect, and things like energy costs can run out of control... but to be honest with you, I don't see that's a particularly high profile at this time, either within the University or external to the University. It's not something that everybody is watching, to be honest with you (Pro Vice-Chancellor Business/RMIT University).

Nothing comes down from the top to say, 'be careful to watch what you spend on electricity'. The University has come to a difficult financial period over the last couple of years.... During the time of the difficult financial situation, we all tightened our belts, some more than others.... But we didn't tighten them to that extent.... We looked at overseas conferences, staff attending overseas conferences. Why would someone want to go twice a year to the other side of the world? That's a big cost. We looked at all sorts of other things and carefully contained notes, but not the gas and electricity or whatever charge. Interesting, isn't it? ... There certainly hasn't been any signal coming out of Building One.... if we were really stretched, that might encourage them to do that. But then we've been stretched over the last few years, I don't see them having done that. Maybe they just shrug their shoulders and say, 'well, they're just overheads, we'll just have to incur them and that's it' (Head of School/RMIT University).

The senior management does not regard accounting for environmental costs as necessary because of the perception that individuals do not have much control over the costs. Financial managers tend to be constrained to thinking from the education role of universities, and within the framework of existing accounts. Accounting for environmental costs is certainly not a priority. The General Manager of Facilities Services is held responsible and accountable for the environmental costs incurred by the whole university, but the best he could do is to expect behaviour changes in reducing environmental costs. Cultural changes would take away from him some of the pressure to control environmental costs.

The following comments further supported the tentative conclusion of a low priority of accounting for environmental costs as a factor that impedes EMA adoption:

Because you can produce all the reports you like, but if no one opens it, then it won't have any impact (Vice-President Resources/RMIT University).

Barriers are just the people that do it, and whether the information is used or whether people want this information. It's a good thing, but people will lose interest in that.... It could be useful. One day we probably will do that, but we're just not at that place right now (Associate Director, Budget & Financial Performance Measurement/RMIT University).

#### **7.4.1.2 RESISTANCE TO CHANGE<sup>101</sup>**

When asked whether environmental costs should be separately identified and allocated to responsibility centres, Professor Kirk, the Pro Vice-Chancellor Students, replied:

Until we know that allocating it [environmental cost] to the whole of the University is not working, then why invent a whole raft of systems that we may not need? That's my point. I'm not saying, 'don't do it', but let's first demonstrate that what we are doing doesn't work. There is a saying, 'if it isn't broken, don't fix it'. So I guess that's my point (Pro Vice-Chancellor Students/RMIT University).

As mentioned, it is a common practice for service organisations to accumulate environmental costs, such as electricity and water, in an overhead account. It is a general practice, but it fails to bring the costs to the attention of managers who incur the costs. As such, managers have few incentives to manage the costs. However, since it is a common practice, few people would question it, and little attention would be paid to change the current practice. Hence, it is an issue for EMA adoption. For a large organisation like RMIT, a thought like that is common as indicated by the Vice-President of Resources:

So I think that's the main issue. But that's not unusual in any large organisation, because the centre always streams off new things for the business to do and the business says, 'enough is enough' (Vice-President Resources/RMIT University).

The resistance to change impedes the University from allocating environmental responsibilities to academic schools, or other administrative divisions. This reduces the chance to manage environmental costs as they are considered as costs that would be incurred anyway. For example:

But things like gas and electricity and whatever, they're just standard things. And now you're making me feel guilty, but they're standard things and you'd have to incur the cost regardless (Head of School/RMIT University).

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<sup>101</sup> This barrier comprises the views or perceptions of participants about the attitudes of their colleagues towards accounting changes in managing environmental costs.

The role of internal practices for universities is also neglected (i.e. they are not practicing what they preach). Consider the following two comments:

If the cost to produce a graduate could be established, they could see how profitable it is to provide more graduates. To take a business point of view, we're making cars or bottle tops or things like that, you are trying to put out as many quality units as possible at the least operating cost. Universities do not look at their business that way (General Manager, Facilities Services/RMIT University).

That's because we're not producing widgets (Pro Vice-Chancellor Students/RMIT University).

Traditionally, universities are assessed mainly on education quality and research output. There are no bonus or reward systems for improvements in internal practices. As indicated by the Executive Director of Property Services:

There isn't really a system apart from just really reporting on budget performance and acceptance whether that's good or bad. It's not really a bonus system, so there is no financial reward type system that can be linked. So it's mainly for tracing whether you perform within your budget, responsibly or not. So to that extent, yes, people could be held accountable, but there is no other system apart from that (Executive Director, Property Services/RMIT University).

On the contrary, the Head of School interviewed personally agreed and would be happy to be assessed against any environmental performance indicator in place, if there was any. However, the head also warned, 'you have to be so careful about what you settle for as performance indicators, because that can cause dysfunctional behaviour' (Head of School/RMIT University). For universities, taken from a traditional viewpoint, teaching and research is the first priority. Things that could impact the outcome of teaching and research have to be dealt with carefully, for example the allocation of environmental costs and environmental performance measurement. Professor Gardner, the Vice-Chancellor and President, expressed her concern about implementing EMA practices:

I am actually trying to encourage them [to do research]. So what if I send them a signal that says all the researching schools should stop, people should do less, be at work less.... That's not a good signal.... So it seems to me that my first priority is what I call the gross efficiency, and that's what I've been focusing on, and we still have a lot left to do there. The second thing is where we can institute system changes that will reduce overall costs for everyone, that's our first priority, that's our first activity. And I am less in favour of turning off the fountains than I am in putting in infrastructure that will provide better overall use of water, because, as between those two things, I think the infrastructure that provides the overall use of water is better, might be more expensive, but is more important than turning off the fountains. So it's that judgment that I'm having to make. Similarly, to look at the indirect costs, first we have to get a fine enough grain, but second, we have to ask a question, 'what signals are we trying to send?' Should the benchmark be used for a science school, of energy? You don't know whether you should be trying to get them to reduce it, or they might be trying to reduce it already, so, data, in and of itself, doesn't mean anything, unless you actually know what constitutes efficient use (Vice-Chancellor and President/RMIT University).

The concern about EMA might result in unfavourable responses, or reactions, by academic staff would directly impact the decision to adopt, or not to adopt, EMA. However, three participants indicated that they agree EMA would be helpful in bringing environmental costs to the attention of individuals, but they also doubted how far EMA could help in changing behaviour, for example:

Measuring it [environmental cost] certainly would help, because doing that comparison exercise would make people stand up and take notice. But at the end of the day, it's either that cultural change agents go out and start lecturing people, or we put money in the capital and bring in technological solutions... (General Manager, Facilities Management/RMIT University).

We expect to spend the resources to get the best results. So I think for the University it's better for us to look at the overall cost of the electricity and then look at ways to reduce it and do the culture change programming (Executive Director, Property Services/RMIT University).

But what's more important: the information or the change in behaviour? And it seems to me that it's the change in the behaviour, the ways of thinking, those sorts of thing. That's the primary objective, and gathering the information is just one way of doing that.... I don't think that EMA is an end in itself, so I think we need to be very mindful of that. But we do need something like that to tell us how close we are getting towards a more sustainable work practice and a more sustainable work environment...(Pro Vice-Chancellor Students/RMIT University).

The resistance to make changes from common practices traditionally used within universities has impacts in shaping accounting practices. Further, due to the concern about unfavourable reactions induced by EMA implementation and the doubt about the influence of EMA on behaviour changes, RMIT would also hesitate to make accounting changes. In either case, EMA is less likely to be adopted.

#### **7.4.1.3 A SUMMARY OF THE ATTITUDINAL BARRIERS**

The attitudinal barriers represented comments from participants reflecting a *low priority of accounting for environmental costs*, and expressing concerns about people's *resistance to change*. There was also concern that unfavourable outcomes might flow from the implementation of EMA. In terms of the number of participants making references, a *low priority of accounting for environmental costs* appears to be a strong factor that provides explanations about a lack of EMA adoption within the University. This will be revisited in the later section that presents an overall summary of the strong factors impeding EMA adoption. The next section will introduce the financial barriers.

## 7.4.2 FINANCIAL BARRIERS

The financial barriers consist of two factors: *efficiency or financial considerations* and *resource constraints*. The participants were concerned about whether benefits of EMA implementation would be significant enough to cover the cost, or whether they would have extra financial and human resources to put in place mechanisms to implement EMA. The following table shows the number of participants who commented on the two factors and the frequency of references.

**TABLE 7.3 FACTORS IN RELATION TO THE FINANCIAL BARRIERS**

Financial Barriers	Number of Participants*	Frequency of References
<i>Efficiency or financial considerations</i>	6	14
<i>Resource constraints</i>	7	13

\* On the basis of eleven participants

### 7.4.2.1 EFFICIENCY OR FINANCIAL CONSIDERATIONS<sup>102</sup>

EMA is a tool to manage environmental costs and help improve environmental performance. Whether the tool would be adopted might depend on whether the benefits outweigh costs associated with EMA adoption. A manager at Financial Services indicated that a challenge for EMA adoption is to justify the cost in relation to the adoption:

Whilst we don't do that, I think that is a good idea. To do that, there is obviously a cost associated with it: obtaining information and reporting information. That would have to be weighted up in terms of the cost versus benefit (Associate Director, Business Advisory/RMIT University).

It seems that only when a business case could be demonstrated would EMA be adopted. There is much evidence that a business case currently exists as there is clear evidence in the literature that accounting for environmental costs can ultimately lead to real cost savings (and related benefits for the environment). It also appears that senior management in the University has been exposed to such literature. The Pro Vice-Chancellor Business specified:

You know technologies are there now. It's not a big cost to get the data. If you start monitoring, making some savings, you should probably pay it off fairly quickly (Pro Vice-Chancellor Business/RMIT University).

Another Pro Vice-Chancellor also indicated:

That would actually have the effect of pushing our indirect costs up, so that would be a kind of financial disincentive for us to get involved in it because it would make things more expensive, but then that may be offset by some of the savings that we make as it makes things more apparent, we can maybe reduce our energy consumption, paper usage and all of that (Member of Vice-Chancellor's executive team/RMIT University).

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<sup>102</sup> This is one of the prerequisite codes, which is a theoretical category developed from the contingency theoretical perspective. It refers mainly to the comments about cost and benefit aspects of EMA adoption and implementation.

The Vice-President of Resources concurred:

Well some of them will not improve short-term financial performance because it will cost us to capture more information. There's no doubt in the short, very short term, it will have a negative impact, but in the longer run, it will have a positive impact because our reputation will be enhanced, [and] we will attract more people who want to be attracted to an organisation that is more environmentally conscious. And over time if we can manage our energy usage, for example, we will be better off financially as well. So I've no doubt in the longer run, it will have a beneficial outcome, but in the shorter run, I'm sure it will cost us more, because you have to capture more information to educate people to manage that better (Vice-President Resources/RMIT University).

In spite of the future benefits (both financial and environmental) that EMA can deliver, EMA still cannot appear to pass the financial cost hurdle. Senior management recognised that EMA has the potential to generate cost savings but admitted that cost and benefit considerations would have impacts on EMA adoption. It should also be noted that there were different opinions from participants on whether EMA could ultimately result in benefits. This might be part of the reasons why EMA could not pass the financial cost hurdle. For example, the Executive Director of Property Services expressed his opinion on EMA adoption:

From our financial management point of view, that's just like internally allocating them the expenditure without a lot of return. It's certainly true if the key factors are transparent to the people, then some are going to affect their behaviour.... We can allocate a reasonable approximation of cost, but we can't do it to allocate actual cost, because not every building is metered, and not one occupant per building.... You spend a lot on metering the buildings rather than spending money on the infrastructure within the buildings, which we know will reduce the consumption. It comes down to the question – we expect to spend the resources to get the best results (Executive Director, Property Services/RMIT University).

Convincing people that EMA really leads to benefits seems to be required to clear the perceived cost versus benefit barrier. As EMA is a flexible tool that can be applied to different scales or scopes, one way to demonstrate the benefits is to undertake smaller-scaled EMA projects involving only one environmental cost in a single building or individual school. Certainly, a small-scaled project would only result in small cost savings. However, it is a good starting point to demonstrate what EMA can achieve.

#### **7.4.2.2 RESOURCE CONSTRAINTS<sup>103</sup>**

The second factor of the financial barriers is *resource constraints*. Six out of the seven participants identifying the constraints stressed that the University's infrastructure should be taken into account when making environment-related decisions. RMIT has 140 buildings, of which most are old, and some are under historic preservation orders. Thus, most of the effort undertaken to improve environmental performance is centred on upgrading the infrastructure. As the Vice-Chancellor and President said:

... I would say, looking at our activities, that our first set of priorities is improving our infrastructure, because we've got a lot of old buildings, so our first priority is, 'can we get the basics to a level that makes

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<sup>103</sup> The constraints include the human and financial resources that would be required to support the extra work as a result of EMA adoption and implementation.

them quite efficient?' That would probably produce the biggest impact overall (Vice-Chancellor and President/RMIT University).

The Vice-President of Resources also indicated:

Remember a lot of our buildings are very old, like this one, very difficult to implement a full green environmentally conscious system in a building, such as this one. There are some things you can do, but there are some things out of our control (Vice-President Resources/RMIT University).

There is a lot more RMIT can do, but with most of the resources being used to improve the infrastructure, there seems to be no more resources allocated to implement EMA. Several participants made it apparent that resource constraints would be a significant barrier. Typical responses consisted of:

Again people, because we haven't had people concentrating on the environmental area for a while. We haven't got an energy manager (will be happening shortly), and then if we get an environmental coordinator, that will solve the problem (Executive Director, Property Services/RMIT University).

If I had someone to do it, I would do it (General Manager, Facilities Services/RMIT University).

There're also the time, resources and staff – if the staff has the capacity to be able to implement that as part of their work plan. That would be something we need to look at (Senior Accountant, Property Services/RMIT University).

More specifically, a Pro Vice-Chancellor stressed that financial sustainability could be the only barrier:

It's important to consider where RMIT is. You have to have the capacity to be able to do it, and up 'til now, we haven't. So I think when you look at it in that historical context, I think provided we retain financial viability into the future, you'll see more action out of RMIT.... That's the major impediment. It's about financial sustainability. But if we cross that hurdle, then there would be no other major impediment other than the other extra accounting charges and all of that, there's no political impediment, the only impediment is really I think financial (Member of the Vice-Chancellor's executive team/RMIT University).

By inference, the above comments would suggest that *resource constraints* could potentially impede EMA adoption.

#### **7.4.2.3 A SUMMARY OF THE FINANCIAL BARRIERS**

The financial barriers highlighted the influence of *efficiency or financial considerations* on the decision to adopt, or not to adopt, EMA, and stressed *resource constraints* as part of the reasons for a lack of EMA implementation. The next section will discuss the informational barriers.

### 7.4.3 INFORMATIONAL BARRIERS

The informational barriers were derived mainly from the contingency relationship between physical environmental uncertainty and information processing. Therefore, physical environmental uncertainty and difficulties in information processing are the focus of the discussion. A *low physical environmental uncertainty* and *difficulties in collecting or allocating environmental costs* were identified as factors that could impact EMA adoption. A summary of the number of participants and frequency of references in relation to the two factors is shown in Table 7.4. As shown, the factor of *difficulties in collecting or allocating environmental costs* appears to be a strong factor that explains a lack of EMA implementation within the University.

**TABLE 7.4 FACTORS IN RELATION TO THE INFORMATIONAL BARRIERS**

<b>Informational Barriers</b>	<b>Number of Participants*</b>	<b>Frequency of References</b>
<i>Difficulties in collecting or allocating environmental costs</i>	11	23
<i>Low physical environmental uncertainty</i>	6	11

\* On the basis of eleven participants

#### 7.4.3.1 DIFFICULTIES IN COLLECTING OR ALLOCATING ENVIRONMENTAL COSTS

All of the eleven RMIT participants mentioned some form of difficulties in collecting or allocating environmental cost information. Two participants with the role of environmental management indicated that the absence of a comprehensive metering system at RMIT makes it challenging to collect and provide better information. The Executive Director of Property Services pointed out:

To the extent we could have some valid information in place, then yes. But there is no point giving them KPIs against something we can't measure.... So that really depends on whether or not we get a system in place that can provide the information (Executive Director, Property Services/RMIT University).

The General Manager of Facilities Services indicated that problems associated with the absence of a metering system might be common to a majority of universities:

Different activities require a different level of service. To make it work properly, I would think you would need to know exactly how much it costs for each person, like you would in a commercial area. Well, each tenancy has its own power meter. As an occupier, you would know how much it costs you to occupy that business. Here, we don't have that metering, so it's very difficult to run an argument to the heads of the portfolios that they should hand over a heap of space because it's costing this much where you really can't justify it. I think it's probably unique to all the universities – big space that's grown over the years, with that intensive management infrastructure, you just haven't got total control over them (General Manager, Facilities Services/RMIT University).

Environmental managers focused on the technical aspect of difficulties in collecting information, whereas financial managers approached the issue from a different perspective. Three participants, with the role of management accounting, recognised the importance of

providing better environmental cost information, but they had different opinions on why the University did not provide such information. Their responses included:

I am not sure whether the other ones have done that before.... I'm sure everyone wants to do better at it anyway. So absolutely, if we have the data, we should absolutely provide it, definitely. I think we should provide that information as long as people can do something with it to change behaviour and understand the costs (Associate Director, Budget & Financial Performance Management/RMIT University).

We have to do something on that particular area until we are able to give specific information on building levels. Business probably is the only one where you can say ok at the moment. The Building 108 is pretty much for the business portfolio, but in the rest of the buildings, it's a mixture of a number of different schools and portfolios. So it wouldn't be very easy (Senior Accountant, Property Services/RMIT University).

The major problem is having a robust data set at the start, agreeing on a methodology (I'll use a technical solution to deliver it), and then providing accurate reporting. So, the accurate reporting is pretty easy. The technical solution is: can the ledger break it down to that level of detail, and then do we have a methodology to take the inputs – the bills from the supplier, and then allocate it to the ledger that is meaningful and useful to the end user? So, again, it comes back to a cost benefit analysis. So all that work, is that going to deliver a benefit to the organisation? And that's the challenge (Associate Director, Business Advisory/RMIT University).

It seems that managers involved in a management accounting function focused on problems relating to environmental cost allocation. The Associate Director of Budget & Financial Performance Measurement was concerned with whether the allocation practice is common to other universities. The Senior Accountant mentioned the difficulties in proposing an appropriate allocation basis. The Associate Director of Business Advisory also saw the problem associated with the allocation basis, but questioned whether the allocation process would deliver benefits to the University.

Senior managers also expressed their opinions on the issue of environmental cost information processing. Some recognised the problems with the lack of environmental cost information, for example:

No, because there is no data by which to hold them accountable anyway. I don't know how well they're doing. I don't even know how well this building's rated against the other buildings. I have no idea (Pro Vice-Chancellor Business/RMIT University).

Every single person should be responsible for their behaviour and the impact of what they do on the environment. As a manager, I can say, 'right, we're going to reduce our electricity costs and our use of electricity by 20%'. Where does the figure of 20% come from? I don't know. I just made it up. So, if we're going to go down that path, we need information so that our actions are achievable (Pro Vice-Chancellor Students/RMIT University).

I have no doubt that we should be measuring not only the cost of the environmental resources we use, but the impact we have on the community and the environment. If we cause something to occur which has a community cost, we ought to at least measure it if we can. So I have no doubt about that. But whether that's possible is a big question in my mind (Vice-President Resources/RMIT University).

Some senior managers expressed their concerns about whether academic schools or portfolios have any control over environmental costs incurred. This also implied a concern about whether the allocation of environmental costs would be fair to schools or portfolios. For

example:

Oh, yeah, but there is a proviso on that, two provisos, one, they have the information, but also they do have some means of managing it... For example, if I was accountable, but Chris White was responsible for all the plumbing around here and so on, what can I do about it? So in a sense, managers need information but they need at least some ability to manage it. So for example, if I was responsible for electricity in here, and then I find that then what happened in the evening after I've gone home at 8:00, there is an army of cleaners coming in here, the first step is to put every light on, on every floor, I mean that's what happened in the city block, all lights on, at 2am they go out, if you're lucky, they will remember to turn all the lights off, I think, hang on, that's probably using a huge of electricity... I don't want them to come in. I only want them to light the floor where they are working at. That's an example that I was held accountable, but the cleaners rush into making the decision (Pro Vice-Chancellor Business/RMIT University).

The Vice-Chancellor and President gave an example to explain the concern:

I'll give you a good example. On one of our campuses, we have a school, it's a campus that is not particularly used, this is Brunswick, it's not a crowded, not an overcrowded campus. That school gets allocated to it the costs of all those buildings that it's associated with. But it's not that that school really wants to use all those buildings, it's just that it's the only school occupying that space. So you get a certain amount of artificiality with some of these things, because there's a question to which, how much of it's in the school's control (Vice-Chancellor and President/RMIT University).

By inference, the above quotes would suggest that managers feel little control over environmental costs incurred. Due to this limited controllability, a cost allocation mechanism that shows clear cause and effect relationship is required for the University to consider allocating environmental costs. As indicated by the Vice-President of Resources:

In their minds, they'll feel no control, so we need to design measures that they can control (Vice-President Resources/RMIT University).

A technical solution is to separately meter buildings, which was mentioned by the two environmental managers. Cases have been made that investments in metering and monitoring systems are cost-effective and can have very short payback periods for higher education institutes (see HEEPI 2005). However, it seems that senior management was not convinced. The Vice-Chancellor and President said:

Well, the truth is, I don't know that it would be fair to allocate the costs... the school itself, in fact, probably would not be able to do anything, unless you metered each floor, and the question is, 'is that the first thing you'd do to drive down the cost of the building?' (Vice-Chancellor and President/RMIT University).

To reduce environmental costs, metering certainly is not the first thing to do, if there are no robust management mechanisms in place to ensure that information collected is used effectively. However, it is a starting point for benchmarking and better understanding of activities and infrastructure that drive environmental costs. EMA implementation requires environmental cost information. Without the technical support, collecting the required information could be a barrier to EMA adoption.

It is also interesting to note that the importance of better environmental cost information was recognised, and the problem for not being able to provide better information was identified. However, the priority to implement technical solutions for the provision of required information was rated low. The reason could be tied back to the contingency relationship between physical environmental uncertainty and environmental cost information processing. The discussion on physical environmental uncertainty follows.

#### **7.4.3.2 LOW PHYSICAL ENVIRONMENTAL UNCERTAINTY<sup>104</sup>**

The provision of environmental cost information is an important function of EMA. If the perspective of information processing is taken, perceived physical environmental uncertainty could be interpreted as the result of decision makers experiencing a lack of environmental cost information. As the physical environment becomes a source of environmental uncertainty, decision makers would tend to process more relevant environmental cost information to reduce the uncertainties. Therefore, the level of perceived environmental uncertainty could directly impact the decision of managers to collect or allocate environmental costs.

Experiences and comments from RMIT participants suggested a low level of perceived physical environmental uncertainty. Although some environmental regulations are now in places and would eventually have impacts on universities, these are all voluntary and not specific for universities. When asked about whether there are any compulsory environment or building related regulations imposed on universities, the Executive Director of Property Services replied:

Not specifically for universities. Certainly, there has been change with the Victorian Government building regulation, which is supporting four and half star, I think, and the Victorian Australian greenhouse gas standard on new buildings. Some of the benchmarks have been considered in the regulations. I am also the director of TEFMA. We have been working with the Australian Green Building Council to develop a green star tool for educational buildings. That will be piloted and then become available next year.... For this project, it's funded by the Department of Education in South Australia and Queensland. Victoria has recently come on board. They put some money in, but the major money is from South Australia and Queensland. I am not sure how much they are now putting into that, but they were a lagger (Executive Director, Property Services/RMIT University).

In considering environmental resources used and possible future regulations on the use, the General Manager of Facilities Services said:

The universities are tied to certain degree with the Government, but again in this particular corner of Australia, where there's cheap brown coal, I don't know if it'll be around – the imperative is going to come out over ten years (General Manager, Facilities Services/RMIT University).

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<sup>104</sup> To measure the perceived physical environmental uncertainty, the study considered government environmental policies in relation to universities, environmental resources and services typically used by universities, environmental technologies and solutions, the concerns of environmental stakeholders over universities, and how major environmental issues are affecting universities. The dimensions considered in this study were tailored from the scheme proposed by Lewis and Harvey (2001, pp. 227-8) to measure physical environmental uncertainty.

The fact that Australia has abundant natural resources (e.g. brown coal) significantly reduces uncertainties associated with the supply of resources and regulations on the use. This in turn reduces the level of perceived physical environmental uncertainty and impacts organisational decisions to control and manage the consumption of natural resources.

In terms of the behaviour of environmental stakeholders, such as the community and regulators, pressures are mounting, but not directly on universities. The following comments by the senior management also suggested a low physical environmental uncertainty:

I think we're accountable to our council and to the community at large. I think various government bodies, state and federal, believe that we should be accountable to them but I'm not sure they know what they want us to be accountable for yet. So I feel more pressure from the community than I do from any other source at this stage, but eventually I think it will become a bigger issue for our council and for our regulators (Vice-President, Resources/RMIT University).

I guess so, but it [pressure on accounting for environmental costs] would be indirect, because government is always interested in wise use of the funds they provide (Pro Vice-Chancellor Students/RMIT University).

Oh, they're important issues to all of humankind, and there's no doubt that the public imagination and the public interest is now skyrocketing, especially in Australia with the matter of drought and all of that. So it's so important. Now the federal government, they won't even sign the Kyoto Agreement, is suddenly all looking all green, aren't they? But there's not any evidence of it yet within RMIT, other than that green office project that's coming around. So I think we're lagging, but I'm sure there'll be more pressure brought to bear on us (Member of the Vice-Chancellor's executive team/RMIT University).

The discussion about environmental policies and regulations, environmental resources used, and concerns of environmental stakeholders appears to suggest a low physical environmental uncertainty perceived by managers within the University. The result is consistent with the University's current accounting practices for managing environmental costs. For example, RMIT has a low level of EMA implementation, and the priority of environmental cost processing is also rated at a low level.

#### **7.4.3.3 A SUMMARY OF THE INFORMATIONAL BARRIERS**

The two factors of the informational barriers were derived from the contingency theoretical framework. The factor, *difficulties in collecting or allocating environmental costs*, appears to be a strong factor in explaining the lack of EMA implementation in the University (this will be revisited in a later section). Although difficulties in information processing exist, solutions to reduce the difficulties are available and could be cost effective. However, the priority to implement the solutions is low, which could be explained by a low perceived physical environmental uncertainty. Therefore, the two factors and their contingency relationship potentially influence EMA adoption within the University.

#### 7.4.4 INSTITUTIONAL BARRIERS

The institutional barriers include a *lack of institutional pressure*, *legitimacy considerations*, and *stakeholder power*. Institutional pressure could be government pressure, mimetic pressure or normative pressure. All the three factors under the institutional barriers are theoretically based. As shown in Table 7.5, a *lack of institutional pressure* appeared to be a strong factor in explaining a lack of EMA adoption. The discussion follows.

**TABLE 7.5 FACTORS IN RELATION TO THE INSTITUTIONAL BARRIERS**

Institutional Barriers	Number of Participants*	Frequency of References
<i>Lack of Institutional pressure</i>	9	19
<i>Stakeholder power</i>	7	11
<i>Legitimacy considerations</i>	4	5

\* On the basis of eleven participants

##### 7.4.4.1 LACK OF INSTITUTIONAL PRESSURE<sup>105</sup>

Nine out of the eleven RMIT participants commented on the absence of institutional pressure on universities to account for their environmental costs. In response to the question of whether there is any external pressure imposed on universities to account for environmental costs, a majority of participants appeared ready to say something about the absence of pressure. The following quotes reflected perceptions by the participants, with four different management roles. The response of a senior manager was:

No, no external pressure to the University. And there is very little discussion on it, but it's [environmental cost] been measured, as I said, at the macro level.... That's interesting. So I may not think it's always a question of hearts and minds. I mean, there are one or two solutions, one is externally imposed by regulations.... That's one reason you do things, because you have to. There are penalties around these consequences if you don't. The other reason is you choose to do things, but why? Mechanisms we do within the University are for societal benefits, because we want to, because we believe it... I don't see that we can register the same sort of imperative in terms of those environmental issues (Pro Vice-Chancellor Business/RMIT University).

The comment of an environmental manager was:

For this particular government, no, I don't think they will [impose the pressure to account for environmental costs]. But I don't think it's far off. As I said earlier, the state Government now requires us to buy 10% green energy (General Manager, Facilities Services/RMIT University).

A financial manager said:

... I think people care about cost, but only to the fact that it influences their personal outcome. So whilst the University is a fictitious beast, it's a bunch of individuals working under one banner. So does the University have it's own personality? Yes, it does. Does the community then recognise that personality,

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<sup>105</sup> The category of institutional pressure includes the three types of pressure developed from the institutional theoretical perspective, and they are government pressure, mimetic pressure, and normative pressure. As the three types of pressure are not always mutual exclusive, and a sharp distinction among them is not necessary, they are combined as the broader institutional pressure for the purpose of this study.

and say yes they should be reducing their costs? I don't think the nexus is linked to the community at this point (Associate Director, Business Advisory/RMIT University).

A head of academic school indicated:

Not major enough. No. Because obviously they influence financial reporting, they've influenced what goes into the University's accounts, but not in management accounting. They haven't. So if there were a standard, an accounting standard on that [environmental cost], then it would obviously influence the University. If government and the accounting body... yes that's right, if there was that sort of accountability (Head of School/RMIT University).

The pressure could be related to the government, the wider community, and professional accounting bodies. The institutions do not seem to exercise any pressure on universities to account for their environmental costs. In terms of what would trigger universities to do so, again the three types of pressure (normative, mimetic, and normative) were all referred to as important in influencing accounting practices. Comments included:

I guess what other universities do. If other universities put more in their reports here and there, if there's some sort of public scrutiny of it, if something gets in the papers ... something like that, then that would put a focus on it... Unless we have an environmental issue here, and that would be around costs, because we are interested in controlling costs anyway.... Unless there's something that went wrong, or public pressure on what we are doing, we'd just continue the way we were doing it, I guess (Associate Director, Budget & Financial Performance Measurement/RMIT University).

Well, we are a very big organisation, we have 56,000 students around the world, we have thousands of staff, we have a very big infrastructure, and so we are a producer of greenhouse gas, we must be. So to the extent that we're part of the problem, it has to be a matter of some importance to us. I think your project, the green office project, pressure is mounting on us to be more active than we have been (Member of the Vice-Chancellor's executive team/RMIT University).

Triple bottom line is being addressed, but it's still a very peripheral issue. I think the major issue in the accounting body at the moment is harmonisation to international accounting standard, which I suppose has taken a lot of attention over the last three years (Associate Director, Business Advisory/RMIT University).

However, coercive pressure was still regarded as the most important pressure in driving accounting changes. Seven of the RMIT participants indicated that coercive pressure, in particular from government, plays an important role in promoting environmental initiatives or reporting practices. For example, the Victorian Government has imposed a requirement for universities to purchase at least 10% green power, and also requested universities to report back about the environmental initiatives being carried out. RMIT has fulfilled the 10% requirement. However, the General Manager of Facilities Services said, 'if there isn't any external pressure, it will be a slow process'. Government pressure has forced the University to discharge some sort of environmental accountability.

Mimetic pressure could also be required for accounting changes. The Associate Director of Budgets & Financial Performance Management predicted that it could become a general practice to report environmental sustainability information in annual reports of universities, because 'if corporations do it, then the University ultimately will' (Associated Director of Budgets & Financial Performance Measurement/RMIT University). If universities would

choose to report environmental information because business organisations report the information, then they might consider adopting EMA because there are an increasing number of corporations having implemented EMA. However, as no external pressure has been imposed on universities for improving internal environmental accountability, EMA is an issue that is still not in the ‘spotlight’. The following quotes highlighted the point:

If there was some component, for example, of our funding that was contingent upon environmental policies and accounting practices, then we’ll do it, but doing it just because Steve and I or Margaret or somebody thinks it’s a great, noble thing to do is not going to get us very far (Member of the Vice-Chancellor’s executive team/RMIT University).

I mean, the University’s become much more business-like over recent years, because government insisted that they become so. We talk about corporate governance and all of those things that we never used to, so there’s a lot of changes, but we just haven’t got that far yet. So that would be, if there were external demands upon the University to identify these costs, then what choice do we have (Head of School/RMIT University)?

As mentioned, RMIT University is a member of TEFMA, which does a benchmarking exercise for participating universities every year. To ensure compliance, three or four staff members within Property Services are in charge of collecting the data and making sure that the data is complied in a way consistent with the previous years. Although normative pressure has forced the University to report environmental information, the pressure is placed on environmental managers, rather than on management accountants. At senior management level the environment was not really seen as having much to do with accounting. If accountants could be involved, and were willing to be involved, current reporting practice could therefore serve as a starting point to implement EMA. However, the absence of institutional pressure (including coercive, mimetic and normative) reduces the chance to implement EMA within the University.

#### **7.4.4.2 STAKEHOLDER POWER<sup>106</sup>**

Some participants indicated that they feel no pressure from stakeholders (either with or without power) to control the major environmental costs. For example:

No, I don’t feel any pressure at all from stakeholders, no (Pro-Vice Chancellor Students/RMIT University).

Some participants said environmental issues are not what stakeholders (e.g. students and researchers) are concerned about. For example:

Students are much more concerned with getting good teaching.... I don’t think they’d be concerned about the environment (Head of School/RMIT University).

Well, clearly the governments think they are key stakeholders, but in my view the most important

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<sup>106</sup> This category contained the coded data in relation to concerns and expectations of stakeholders (either with or without power) interested in the environmental issues relevant to universities. In particular, the category highlighted the influence of stakeholder power on organisational accounting changes.

stakeholders are the students and the researchers and we need to be driven to some extent by what they think are the key priorities. We do regular surveys on the top ten issues in the minds of our staff and students.... Better student services or better classrooms, they're clearly on the top.... We don't exist just because we want to exist. We're here because people want to buy our services. They're willing to pay a price, whether to the federal government as loans for higher education or as fee-paying students and they're the people who drive what we do. The market demands certain things and we have to deliver. No doubt about that (Vice-President Resources/RMIT University).

It comes back to what impacts an individual is more important to what impacts an individual's position, and then what impacts an individual's community. So the individual should always come first. That's human nature. Ok, my tuition fee's my first point of interest. The second thing is that, 'is the University financially stable?' ... I think they're probably more important to students than how much paper and how much water we use each year (Associate Director, Business Advisory/RMIT University).

Environmental issues do not seem to be what the influential stakeholders (i.e. students and researchers) are interested in. However, there are still a few stakeholders worrying about these issues, but they are considered not to be particularly visible and powerful. For example:

There are a few, but they are not particularly visible... Well, we've got Global Sustainability. They worry about these things... But I have to be brutally honest and say if it's not in the senior level, it's not having a significant impact. It's not having a significant impact. I don't want to be painting a totally black picture. There're clearly some people around, including myself, who are individually trying controlling it anyway and they're trying it at home. What I'm saying is I think we can get a whole lot of improvement if we actually put some good data through that and good financial information, allowing people to be beneficially resolving further affirmative action. So it's not all black, I mean there are a lot of individual pictures about those sorts of things (Pro Vice-Chancellor Business/RMIT University).

The stakeholders, such as the Global Sustainability Institute<sup>107</sup>, have some influence, but since they do not have 'formal power', their influence is limited. Powerful stakeholders, such as government, do not seem to exercise pressure on universities to control their environmental costs. Due to a lack of interest and attention from stakeholders, in particular those with power, in accounting for the environment by universities, it is less likely that RMIT would put into place an EMA system for the purpose of controlling environmental costs.

#### **7.4.4.3 LEGITIMACY CONSIDERATIONS<sup>108</sup>**

*Legitimacy considerations* do not appear to have strong influence on EMA adoption within the University. Only four participants mentioned the desire to gain legitimacy as a motive to account for the environment. Comments by four participants were:

If we do something that's really good and really successful, we want the good news to be run outside to the people. You know before we practice we preach. So within the boundary we can do it, because we still financially have to be very careful. What would be motivated is actually to say this is something we have achieved and link it into the public side (Associate Director, Budget & Financial Performance Measurement/RMIT University).

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<sup>107</sup> As mentioned in Chapter Four, the Institute is involved in developing new concepts and methods relating to global sustainability in practical ways so that they can be applied to the work of RMIT itself and to organisations in the private and public sectors. It is one of the main vehicles driving environmental sustainability across the university.

<sup>108</sup> Legitimacy refers to the desire of an organisation to improve its appropriateness of actions within an established set of regulations, norms, values, or beliefs (Suchman 1995). The factor here captured data on an organisation's desire to manage the perceptions of their stakeholders in terms of legitimacy.

Yes, we've signed several, Talloires Declaration, Greenhouse Gas Challenge, the Sustainable Energy Authority of Victoria.... I think there're enough in there to drive us to do the right thing (General Manager, Facilities Services/RMIT University).

There's no doubt. In the short, very short term, it [accounting for the environment] will have a negative impact but in the longer run, it will have a positive impact because our reputation will be enhanced, we will attract more people who want to be attracted to an organisation that is more environmentally conscious (Vice-President Resources/RMIT University).

And I think reputation is important, but, to be honest with you, I don't see that's particularly high profile at this time, either within the University or external to the University. It's not something that everybody is watching, to be honest with you (Pro Vice-Chancellor Business/RMIT University).

The desire to gain legitimacy appeared to motivate the University to report good news, to sign environment-related agreements, and to implement environmental management initiatives. By so doing, the University would appear as a good corporate citizen and improve its reputation as an environmentally conscious organisation. Indeed, the desire to appear legitimate motivated the University to be engaged in reporting environmental information and undertaking environmental initiatives. However, it is still not significant enough to drive management accounting changes.

It is argued that threats to an organisation's legitimacy are believed to undermine its license to operate, or its long-term survival (Deegan 2002). Findings in the case appeared to support this theoretical relationship between organisational legitimacy and organisational survival. EMA was not seen as a way to legitimise internal practices. A lack of EMA implementation would not undermine the license to operate, or long-term survival. Therefore, adopting EMA attracted little attention and interest. Implementing EMA was not considered as a priority.

#### **7.4.4.4 A SUMMARY OF THE INSTITUTIONAL BARRIERS**

Of the three factors in relation to the institutional barriers, a *lack of institutional pressure* appears to be a strong factor with explanatory power to EMA adoption for the University. The institutional pressure referred to includes coercive pressure (in particular from the government), mimetic pressure, and normative pressure. The factor of *stakeholder power* also contributes to explain the absence of EMA adoption within the University, but from a different perspective. *Stakeholder power* stresses the power of stakeholders in influencing accounting practices. *Legitimacy considerations* do not seem to have significant impacts on EMA adoption, because adopting EMA is not yet considered as a means to legitimise internal practices for the purpose of managing environmental costs.

#### 7.4.5 MANAGEMENT BARRIERS

The management barriers include four factors, a *lack of environmental responsibility & accountability*, a *lack of integrating the environment into strategic planning*, *few incentives provided to manage environmental costs*, and a *lack of advocacy from the university leadership*. *Advocacy from the university leadership* is a pre-requisite factor that is suggested by a literature review as key to the success of campus environmental management initiatives. A *lack of integrating the environment into strategic planning* is a theory-based factor that was developed from the contingency theoretical perspective. It reflects the influence of environmental strategies on changes in management accounting systems. The remaining two factors were emerged during the coding process. As shown in Table 7.6, a *lack of environmental responsibility & accountability* appears to be a strong factor in explaining a lack of EMA adoption, but not the other three.

**TABLE 7.6 FACTORS IN RELATION TO THE MANAGEMENT BARRIERS**

Management Barriers	Number of Participants*	Frequency of References
<i>Lack of environmental responsibility &amp; accountability</i>	11	22
<i>Lack of integrating the environment into strategic planning</i>	4	5
<i>Few incentives provided to manage environmental costs</i>	4	5
<i>Lack of advocacy from the university leadership</i>	3	3

\* On the basis of eleven participants

##### 7.4.5.1 LACK OF ENVIRONMENTAL RESPONSIBILITY AND ACCOUNTABILITY<sup>109</sup>

In terms of the number of participants, a *lack of environmental responsibility & accountability* represents a very strong factor to explain the absence of EMA adoption within the University. All the eleven participants commented on the issue.

The University's current practices do not reflect an attempt to make key managers accountable for their environmental performance. No heads of academic schools, or deans, have any form of environmental targets, or budgets, imposed within their work plans. For example, the Senior Accountant indicated the problem associated with the lack of a responsibility-centred budgeting system:

If they had their own budgets and their own measures [tied to particular attributes of environmental performance], then they would monitor and control that regularly. It's the nature of the way people are. If

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<sup>109</sup> Accountability is defined as 'the ability to provide an account of its activities both as an explicit record of them and as an acceptance of responsibility for them' (Gonella et al. 1998, p. 86). Environmental accountability represents one specific dimension of accountability, which calls for an organisation to take the responsibility of environmental management, provide an account of actions taken, and implement enforcement mechanisms to ensure that people are held accountable for actions taken and consequences incurred. It is important to note that one should take the responsibility of controlling environmental costs before he/she can be held accountable for environmental costs incurred. This category captured data in relation to comments about environmental responsibility and accountability.

they are not being held accountable for it, then they are not really going to worry about it. They might turn the lights off to reduce our energy usage, but they are not really focusing on that (Senior Accountant, Property Services/RMIT University).

The General Manager of Facilities Services concurred:

No, I don't think the heads of portfolios would be grilled as to why their operating costs are increased (General Manager, Facilities Services/RMIT University).

The comment by the Pro-Vice Chancellor Business highlighted the importance of providing information about the consumption of resources, and linking the control of resources consumption to the work plans of key managers. These costs would just be ignored if they do not know what they are. For example:

I don't pay those bills. I don't pay the water bill, I don't pay the energy bill, [and] I don't pay the cost of managing all the wastes we generate, so there is no imperative there. I do, however, pay for the telephone usage, so I was interested in that and said, 'well, let's try to keep our telephone cost down, because that's better for us and increases the money for other purposes'.... So to try to make management reduction, you have got to get consequences for not doing it. I mean this is quite apart from any environmental beliefs you may have... but it's not showing up on my accounts. That's not to say it's not been evaluated, but actually we don't know what it is (Pro Vice-Chancellor Business/RMIT University).

The Pro Vice-Chancellor Students also mentioned the absence of consequences for not controlling environmental costs:

As a PVC, I'm aware of what's in the business plan and I'm also aware of what's in the strategic plan, and the managers within the portfolio are aware of those as well. So to that extent, yes, I think we're all held accountable. But I have to say, if I use too much electricity in my office, I don't know what would happen to me (Pro Vice-Chancellor Students/RMIT University).

Further evidence showed that the responsibility and accountability to manage environmental impacts and associated environmental costs is now all on Property Services. As indicated by the Vice-Chancellor and President, that is where their responsibility lies:

I should say, in terms of the University's overall management of particular things like water, energy, paper costs and waste management, the day-to-day management accountabilities for those rest with the Director of Property Services, who reports to the Vice President of Resources, who is the Chief Operating Officer, and so that's where the day-to-day or the overall accountabilities reside (Vice-Chancellor and President/RMIT University).

It is a common practice to charge the overall environmental responsibility and/or accountability to the division responsible for facilities management. However, without the responsibilities being allocated to academic schools or other administrative divisions (those being the users of environmental resources), the effectiveness of managing environmental costs would be limited. The Vice-President of Resources said:

Well, in the longer run, given that I'm the Vice President of Resources, I think it will be my responsibility to effectively manage our use of the environment and the costs of the resources we utilise, so I expect that it will come from me. That needs to be shared with everybody else in the organisation, because I can't manage that on my own (Vice-President Resources/RMIT University).

Another two Pro Vice-Chancellors concurred, but stressed that the University is not allocating any of the major environmental costs. Their comments were as follows:

... but you have got to allocate the responsibilities for actually managing it and personally reducing it. We are not doing that yet (Pro Vice-Chancellor Business/RMIT University).

I guess the responsibility goes right through the organisation, right down to the individual, it all gets aggregated up, and then when we come to report, the person who finally signs up on that would be the VP Resources, because Property Services reports to him, but that's not to say that Steve Somogyi personally has responsibility for it.... It seems that it's a kind of a food chain here, and so it's got to get down to the school, then it's got to get down to the program.... At the end of the day, to some extent, it's about individual decisions.... Everyone has to take some responsibility that's appropriate for their level (Member of Vice-Chancellor's executive team/RMIT University).

Perhaps due to the aggregated responsibility, managers (except for those at Property Services) do not seem to be interested in environmental cost control and savings that could be made. This has direct implications for the demand to put in place an EMA system. The General Manager of Facilities Services expressed his concerns about the issue:

They may believe that they're working at it. But I can tell you that they haven't phoned me up and asked me for what their electricity bill was.... I mean, if they knew what that was, they'd get a pretty good idea what it costs the University to make that facility available to them.... There's another aspect of cultural change that needs to probably work more so with middle management than anywhere else. Senior management can see our expenditure that is used to save on the environment. Down at the local level, the lab technicians can see it. The middle management area gets so consumed with health and safety, getting the budget reporting, and all that sort of things, that they unfortunately cannot see a lot of costs. It's not a criticism, but it's just what happens at that level (General Manager, Facilities Services/RMIT University).

The Senior Accountant explained:

No, it's not their main focus.... It's not monitored, and it's not one of their key accountabilities.... But they're not really held accountable for environmental usage. So if that's not in there as one of their key accountabilities, then it's not going to be their key focus at the moment (Senior Accountant, Property Services/RMIT University).

There might be a collective conscience about controlling environmental costs within the University. However, the Executive Director of Property Services said, 'there are more people responsible, but it's more difficult to get people to take on that responsibility' (Executive Director, Property Services/RMIT University). It seems that this aggregated environmental responsibility would discourage managers from actively managing environmental costs. This could be due to the fact that it is not described as part of their daily responsibilities. As key managers are not held responsible and accountable for environmental costs incurred, which seems to be a common practice, an EMA system that can be utilised to improve environmental accountability would be less likely to be implemented.

#### 7.4.5.2 LACK OF INTEGRATING THE ENVIRONMENT INTO STRATEGIC PLANNING<sup>110</sup>

The University has generated some positive outcomes from the environmental management programs and initiatives that are in place. However, the University's environmental policy has not been revised since its adoption in 1994, the targets for key environmental indicators have not been set, many of its environmental commitments have not been adequately resourced, and the action plans to meet requirements of these commitments have not yet been implemented. They are the issues that require further attention and resolution. These problems were reflected in some of the University's internal documents, and there were also some participants making comments on the issues. For example:

I think we need to get some more systems or practices in environmental areas in place before we could get to that stage [accounting for the environment] (Executive Director, Property Services/RMIT University).

I think that's [updating environmental policy] good because it makes it more visible, more conspicuous out there, but if I can put it this way, that sort of thing is necessary but not sufficient, because RMIT is always making policies, but does it actually mean anything? So it's not just that we make policies, the next question is, 'well, what does this mean on the ground and how are you going to implement it?' (Member of Vice-Chancellor's executive team/RMIT University).

You might say that there's prescribed legislative requirement to be accountable, but we do aspire in this area, and we do make reference to that in our annual report. But do we then take that to the next level? I don't think we do. So I think it's aspirational rather than directional at this point (Associate Director, Business Advisory/RMIT University).

A look at the University's most recent strategic plan, *RMIT2010: Designing the Future*, revealed that the only available environmental indicator is *infrastructure quality*, which describes the goal of '75% of buildings classified as satisfactory by the Tertiary Educational Facilities Management Association by 2010'. Obviously, the University has a main focus on improving its overall infrastructure quality. This focus also echoes the way environmental costs are managed within the University (i.e. an aggregated environmental responsibility and accountability). However, it is still not clear how far this strategic position would influence EMA adoption due to the limited comments from only four participants.

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<sup>110</sup> This category was derived from the contingency theoretical perspective, which emphasises the influence of environmental strategies on organisational accounting practices. The study looked at a university's strategic plan and environmental policy (if any) as an indicator of its strategic position about environmental issues. Further, the factor is measured by outcomes in the form of actions that it undertakes for regulatory compliance, and initiatives it takes to meet commitments made to minimise its environmental impacts. The category documented opinions and views of participants about the influence of a university's environmental strategic position and environmental strategies undertaken on EMA adoption.

### 7.4.5.3 FEW INCENTIVES PROVIDED TO MANAGE ENVIRONMENTAL COSTS<sup>111</sup>

A number of studies pertaining to the barriers to the ‘greening’ of universities have established ‘a general lack of incentives and information on environmental issues’ to be among the most important barriers to the adoption of environmental initiatives (e.g. Meyerson & Massy 1995; NWF & ULSF 2001; Sammalisto & Arvidsson 2005). Likewise, this study found that the factor, *few incentives provided to manage environmental costs*, impedes EMA adoption. This could be due to a practice of measuring performance against budget. The Executive Director of Property Services noted:

There isn’t really a system apart from just really reporting on budget performance and acceptance whether that’s good or bad.... So it’s mainly for tracing whether you perform within your budget, responsibly or not (Executive Director, Property Services/RMIT University).

A Head of School provided some explanations about why striving for reducing costs is not necessary:

I think another reason why we haven’t focused on trying to reduce expenditure is because if we make a surplus in any year, we lose it. It just goes to the centre. So there’s been no incentive to try to reduce costs. I mean there’re all sorts of reasons and I could go on and on.... There just wasn’t the incentive to do it (Head of School/RMIT University).

No incentives, coupled with no pressure to manage environmental costs, make the factor a barrier to adopting EMA practices within the University.

### 7.4.5.4 LACK OF ADVOCACY FROM THE UNIVERSITY LEADERSHIP<sup>112</sup>

As not all of the members of the Vice-Chancellor’s executive team participated in this study, it would not be appropriate to draw the conclusion about whether the senior management supports EMA adoption. However, one of the executive team members indicated that not enough time was committed to the discussion of issues in relation to accounting for the environment:

I guess it’s because we haven’t captured the hearts and minds at the senior level.... Partly we never take time to do it. Secondly, we probably have other things on our mind from time to time. Yeah, that was probably the main reason. But this sort of issues would’ve been identified and go to the senior executive members of the University, maybe two, three, four times a year.... How much discussion do they have? Three, four minutes a year, maximum, where we probably just recorded that’s very interesting and then moved on, because it doesn’t seem to be any imperative or relative to the other parities.... There’s no compulsion to do this [accounting for the environment] (Pro Vice-Chancellor Business/RMIT University).

It seems that environmental costs are not what the senior management is interested in. For example:

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<sup>111</sup> This category captured the data relating to participants’ opinions on whether incentives are provided to control, or manage, the major environmental costs within the University.

<sup>112</sup> This category captured the data relevant to the senior management support and advocacy for accounting for the environment.

We've different accounts. So we think, 'ok, how can we capture costs properly?' You know, at the end of the day, what is management interested in? They're interested in how much we spend on travel and how much we spend on consumables. So would they ask how much we spend on the environment? ... They never have, or it hasn't come through to me... They may discuss it at different forums. But it would be very hard to measure (Associate Director, Budget & Financial Performance Management/RMIT University).

Experience of the General Manager of Facilities Services highlighted the importance of involvement and support from the senior management in improving environmental management. However, it seems that the University's leadership does not demonstrate the level of advocacy required for managing environmental issues within the University. The General Manager said:

I've been to a couple of presentations by Monash where the Vice-Chancellor gets up and talks to a lecture theatre centre full of students, staff, outsiders, all interested in improving environmental management, and he'll answer questions from them. He's not afraid of the questions out there that might be asked that might put him on the spot. RMIT's not in that field yet (General Manager, Facilities Services/RMIT University).

Given the role of EMA to support environmental management, a reasonable extension of the above-mentioned quotes is that EMA is less likely to be adopted because of a lack of advocacy from the University leadership in environmental management.

#### **7.4.5.5 A SUMMARY OF THE MANAGEMENT BARRIERS**

Among the management barriers, a *lack of environmental responsibility & accountability* is a very strong barrier to EMA adoption in the case of RMIT University. A *lack of integrating the environment into strategic planning*, *few incentives provided to manage environmental costs*, and a *lack of advocacy from the university leadership* do not appear to be strong factors in this case, but they offer valuable and other explanations about this lack of EMA adoption in the University.

Having discussed the five key barriers and their related factors, it is useful to present an overall summary of barriers to EMA adoption for the University.

#### **7.4.6 AN OVERALL SUMMARY OF BARRIERS TO EMA ADOPTION FOR RMIT UNIVERSITY**

Interviews with the eleven RMIT participants suggested that *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers potentially influence EMA adoption. As mentioned in Chapter Six, structured role-ordered displays were used to present the data for this study. The purpose of the displays is to show patterns in the data that would be driven by the different management roles of participants. The following section will present the findings across RMIT participants and by their management roles, with the strong factors being highlighted.

#### 7.4.6.1 PRESENTATION ON THE STRONG FACTORS

Table 7.7 provides a summary of the strong<sup>113</sup> factors identified in this case. The number of participants, who either implicitly or explicitly referred to that particular factor as potentially influencing EMA adoption, is shown. The presentation highlights the relative strength of the factors in explaining a lack of EMA adoption. As shown, a *low priority of accounting for environmental costs, difficulties in collecting or allocating environmental costs, a lack of institutional pressure, and a lack of environmental responsibility & accountability* are the factors with strong explanatory power.

#### 7.4.6.2 PRESENTATION OF FINDINGS ACROSS PARTICIPANTS AND BY MANAGEMENT ROLES

As explained in Chapter Six, it is useful to present the findings across all the participants and by their management roles to gain further understanding of the topic being investigated. Rather than showing the difference in explanatory power of the factors, the purpose of the comparison is to recognise the different perceptions by participants with different management roles in explaining EMA adoption. As shown in Table 7.7, the *informational and management barriers* were identified by all the participants (regardless of their management roles) to be impeding EMA adoption. From the perspective of those people in different management roles, managers with either an environmental management function, or a management accounting function, identified all the five key barriers as influencing EMA adoption. Participants, who would be directly involved in the process of EMA adoption (if such a process was implemented), seem to perceive more barriers than the senior management and heads of academic schools.

The presentation highlights four strong factors, which represent four different barriers to EMA adoption. The following section will provide lessons learned in relation to these barriers from the case of RMIT University.

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<sup>113</sup> These factors were identified by at least *nine* participants as potentially influencing EMA adoption within the University. The number was determined by considering the total number of participants (this being eleven), and the four management roles involved in this study. The four strong factors are marked by '@' in Table 7.7.

**TABLE 7.7 A PRESENTATION OF THE FINDINGS ACROSS PARTICIPANTS AND BY MANAGEMENT ROLES FOR RMIT UNIVERSITY**

Barriers	Management Roles Participants	Senior Management					Environmental Management		Management Accounting			Academic School	No of Participants
		Gardner	Whitaker	Somogyi	Kirk	Anonym	White	Bell	Stockwell	Poole	Stewart	Anonym	
<i>Attitudinal Barriers</i>													
@	Low priority of accounting for environmental costs	X	X	X	X		X	X	X	X	X	X	10 @
	Resistance to change	X		X	X		X	X		X	X	X	8
<i>Financial Barriers</i>													
	Resource constraints	X		X		X	X	X	X		X		7
	Efficiency or financial considerations		X	X		X	X	X		X			6
<i>Informational Barriers</i>													
@	Difficulties in collecting or allocating environmental costs	X	X	X	X	X	X	X	X	X	X	X	11 @
	Low Physical environmental uncertainty	X		X	X	X	X	X					6
<i>Institutional Barriers</i>													
@	Lack of institutional pressure		X	X		X	X	X	X	X	X	X	9 @
	Stakeholder power		X	X	X	X	X			X		X	7
	Legitimacy considerations		X	X				X			X		4
<i>Management Barriers</i>													
@	Lack of environmental responsibility & accountability	X	X	X	X	X	X	X	X	X	X	X	11 @
	Lack of integrating the environment into strategic planning	X				X	X			X			4
	Few incentives provided to manage environmental costs		X			X	X					X	4
	Lack of advocacy from the university leadership		X					X			X		3

**Notes:** There are *eleven* RMIT participants.

@ – a strong factor to explain EMA adoption in terms of the number of participants who identified the factor as an EMA barrier

X – the factor that was identified by the participant as a barrier to EMA adoption

**Dark-greyled areas** – the barrier that was identified by the participant as potentially influencing EMA adoption

**No of Participants** – the number of participants who identified the factor as an EMA barrier

#### **7.4.7 LESSONS LEARNED FROM RMIT UNIVERSITY**

Four strong factors were identified by RMIT participants to explain the lack of EMA adoption within the University. The factors are a *low priority of accounting for environmental costs*, *difficulties in collecting or allocating environmental costs*, a *lack of institutional pressure*, and a *lack of environmental responsibility & accountability*. Lessons learned in relation to the four factors would help overcome part of the barriers to EMA adoption, and they are provided below.

##### **7.4.7.1 LOW PRIORITY OF ACCOUNTING FOR ENVIRONMENTAL COSTS**

A *low priority of accounting for environmental costs* was found as a strong factor in this case. As mentioned, it could be due to the fact that the major environmental costs are relatively low for RMIT University. This makes it more difficult to build a business case to implement EMA for financial reasons alone. Other drivers would be required to assist in building the business case for EMA adoption within the University. For example, the pressure would be required from powerful stakeholders, such as the government. Other benefits that EMA can deliver would also need to be considered, e.g. reputation, improved environmental performance, enhanced organisational culture and employee morale, and educating future leaders to be environmentally responsible.

##### **7.4.7.2 DIFFICULTIES IN COLLECTING OR ALLOCATING ENVIRONMENTAL COSTS**

It was found that *difficulties in collecting or allocating environmental costs* have significant impact on EMA adoption. However, as demonstrated in the EMA framework used for this research project, EMA is a flexible tool that may be implemented incrementally, beginning with limited scale and scope. As RMIT spends over AU\$6,000,000 annually on energy and water, energy related costs represent a good choice for the trial to implement EMA. In particular, the main campus of the University is located in the central business area of Melbourne. Therefore, some schools/portfolios (e.g. RMIT Business), or administrative divisions, occupy a whole building. They can be chosen as a small-scale trial to implement some form of EMA. As for information collection, building specific energy cost can be easily obtained through negotiation with energy providers. Subsequent allocation can also be done with the assistance of activity-based costing (ABC).

RMIT intended to implement ABC a few years ago. That ABC project was not successfully implemented, with one of the reasons being difficulties experienced in allocating the identified costs. It should be noted that the success of ABC, or EMA, is not dependent on identifying or classifying all the environmental costs straight away. It would reduce resistance

from the employees and accompanying difficulties if ABC, or EMA, could be incrementally implemented. Once a case (either based on a single building or a school) is built up, subsequent applications would be relatively easier to introduce. The solution is also consistent with the suggestions by the *ECOMAC* research project that ABC is recommended to be used to get on board EMA (see Bartolomeo et al. 1999; Bartolomeo et al. 2000). Another point is that ABC does not automatically reveal environmental costs. Therefore, substantial inputs from environmental managers and management accountants will certainly be required to ensure this occurs.

#### **7.4.7.3 LACK OF INSTITUTIONAL PRESSURE**

A *lack of institutional pressure*, including government, mimetic and normative, was shown in the case in terms of accounting for the environment. The large majority of Australian universities are directly funded by the government, and are held accountable to government for their financial performance (in particular they do not incur large operating deficits). The Australian Government does not appear to require accountability in terms of a university's environmental performance. This lack of accountability at the top level flows through the various accounting systems within Australian universities. Arguably it is incumbent for government to address this issue.

The creation of TEFMA imposes pressure on Australian universities to implement environmental management initiatives and report environmental performance. However, the pressure is on environmental managers, rather than on management accountants. Some international professional accounting bodies (e.g. IFAC and the Asian-Pacific section of EMAN Network) are promoting EMA in manufacturing industries and small business, but the higher education sector still fails to be the focus. This lack of normative pressure reduces the chance for universities to adopt some form of EMA. Arguably, this is also an issue requiring further attention.

#### **7.4.7.4 LACK OF ENVIRONMENTAL RESPONSIBILITY AND ACCOUNTABILITY**

A reason for the *lack of environmental responsibility & accountability*, as referred to by a number of RMIT participants, is the limited control and influence over environmental costs by key managers, or heads of schools. It is true that organisations operating in an office environment are often not directly in control of environmental resources and services consumed. It is also common that managers are not held accountable for environmental costs incurred, except for the division responsible for facilities management and services to the entire organisation. This case illustrated that many services (e.g. cleaning, waste collection

and disposal, electricity, and water) are provided through Property Services. The responsibility and accountability for managing associated costs are mainly on Property Services. If costs incurred are not allocated to individual managers, they are not likely to influence behaviours. In the absence of some form of responsibility, users of environmental resources and services are not going to be accountable for the resources and services consumed. Their potential to influence environmental costs, and minimise associated environmental impacts, would be significantly reduced.

#### **7.4.7.5 A SUMMARY OF THE LESSONS LEARNED**

The discussion of lessons learned has provided some potential solutions to dissolve part of the barriers for EMA adoption within the University. Three of the four factors (i.e. a *low priority of accounting for environmental costs*, *difficulties in collecting or allocating environmental costs*, and a *lack of environmental responsibility & accountability*) are related to changes in accounting practices for managing environmental costs. However, external drivers would be needed to address the issue of a *lack of institutional pressure*, which is theoretically based. Intentionally, this chapter has not provided implications of the theory-based factors for practice. Chapter Nine (the chapter following the presentation of results and findings pertaining to the other four cases) will be dedicated to provide such details.

### **7.5 CONCLUSION**

In this chapter, current accounting practices for managing the major environmental costs, suggestions to improve current practices, barriers to EMA adoption, and lessons learned from RMIT University have all been presented. The results and findings were based on the analysis and interpretation of the coded data from the eleven RMIT participants. The discussion demonstrated that the University's current accounting practices do not reflect an attempt to hold managers responsible and accountable for the major environmental costs incurred. Five key barriers (i.e. *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers) were found to potentially be retarding accounting changes within the University. Among the key barriers, a *low priority of accounting for environmental costs*, *difficulties in collecting or allocating environmental costs*, a *lack of institutional pressure*, and a *lack of environmental responsibility & accountability* are strong factors impeding EMA adoption. Lessons learned from the four strong EMA factors were also provided.

Purposely, this chapter has not provided any analysis of these findings from the four theoretical perspectives<sup>114</sup> that form a theoretical framework to underpin this study, as it is

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<sup>114</sup> They are contingency, institutional, legitimacy and stakeholder theoretical perspectives. The proposed theoretical framework has been introduced in Chapter Five.

the role of Chapter Nine to provide such details. The next chapter, Chapter Eight, will present the results and findings pertaining to the other four cases. Chapter Nine will then provide theoretical analysis and implications for practice.

## **CHAPTER EIGHT**

### **RESULTS AND FINDINGS – THE OTHER FOUR CASES**

#### **8.1 INTRODUCTION**

The previous chapter has provided results and findings pertaining to RMIT University. This chapter will present results and findings for the other four cases. The four cases are AUS University<sup>115</sup> in Australia, and Transworld Institute of Technology (TIT), Nanhua University, and National University of Kaohsiung (NUK) in Taiwan. They will be presented in that order.

The presentation and discussion will follow the same format used in the previous chapter for RMIT University. It begins with a general description of a university and its environmental responsiveness. Results and findings in relation to the first and second research objectives will then be provided. Lessons learned will also be discussed. Following the discussion of all the four cases, overall summaries across the five participating universities, including RMIT University, will be provided. The chapter will then be concluded.

It should be noted that the purpose of this chapter is to provide evidence that supports, or does not support, findings presented in the previous chapter for RMIT University. Rather than producing intensive quotes, the focus is to demonstrate similarities and differences (if any) between RMIT University and the four universities in terms of accounting practices for managing environmental costs, and factors impeding EMA adoption.

#### **8.2 AUS UNIVERSITY, AUSTRALIA**

AUS University (a pseudonym) is located in Victoria, Australia. The University offers a broad range of study options in a variety of disciplines within various schools.

##### **8.2.1 ENVIRONMENTAL RESPONSIVENESS**

AUS University participates in environmental commitments at a domestic level only. The University is a signatory to the Commonwealth Greenhouse Challenge by Australian Government, but does not yet commit itself to any international environment-related declarations or agreements.

To improve internal operations, the University has committed to an environmental policy that defines its environmental interests and aspirations in the context of recognised best

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<sup>115</sup> As the university requested to be anonymous, the name of 'AUS University' is used for the purpose of this thesis.

practices for sustainable resource management. Programs and initiatives undertaken to meet the objectives of the policy include waste audits, energy conservation, sustainable landscape design and management, waste paper/material recycling, waste water and other resource re-use, and operational management of buildings conforming to legislative requirements. In addition, the University's most recent strategic plan comprises a goal to improve organisational efficiency and effectiveness by reducing administrative expenses.

The University has started to report environmental sustainability information in its annual reports. For example, a half-page summary of environmental performance is included in its 2005 annual report. The summary does not contain any environmental targets, indicators or figures on resources consumed or greenhouse gas emissions produced. Rather, it provides commentaries on the University's commitment to environmental sustainability and on specific initiatives or programs that have been undertaken to meet the commitment.

Having briefly described the University's environmental responsiveness, the following sections will present results and findings pertaining to AUS University for the two research objectives of this study, respectively.

### **8.2.2 RESULTS AND DISCUSSION FOR THE FIRST RESEARCH OBJECTIVE – CURRENT ACCOUNTING PRACTICES FOR MANAGING ENVIRONMENTAL COSTS**

AUS University uses a standard SAP accounting information system for the purposes of financial and management accounting, as does RMIT University. The Chief Accountant indicated that total costs for electricity, water and waste disposal (both general and hazardous wastes) are separately identified in the accounting system, but only monetary information is available.

The University charges its various faculties and administrative divisions for their electricity usages via the allocation of annual budgets. An electricity audit was done before determining the budget allocated to building occupants. Within the University, most faculties occupy an entire building. For buildings with mixed faculties, electricity usages are allocated on the basis of floor space occupied. If the actual usage turns out less than the budgeted one, the occupants can keep the budget that is over the actual charge, whereas anything over, they have to pay out of their budget. The University initiated the allocation practice six years ago, and has been implementing the practice since then. The practice is considered a management control for motivating building occupants to monitor electricity usages and drive cost down. The Chief Accountant said:

There's an element of self-control there or management control in each of those departments or faculties, because there's a cost ascribed to them (Chief Accountant/AUS University).

To monitor and improve overall energy efficiency, AUS University employed an energy manager<sup>116</sup> a few years ago. The manager is responsible for monitoring energy usages, making suggestions for mechanical projects, looking after energy contracts, and analysing the trends of energy usages and greenhouse gas emissions. However, the manager is more focused on physical rather than monetary information, which is the responsibility of their budget officer. Although the energy manager and the budget officer both report to the Executive Director of Property Services, collaboration and communication between them in terms of controlling environmental impacts and reducing associated costs does not seem to exist. That is, there is little evidence supporting the link between monitoring physical environmental information and controlling monetary environmental costs for the University.

However, the University has recently developed an energy data management system. The system incorporates both physical and monetary information on energy consumption, but it is not linked to the accounting system. The energy information is available to key persons responsible for managing energy and taking appropriate actions. According to the energy manager, the implementation of this data management system is in part driven by being a signatory to the Greenhouse Challenge Program, as the energy data is used to meet the reporting requirements by the Program. With the system, the University is now able to do internal benchmarking on resource consumption (e.g. electricity and gas) and emissions released (e.g. greenhouse gas). The internal benchmarking is mainly at a campus level, although information on some of the major buildings is also available. This benchmarking information is prepared periodically and provided to the Vice-President of Resources, but whether the other senior management is interested in and monitors this information is not clear.

As mentioned, the University allocates electricity budgets to motivate cost control. The University is now considering extending the practice to water and gas. The energy manager indicated that at the beginning stage, the University would monitor gas and water consumed within main buildings only. Once reliable information becomes available, the University can then allocate budgets for gas and water to responsibility centres. That is, the extended practice will be carried out in a smaller scale or on a building basis first. However, it is still considered as a lower priority to extend the practice to waste management. The Executive Director of Property Services indicated:

At this stage, that's the lower priority. Certainly I wouldn't discount it but I haven't really had it on the radar, [or] on the agenda (Executive Director, Property Services/AUS University).

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<sup>116</sup> The appointment of an energy manager to monitor energy efficiency seems to be becoming a general practice in universities (Shriberg 2002). RMIT has budgeted for the position, but it has not yet been filled while conducting interviews with RMIT participants.

In spite of the appointment of an energy manager, the implemented data management system, and the allocation of budget for electricity usages, the University still lacks a strategic focus on environmental management. For example, the University has not yet implemented its environmental policy, and has not put in place an environmental performance measurement framework to manage environmental costs better.

### 8.2.3 RESULTS AND DISCUSSION FOR THE SECOND RESEARCH OBJECTIVE – IDENTIFYING FACTORS INFLUENCING EMA ADOPTION

As described in Chapter Seven for RMIT University, five<sup>117</sup> key barriers emerged from the final coded data, with each barrier containing two to four factors that provide further explanations about how the barriers influence EMA adoption. Based on the same coding structure, Table 8.1 highlights the five key barriers and their related factors identified by three<sup>118</sup> participants from AUS University.

**TABLE 8.1 A SUMMARY OF EMA BARRIERS AND FACTORS FOR AUS UNIVERSITY**

Barriers	Number of Participants*	Frequency of References
<b>Attitudinal Barriers</b>		
Low priority of accounting for environmental costs	2	8
Resistance to change	2	3
<b>Financial Barriers</b>		
Efficiency or financial considerations	1	1
Resource constraints	2	2
<b>Informational Barriers</b>		
Difficulties in collecting or allocating environmental costs	0	0
Low physical environmental uncertainty	1	1
<b>Institutional Barriers</b>		
Institutional pressure	1	1
Legitimacy considerations	2	2
Stakeholder power	2	2
<b>Management Barriers</b>		
Few incentives provided to manage environmental costs	2	2
Lack of advocacy from the university leadership	2	6
Lack of environmental responsibility & accountability	1	2
Lack of integrating the environment into strategic planning	2	3

\* On the basis of **three** participants from AUS University

<sup>117</sup> They are *attitudinal, financial, informational, institutional, and management* barriers.

<sup>118</sup> There are four key persons participating in this research. The energy manager gave detailed description and provided valuable insights about the University's management measures in improving energy and resource efficiency. However, the manager indicated that he is not in a good position to identify factors impeding, or assisting, changes in accounting practices for managing environmental costs. He made no comments on barriers to EMA adoption, and therefore was not considered to be participating in the second part of this study.

In view of the limited number of participants in this part of study, the purpose of the data presentation is not to stress the relative strength of each factor, but to confirm the factors that seem to be impeding EMA adoption. Based on the opinions and comments from the participants, the five key barriers and their related factors are discussed in turn.

#### **8.2.3.1 ATTITUDINAL BARRIERS**

The two factors of attitudinal barriers, a *low priority of accounting for environmental costs* and *resistance to change* were both supported in this case. The following comments by the Executive Director of Property Services and the Chief Accountant reflected a low priority to account for the environment:

I just think there are too many other issues for higher education and the University to be concerned about it at the moment. It's just not in the priority stack at the moment (Executive Director, Property Services/AUS University).

But we're struggling with all of the other pressures on an organisation to be successful, that is a high priority ... and I'd say it's not even on the radar for the management of the organisation at the moment (Chief Accountant/AUS University).

The Chief Accountant said that he has never thought about changing or modifying SAP, and it is not his experience to do so. Further, the Executive Director indicated that it seems to him that EMA could be used to penalise faculties for not being environmentally friendly. The Chief Accountant and the Executive Director would be the key persons if the University were to adopt a comprehensive EMA system to better manage environmental costs. However, it appears that they are concerned about the negative impacts that might be caused by the implementation of an EMA system. As such, it would be less likely for the University to change the current accounting system. By inference, *resistance to change* could be a factor impeding EMA adoption within the University.

Although the University has already adopted some form of EMA (such as the allocation of electricity costs to responsibility centres), it would be less likely that the University would proceed to the next level of EMA implementation. This could be due to a *low priority of accounting for environmental costs* and key managers' *resistance to change*.

#### **8.2.3.2 FINANCIAL BARRIERS**

The two factors of financial barriers, *efficiency or financial considerations* and *resource constraints*, were both mentioned in this case. The Chief Accountant expressed his concerns about the cost of capturing more data and additional human resources required to process the data. The Executive Director concurred by saying, 'with appropriate resources, we will'. Therefore, the two factors were supported in this case.

### 8.2.3.3 INFORMATIONAL BARRIERS

The barriers are mainly related to the influence of a contingency relationship between *physical environmental uncertainty* and information processing on EMA adoption. Due to the limited comments and references, a conclusion could not be drawn about whether the coded data supports this contingency relationship. However, the University is leading in terms of environmental cost monitoring and data collection among the investigated cases. The leading position is arguably an important reason why no participants indicated *difficulties in collecting or allocating environmental costs* being part of the barriers to EMA adoption for the University.

### 8.2.3.4 INSTITUTIONAL BARRIERS

The three factors of institutional barriers, a *lack of institutional pressure, stakeholder power and legitimacy considerations*, were all referred to in this case.

The Vice-President of Resources indicated there is a general lack of government pressure imposing on universities to account for environmental costs. *Legitimacy considerations* did not seem to be a factor that would motivate the University to account for environmental costs. None of the three participants explicitly mentioned the desire to appear legitimate as a driver to do so. Instead, the Executive Director indicated that the University has undertaken some environmental management initiatives, which help to demonstrate the University is environmentally responsible. Accounting for the environment does not seem to be regarded as a means to show the University is environmentally responsible. For example:

I guess because we are doing a number of things, they feel a little bit comfortable than if we were being pointed out by the public saying you're doing nothing. You know, you're an embarrassment or something, then that will become a priority, but because we can point to a lot of things that we're doing, I think that takes the pressure of them a little bit from that (Executive Director, Property Services/AUS University).

There is also a lack of pressure from stakeholders with power to force the University to account for the environment. As the Chief Accountant said:

I can't see it on the University's radar at the moment other than pushing it from a middle management point of view (Chief Accountant/AUS University).

Although the middle management is concerned about the issues in relation to better accounting for the environment, arguably they are not powerful stakeholders, and their influence is limited.

Therefore, a lack of pressure from the powerful stakeholders such as government, and the fact that EMA was not seen as a means to legitimise internal operations help confirm that a

*lack of institutional pressure*, a lack of *legitimacy considerations*, and *stakeholder power* provide explanations about the lack of further EMA implementation in the University.

#### **8.2.3.5 MANAGEMENT BARRIERS**

The four factors of management barriers (i.e. a *lack of integrating the environment into strategic planning*, *few incentives provided to manage environmental costs*, a *lack of advocacy from the university leadership*, and a *lack of environmental responsibility & accountability*) were all supported in this case to be impeding EMA adoption.

There is a *lack of integrating the environment into strategic planning*. The Chief Accountant indicated that the management of environmental issues is mainly driven by the middle managers rather than being taken care of strategically. He said:

They're not strategic. They're used strategically on occasions, but they've been really driven from the middle management's conscience basically.... In fact, I think there is now, but there was, for a long time, not even an environmental policy for the University on the strategic level (Chief Accountant/AUS University).

The Executive Director also stressed that the University has put in place systems to collect environmental cost information, but having this information linked to the strategic goal of the University is still missing. For example:

Having the data linked to some sort of strategic goal is the bit that's missing. I mean we've got the data, we've got it available.... We've got the ability to benchmark these things as well and work out how much we're spending per head and all of those sorts of values.... The University hasn't actually reached that point.... And that's easy to test because you can look at the strategic plan and the documents sitting on the University's website and stuff like that (Chief Accountant/AUS University).

In terms of incentives in place to encourage the management of environmental costs, both the Chief Accountant and the Executive Director agreed that there are few incentives being enforced for the purpose of minimising environmental costs. This could be due to a *lack of advocacy from the University leadership*. For example:

There's been no driver for it (Chief Accountant/AUS University).

There hasn't been a senior management executive imperative to account for it (Executive Director, Property Services/AUS University).

... the process of getting buy-in from the chief executive is absolutely critical, otherwise you won't go anywhere in this sort of stuff (Executive Director, Property Services/AUS University).

It really is a huge area.... See, it's easy to concentrate on my side, because it's easily defined and you can do it. But compared to the total picture of sustainability, it's like a big toe on a foot... in terms of accounting, they [senior management] haven't even thought about it and they're not committed to it (Executive Director, Property Services/AUS University).

Perhaps due to this lack of leadership advocacy, few incentives are provided to manage environmental costs. The Executive Director, who is held responsible for facilities management and services, stated:

I probably shouldn't say this, but I don't believe that I'm being held accountable.... No one's putting pressure on me on any of those issues at the moment, but I know that they're important, and within the resources we've got, we should try and do what we can do. I guess the budgeting process in one sense holds us accountable to some degree... but if it's within those budgets, it's really me saying, 'well, let's try and drive it down further' (Executive Director, Property Services/AUS University).

The four factors of management barriers appear to be interrelated and combine to make the implementation of EMA practices difficult, and less likely to happen.

#### **8.2.3.6 A SUMMARY OF FACTORS INFLUENCING EMA ADOPTION FOR AUS UNIVERSITY**

Table 8.2 on the following page presents the findings across the three participants and by their management roles. As shown, the five key barriers appear to be supported in this case. Except for *difficulties in collecting or allocating environmental costs*, the factors identified by RMIT participants to be impeding EMA adoption were all referred to by the three AUS participants. The exclusion of *difficulties in collecting or allocating environmental costs* could be due to the technical measure (i.e. the energy data management system) adopted by AUS University for data collection.

#### **8.2.4 LESSONS LEARNED FROM AUS UNIVERSITY**

An important lesson learned from this case is that a responsibility-centred budgeting system for environmental costs would motivate managers to control their environmental costs. The practice is not that difficult to implement, but an audit might be required to determine a suitable allocation basis if relevant data is not currently available. Once the allocation basis is determined, subsequent reviews are also required to ensure the basis used is still applicable.

The second lesson learned is that collaboration and communication between managers with functions of environmental management and management accounting is important to implement EMA. The two participants with the two management functions were interviewed at the same time. The purpose of this arrangement is that the two managers would like to know each other's opinions about issues in relation to both environmental management and accounting, which they think are relevant to their work. They pointed out that they work closely in terms of managing environmental issues. They also indicated that their support and collaboration is key to the success of implementing the responsibility-centred budgeting system for electricity cost within the University.

**TABLE 8.2 A PRESENTATION OF THE FINDINGS ACROSS PARTICIPANTS AND BY MANAGEMENT ROLES FOR AUS UNIVERSITY**

		Management Roles			NO OF PARTICIPANTS
		Senior Management	Environmental Management	Management Accounting	
Barriers	Participants	VP-Resources	Executive Director of Property Services	Chief Accountant	
		<b>Attitudinal Barriers</b>			
	Low profile of accounting for environmental costs		X	X	2
	Resistance to change		X	X	2
<b>Financial Barriers</b>					
	Efficiency or financial considerations			X	1
	Resource constraints		X	X	2
<b>Informational Barriers</b>					
	Difficulties in collecting or allocating environmental costs				0
	Low physical environmental uncertainty	X			1
<b>Institutional Barriers</b>					
	Lack of institutional pressure	X			1
	Legitimacy considerations		X	X	2
	Stakeholder power		X	X	2
<b>Management Barriers</b>					
	Few incentives provided to manage environmental costs		X	X	2
	Lack of advocacy from the university leadership		X		1
	Lack of environmental responsibility & accountability		X	X	2
	Lack of integrating the environment into strategic planning		X	X	2

Notes: *There are three participants in this part of research.*

*No of Participants* – the number of participants who identified the factor as part of the barriers to EMA adoption

*Dark-greyled area* – the barrier that was identified by the participant as potentially influencing EMA adoption

*Vertical-lined area* – questions not asked or answered

*X* – the factor that was identified by the participant as a barrier to EMA adoption

The third lesson is that bringing in technical solutions would help reduce the difficulties in environmental cost data collection and dissolve part of the informational barriers. No participants in the University mentioned difficulties in collecting and allocating environmental costs. This could be due to the technical measure adopted by the University to process data. The finding, to some extent, is consistent with the conclusion by HEEPI (2007b) that technical support is easily attainable, and could be cost effective in managing environmental costs.

The first and second research objectives have been addressed and lessons learned from AUS University have also been provided. The following sections will present results and findings pertaining to the three cases in Taiwan.

### **8.3 CASES IN TAIWAN**

There are three Taiwanese participating universities: Transworld Institute of Technology (TIT), Nanhua University, and National University of Kaohsiung (NUK). In general, environmental sustainability is not explicitly considered in missions or strategies adopted by higher education institutions in Taiwan. No universities are known to release any form of environmental reports. However, to reduce environmental impacts, some environmental management programs have been undertaken. These environmental initiatives are generally applied to improve energy efficiency (e.g. building automation systems), achieve water conservation (e.g. wastewater recycling and reuse systems), and increase waste paper/material recycling (various resource recycling programs). This is because the consumption of energy and water, and the generation of wastes, are usually considered to be causing significant environmental impacts. Indeed, electricity, water and wastes are among the most significant environmental costs identified by participants from the three universities.

The following discussion will be in the order of Transworld Institute of Technology, Nanhua University, and National University of Kaohsiung. Environmental responsiveness, results and findings for the first and second research objectives, and lessons learned in relation to each university will all be provided.

#### **8.3.1 TRANSWORLD INSTITUTE OF TECHNOLOGY**

Transworld Institute of Technology is located in central Taiwan. Founded in 1992, TIT is now an institute with more than 300 staff and 8,000 students. The Institute offers associate, bachelor, and master degrees from its four colleges, *Business Administration*, *Applied Science & Technology*, *Design*, and *Applied Life Science*, and two graduate schools,

### **8.3.1.1 ENVIRONMENTAL RESPONSIVENESS**

According to the five TIT participants, energy efficiency, waste minimisation, and water conservation are the most significant environmental challenges facing the Institute. The three challenges can be connected to the three major environmental costs (electricity, water and wastes) relevant to this study.

Among the three, electricity represents the highest cost. In addition to some energy saving initiatives and programs, the Institute now provides a link to its monthly costs and usages of electricity on the homepage of its official website. However, it is not sure whether stakeholders, such as students and staff, look at the information. Water cost is the second highest, but the five participants stressed that the Institute is not a big water consumer as a result of a wastewater recycling and reuse system in operation. The system is recognised as a best practice by the Ministry of Education in Taiwan. Waste cost is comparatively lower. Paper, the fourth major environmental cost considered in this study, is not seen as a major environmental cost by the participants in this case.

The Institute has a special education program conducted as a compulsory subject for students. Requirements of the program include conducting recycling activities and collecting waste related information. The information<sup>119</sup> collected is maintained by Student Affairs<sup>120</sup>, but not available to General Affairs<sup>121</sup>, which is responsible for the negotiation of waste removal contracts.

The Institute is not a signatory to any environment-related agreements or declarations, nor does it commit itself to an environmental policy. It should be noted that being a signatory, or committing to an environmental policy, are not common for universities in Taiwan.

### **8.3.1.2 RESULTS AND DISCUSSION FOR THE FIRST RESEARCH OBJECTIVE – CURRENT ACCOUNTING PRACTICES FOR MANAGING ENVIRONMENTAL COSTS**

The Institute's bookkeeping function was performed by using a standard accounting package when the interviews for this study were conducted. This system was replaced by a customised system shortly after the interviews.

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<sup>119</sup> Quantity information (mass but not volume) of solid wastes generated is collected.

<sup>120</sup> Student Affairs is the division in charge of student related activities, including waste management.

<sup>121</sup> General Affairs, which is equivalent to Property Services in Australia, is in charge of facilities services and management.

The Senior Accountant participated in this research indicated the following:

- The general ledger uses a combined ‘water & electricity’ account to accumulate total costs for water and electricity, and an ‘office expenses’ account to include paper and waste costs. Waste costs are recognised as including the price paid to have wastes removed from the Institute.
- For the major environmental costs captured within the accounting system, only monetary information is provided. Physical information on the type or quantity of goods or services procured (e.g. electricity and paper) is not currently available, and will not be available in the new system previously mentioned.
- An ‘administrative expenses’ overhead account is used to accumulate costs included in ‘water & electricity’ and ‘office expenses’. The overhead is allocated to teaching and administrative management at an arbitrary rate of 80% and 20%. No further allocation is undertaken.
- Due to a decentralised purchasing practice, paper used and paid by each academic school and administrative division is not accounted for in the accounting system.

Again, the study found that there is no one person, school, or administrative division being held accountable for any of the major environmental costs incurred. The responsibility to manage the costs lies with General Affairs. Environmental performance is not measured, and the role of management accounting in improving environmental performance has not yet been recognised. They all would have implications in EMA adoption. The following section will address this issue.

### **8.3.1.3 RESULTS AND DISCUSSION FOR THE SECOND RESEARCH OBJECTIVE – IDENTIFYING FACTORS INFLUENCING EMA ADOPTION**

Table 8.3 presents factors in relation to the five key barriers identified by the five TIT participants as impeding EMA adoption in the Institute. As shown, a new factor, *environmental costs are not considered significant*, emerged during the coding process, whereas *legitimacy considerations* were not referred to by the participants. The other factors, which were supported in RMIT University and AUS University, were all found to be supported.

#### **■ ATTITUDINAL BARRIERS**

Consistent with findings in the two Australian cases, a *low priority of accounting for environmental costs* and *resistance to change* were both supported. The result confirmed the two factors being relevant to explain a lack of EMA adoption within universities.

**TABLE 8.3 A SUMMARY OF EMA BARRIERS AND FACTORS FOR TIT**

Barriers		Number of Participants*	Frequency of References
<b>Attitudinal Barriers</b>			
	Low priority of accounting for environmental costs	3	5
	Resistance to change	4	7
<b>Financial Barriers</b>			
	Efficiency or financial considerations	1	1
	Environmental costs are not considered significant	3	4
	Resource constraints	5	10
<b>Informational Barriers</b>			
	Difficulties in collecting or allocating environmental costs	5	9
	Low physical environmental uncertainty	2	4
<b>Institutional Barriers</b>			
	Lack of institutional pressure	4	5
	Legitimacy considerations	0	0
	Stakeholder power	2	3
<b>Management Barriers</b>			
	Few incentives provided to manage environmental costs	2	2
	Lack of advocacy from the university leadership	2	2
	Lack of environmental responsibility & accountability	1	2
	Lack of integrating the environment into strategic planning	1	2

\* On the basis of *five* participants from Transworld Institute of Technology

#### ■ **FINANCIAL BARRIERS**

The thought that *environmental costs are not considered significant* was found to be part of the financial barriers, and it is unique to the three cases in Taiwan. Less apparent environmental responsiveness within universities in Taiwan might contribute to explain the factor being identified by the three Taiwanese universities, but not the two Australian universities. The Head of the Accounting Department worried that the cost to implement an EMA system would outweigh the benefits the implementation would bring. *Efficiency or financial considerations* could influence the decision to implement EMA. In addition, some sorts of *resource constraints* were referred to by all the five participants, which gave evidence about the factor being a strong factor to explain the lack of EMA adoption within the Institute.

#### ■ **INFORMATIONAL BARRIERS**

All the five participants spoke about some kinds of *difficulties in collecting or allocating environmental costs* that would impede EMA adoption. In terms of the number of participants making comments, the factor is considered to have strong explanatory potential. Responses of two participants also suggested that there is a *low physical environmental uncertainty*. As a low physical environmental uncertainty would discourage managers from

collecting more environmental information, and there are perceived difficulties in information collection and processing, the informational barriers could be significant in the decision making process pertaining to the adoption of EMA.

#### ■ ***INSTITUTIONAL BARRIERS***

None of the participants spoke about *legitimacy considerations* being a factor motivating universities to adopt some form of EMA. By inference, a lack of *legitimacy considerations* would be a barrier to EMA adoption. However, frequent comments were made about a *lack of institutional pressure* de-motivating EMA adoption, in particular pressure from the government, a powerful stakeholder. For example:

I wish the government would impose the requirements for reporting environmental performance on universities (President/TIT).

If it becomes a general business practice, then we would probably be asked to report. Especially as a university, we should practice what we preach, but as there is no pressure, no pressure from the government or the public, it's really hard. It's really hard to ask a university to report environmental information (Senior Accountant/TIT).

A lack of institutional pressure from the powerful stakeholders, and a lack of legitimacy considerations being given to EMA as a means to legitimise campus operation, would impede EMA adoption. Therefore, the findings supported that a *lack of institutional pressure*, a lack of *legitimacy considerations*, and *stakeholder power* as factors that offer explanations about the lack of EMA adoption within the Institute.

#### ■ ***MANAGEMENT BARRIERS***

In terms of the number of participants and the frequency of references, the management barriers seemed to be less influential than the other four key barriers. However, the four factors would have some implications for EMA adoption. Consider the following quotes:

Commitment itself is not enough. There is no doubt that you should have the commitment first, but besides that, you should operationalise the commitment. I mean you need a formal policy or some procedures to achieve the goal, monitor your progress, and make required amendments to the policy. It's a closed loop. What we are lacking is environmental awareness among staff and students, and strong commitment from the senior management. It's [managing environmental costs] still a soft issue for the University, although we have some environmental initiatives in place (Director of Research & Development/TIT).

If major environmental costs could be clearly defined, or a key environmental performance index could be provided and used to assess key managers' performance, they would definitely attract people's attention. Who cares about how much energy or electricity has been used? No one cares and they don't even care about any price increase in energy usages. Every year the budget for electricity usage is determined based upon usages in previous years, or changes in student numbers, and performance is assessed against this budget. If the actual usage is over the budget, the bill still has to be paid and no one will be held accountable. It's true that the President always says we should control our electricity usage by turning off air-conditioners or lights. It helps but doesn't help a lot, because not enough incentives have been given to change the behaviours (Director of Research & Development/TIT).

If the energy price keeps increasing, there will be a good reason for us to separately identify electricity cost, and subsequently allocate it to both administrative divisions and academic departments. But we just don't have such a plan in the near future. There are no incentives at all, and that's not our priority (Senior Accountant/TIT).

It seemed that there is a lack of environmental policies, or implementation plans, there are few incentives provided to manage environmental costs in place, and there is also a lack of leadership support to manage environmental costs. Although managers are expected to control their budgets, they are not held accountable for environmental costs incurred. These issues would be required to be taken into account before the Institute could implement some form of EMA. Therefore, the four factors in relation to the management barriers were all supported.

#### ■ *A SUMMARY OF FACTORS INFLUENCING EMA ADOPTION FOR TIT*

Table 8.4 presents the findings of relevant EMA factors across participants and by their management roles. As shown, all participants, in spite of their management roles, identified the *attitudinal*, *financial*, and *informational* barriers to have impact on EMA adoption. Further, senior managers and the Senior Accountant (with a role of management accounting) saw all the five barriers being influential on the issue.

#### **8.3.1.4 LESSONS LEARNED FROM TRANSWORLD INSTITUTE OF TECHNOLOGY**

The Institute has recently integrated the accounting system into a newly adopted enterprise resource planning (ERP) system. In terms of environmental cost information provision, the system provides similar information, as did the accounting system previously used. For example, only monetary information is provided, and the major environmental costs are not separately identified in the new system.

Physical environmental information is important in terms of managing environmental impacts. However, it is not common for universities to have an accounting system that incorporates physical information simply for the purpose of environmental management. Further, it would often be considered financially unfeasible to integrate monetary and physical information systems for the purpose of managing environmental costs alone. Therefore, a good time for organisations to integrate the two information systems is the time when their systems are due to be innovated or upgraded. Apparently, the Institute has lost the chance to implement an EMA system at low, or even no cost. Arguably, it is in large part due to a lack of knowledge. A lack of knowledge about accounting's potential in managing environmental costs is potentially responsible for the lost initiative.

**TABLE 8.4 A PRESENTATION OF THE FINDINGS ACROSS PARTICIPANTS AND BY MANAGEMENT ROLES FOR TIT**

Barriers	Management Roles		Environmental Management	Management accounting	Academic School	No of Participants
	Participants					
	Hsu	Wu	Chang	Weng	Pang	
<b>Attitudinal Barriers</b>						
Low priority of accounting for environmental costs	X	X		X		3
Resistance to change	X	X	X		X	4
<b>Financial Barriers</b>						
Efficiency or financial considerations					X	1
Environmental costs are not considered significant			X	X	X	3
Resource constraints	X	X	X	X	X	5
<b>Informational Barriers</b>						
Difficulties in collecting or allocating environmental costs	X	X	X	X	X	5
Low physical environmental uncertainty	X		X			2
<b>Institutional Barriers</b>						
Lack of institutional pressure	X	X		X	X	4
Legitimacy considerations						0
Stakeholder power		X		X		2
<b>Management Barriers</b>						
Few incentives provided to manage environmental costs		X		X		2
Lack of advocacy from the university leadership	X		X			2
Lack of environmental responsibility & accountability		X				1
Lack of integrating the environment into strategic planning		X				1

Notes: *There are five participants in this study.*

*No of Participants* – the number of participants who identified the factor as part of the barriers to EMA adoption

*Dark-greyed area* – the barrier that was identified by the participant as potentially influencing EMA adoption

*X* – the factor that was identified by the participant as a barrier to EMA adoption

### **8.3.2 NANHUA UNIVERSITY**

Located in central Taiwan, Nanhua University is a private university founded in 1996. As of the year 2005, the University has more than 200 staff and 5,500 students. The University offers various programs in 22 schools across five colleges – *Management, Social Sciences, Humanities, Science & Technology, and Arts*.

#### **8.3.2.1 ENVIRONMENTAL RESPONSIVENESS**

Nanhua University has not yet committed to a formal environmental policy, but various environmental management initiatives and programs have been adopted to improve energy efficiency and increase wastewater recycling and re-use. As indicated by the Director of General Affairs, efforts to improve environmental management are focused on the two most significant environmental challenges facing the University – electricity and water.

A building automation system implemented by the University has been recommended by the Ministry of Education in Taiwan as a best practice in energy management within universities. With the system in place, building specific information in relation to energy usages is made available. However, the information is not used for the purpose of management accounting to help improve environmental performance.

As for external environmental commitments, the University has not signed any environment-related agreements or declarations, nor has the University undertaken any form of environmental reporting (again, this is a common practice to most of the universities in Taiwan).

#### **8.3.2.2 RESULTS AND DISCUSSION FOR THE FIRST RESEARCH OBJECTIVE – CURRENT ACCOUNTING PRACTICES FOR MANAGING ENVIRONMENTAL COSTS**

The University uses a customised accounting information system that supports the functions of bookkeeping, capital budgeting and financial performance measurement. According to the Chief Accountant, electricity, water and waste costs are separately identified, but only monetary information is available in the system. Waste costs are recognised as including the cost paid to the contractor for waste removal. The three major environmental costs are accumulated in an overhead account of General Affairs. No further allocation has been undertaken. Again, there is no one person, school, or administrative division being held accountable for any of the major environmental costs being incurred.

The University separately meters electricity and water usages for all buildings on campus. Further, each building has a centrally controlled printing room, which performs printing

jobs and automatically charges works to users' accounts. As such, the University has building specific information (both physical and monetary) on electricity and water, and quantity information on paper usages at a user level. Although the information is collected, it is not available to responsibility centres, and it is not used for management accounting or control purposes. The Chief Accountant indicated that the University does not consider allocating any of the costs just mentioned to responsibility centres, although detailed information is available. The University does not intend to assess environmental performance of key managers, or report environmental information. The following section will present findings in relation to the second research objective – the barriers and potential factors that influence the decision not to adopt some form of EMA within the University.

### **8.3.2.3 RESULTS AND DISCUSSION FOR THE SECOND RESEARCH OBJECTIVE – IDENTIFYING FACTORS INFLUENCING EMA ADOPTION**

From Nanhua University, five key managers participated in this study. Table 8.5 provides a summary of the five key barriers and their related factors that explain how the barriers influence EMA adoption. As shown, the five key barriers were all supported. The thought that *environmental costs are not considered significant*<sup>122</sup> was identified as an EMA barrier, which is consistent with the findings in the TIT case. While *difficulties in collecting or allocating environmental costs* were found not to be a factor impeding EMA adoption. The reason that Nanhua University did not regard environmental cost information processing as a problem to implement EMA could be attributed to the fact that the University has implemented a building automation system, which provides related information<sup>123</sup>. In addition, there are another two factors that were not referred to – a *lack of integrating the environment into strategic planning* and *few incentives provided to manage environmental costs*. The following sections will provide further discussion.

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<sup>122</sup> As mentioned, the factor is unique to the three cases in Taiwan.

<sup>123</sup> Similarly, AUS University, one of the Australian cases, did not view information processing as a barrier to implement EMA, because the University has implemented an energy data management system for the purpose of collecting and monitoring energy usages.

**TABLE 8.5 A SUMMARY OF EMA BARRIERS AND FACTORS FOR NANHUA UNIVERSITY**

Barriers		Number of Participants*	Frequency of References
<b>Attitudinal Barriers</b>			
	Low priority of accounting for environmental costs	3	5
	Resistance to change	3	10
<b>Financial Barriers</b>			
	Efficiency or financial considerations	1	1
	Environmental costs are not considered significant	1	1
	Resource constraints	1	1
<b>Informational Barriers</b>			
	Difficulties in collecting or allocating environmental costs	0	0
	Low physical environmental uncertainty	1	4
<b>Institutional Barriers</b>			
	Lack of institutional pressure	3	3
	Legitimacy considerations	2	3
	Stakeholder power	3	7
<b>Management Barriers</b>			
	Few incentives provided to manage environmental costs	0	0
	Lack of advocacy from the university leadership	2	2
	Lack of environmental responsibility & accountability	1	1
	Lack of integrating the environment into strategic planning	0	0

\* On the basis of *five* participants from Nanhua University

#### ■ **ATTITUDINAL BARRIERS**

The two factors, a *low priority of accounting for environmental costs* and people's *resistance to change*, were identified by three and four participants, respectively. Quotes that reflect the issues included:

Can you name any organisation that provides environmental cost information to its staff (Dean, School of Management/Nanhua University)?

The Ministry of Education has tried to promote responsibility accounting within universities, but it has encountered difficulties. Firstly, academic staff tend to think that their first priority is to educate students and do research. They always take it for granted that the University provides all the support, including facility services. They are used to having unlimited access to water or electricity, which they regard as basic resources required for teaching and research. So here comes the problem. How is the performance of academic staff assessed? They are assessed by their teaching quality and research output. If you changed the system, for example, assessing them against the natural resources they used, they would complain that the University is transferring its budget constraints to them. Ideally, we would like to monitor energy usages for every department, every floor, or even every room. But before so doing, reactions of academic staff should be taken into account (Head, Department of Accounting/Nanhua University).

By inference, if few universities adopt EMA, the priority to implement EMA would not be high in the University. Further, due to academic staff's resistance to changes in the way they treat the use of environmental resources, changes in related accounting practices would not be likely to be implemented. Therefore, the two factors, a *low priority of accounting for*

*environmental costs* and *people's resistance to change*, were supported.

#### ■ ***FINANCIAL BARRIERS***

The three factors of the financial barriers did not seem to have significant impacts on EMA adoption. Each factor was mentioned by one participant. The Dean of the Management School was concerned about the cost that would be incurred to collect and process environmental cost information. He explained:

Senior management is not interested in environmental cost information. Only significant costs would attract their attention, and I am sure they are not environmental costs (Dean, School of Management/Nanhua University).

The Chief Accountant also mentioned that they do not have adequate human resources to take on the work responsibilities created as a result of EMA adoption. Due to the concerns about additional financial cost and human resource constraints, EMA is less likely to be adopted. Further, as environmental costs are not considered significant, the chance to implement EMA simply for the purpose of managing environmental costs would be even lower. Therefore, the three factors of the financial barriers were all supported.

#### ■ ***INFORMATIONAL BARRIERS***

The barriers did not seem to be significant in EMA adoption. Compared to the other two participating universities in Taiwan, the University is more advanced in collecting environmental cost information. Information processing was not seen as a problem, and *difficulties in collecting or allocating environmental costs* were not regarded as barriers to EMA adoption. However, a *low physical environmental uncertainty* was identified, which could de-motivate the University from processing more environment-related information. Due to this low level of uncertainty, EMA is less likely to be adopted, although information processing was not considered a problem.

#### ■ ***INSTITUTIONAL BARRIERS***

The three factors of the institutional barriers were all mentioned, but *stakeholder power* is the one that received the most attention in terms of the frequency of references. A lack of strong stakeholder involvement in issues in relation to accounting for the environment was evident. For example:

No one cares about whether universities are doing their share to protect the environment. What interests the government or the society is research output, but neglected is that universities require consumption of resources, including environmental ones, to produce research output. Are universities environmentally responsible? Even if you are, no one cares (Director, General Affairs/Nanhua University).

You know we, as a private university, will collect information that is required by the Board of Directors or the Ministry of Education. If they don't ask for it, we won't collect and report it (Chief

Accountant/Nanhua University).

They might think environmental issues are important, but I don't think they would think about managing environmental costs. It's partly because less attention has been paid to environmental costs, but mainly because the Ministry of Education has not requested universities to do anything about managing environmental costs or improving environmental performance. I believe if the Ministry imposes the requirements to manage environmental costs, universities will do it. But now, universities just don't have such pressure. No pressure; no action (Head, Department of Accounting/Nanhua University).

Actions from the stakeholders with power seemed to be a pre-requisite for universities to take on the responsibility to manage their environmental costs.

Two participants referred to *legitimacy considerations* as a potential factor. The Head of the Accounting Department indicated that the University is financially supported largely by the general public. Therefore, the University bears strong social responsibilities for the society as a whole. He said:

This is a religious university. Social responsibility is an important factor to be considered while we make any decisions. Therefore, our senior management would embrace new concepts such as environmental accounting because they think it's a good thing (Head, Department of Accounting/Nanhua University).

The Director of General Affairs concurred that the University tends to do the right thing to legitimise its operations, even though the right thing would sometimes cost more. For example:

We are willing to pay more to construct greener buildings, because it's considered a right thing to do (Director, General Affairs/Nanhua University).

*Legitimacy considerations* would be a factor motivating the University to adopt EMA. However, for universities that do not view EMA adoption as a means to legitimise operations, EMA would be less likely to be adopted. Therefore, a lack of *legitimacy considerations* was considered to be a barrier to EMA adoption.

## ■ **MANAGEMENT BARRIERS**

The five participants made no comments about the influence of a *lack of integrating the environment into strategic planning* and *incentives provided to manage environmental costs* on EMA adoption. However, a *lack of advocacy from the university leadership* and a *lack of environmental responsibility & accountability* were supported as relevant factors. It should be noted that advocacy from the university leadership was not referred to as a barrier but rather it is a factor driving accounting changes in the University. The Chief Accountant and the Director of General Affairs stressed that their President and Board of Directors are always very supportive of their environmental programs and accounting suggestions. With the advocacy from the university leadership, EMA would possibly be adopted. They also mentioned that for universities without support from the top management, it would be

difficult to implement new accounting practices, such as EMA.

#### ■ ***A SUMMARY OF FACTORS INFLUENCING EMA ADOPTION FOR NANHUA UNIVERSITY***

As discussed, all the five key barriers were supported in this case. However, some factors (i.e. *difficulties in collecting or allocating environmental costs, a lack of integrating the environment into strategic planning, and few incentives provided to manage environmental costs*) were not identified as factors influencing EMA adoption within the University. Table 8.6 presents the findings across participants and by management roles. As shown, fewer participants saw *financial, informational and management* barriers as factors impeding EMA adoption, whereas *attitudinal and institutional* barriers provided stronger explanations about the lack of interests in EMA adoption for the University.

#### **8.3.2.4 LESSONS LEARNED FROM NANHUA UNIVERSITY**

The University is advanced in collecting environment-related information. Separate metering systems are available to all of the buildings on campus. However, the collected information is not available to building occupants, such as heads of schools or directors of administrative divisions. Further, the information is not used for the purpose of management accounting to reduce environmental costs and improve environmental performance.

The collected information can serve as a good starting point for the purpose of identifying opportunities to reduce the consumption of environmental resources, or the generation of wastes. This would help enhance the University's environmental performance. The physical environmental information, that is made available by the metering systems, could also be applied to extend existing environmental initiatives to the implementation of an EMA system.

The University could also consider providing building specific information to the building occupants. The aim is to ensure the relevant costs that will assist environmental and financial decision-making are brought out in management information. Without collected information being brought to the attention of managers, the value of metering would be ignored.

**TABLE 8.6 A PRESENTATION OF THE FINDINGS ACROSS PARTICIPANTS AND BY MANAGEMENT ROLES FOR NANHUA UNIVERSITY**

Management Roles Participants		Senior Management	Environmental Management	Management Accounting	Academic School		No of Participants
		Chen	Wei	Chen	Chen	Ding	
<b>Attitudinal Barriers</b>							
	Low priority of accounting for environmental costs		X		X	X	3
	Resistance to change			X	X	X	3
<b>Financial Barriers</b>							
	Efficiency or financial considerations				X		1
	Environmental costs are not considered significant				X		1
	Resource constraints			X			1
<b>Informational Barriers</b>							
	Difficulties in collecting or allocating environmental costs						0
	Low physical environmental uncertainty		X				1
<b>Institutional Barriers</b>							
	Lack of institutional pressure	X	X		X		3
	Legitimacy considerations		X			X	2
	Stakeholder power		X	X		X	3
<b>Management Barriers</b>							
	Few incentives provided to manage environmental costs						0
	Lack of advocacy from the university leadership		X	X			2
	Lack of environmental responsibility & accountability					X	1
	Lack of integrating the environment into strategic planning						0

Notes: *There are five participants in this study.*

*No of Participants* – the number of participants who identified the factor as part of the barriers to EMA adoption

*Dark-greyed area* – the barrier that was identified by the participant as potentially influencing EMA adoption

*Vertical-lined area* – questions not asked or answered

*X* – the factor that was identified by the participant as a barrier to EMA adoption

### 8.3.3 NATIONAL UNIVERSITY OF KAOHSIUNG

National University of Kaohsiung (NUK) was founded in 2000. Located in southern Taiwan, the University has more than 300 staff and 5,000 students within 36 schools across seven colleges: *Law, Management, Science, Engineering, Life Sciences, Humanities & Social Science*, and *Asia-Pacific Industrial & Business Management*. Due to limited access, there are only two participants from the University, one with an environmental management function (i.e. the Director, General Affairs) and the other with a management accounting function (i.e. the Director, Accounting & Finance Division). The first research objective, understanding current accounting practices for managing environmental costs, can be met by interviewing the two key persons. However, the identified EMA barriers and related factors would be limited to the views of the two directors participating in this study.

#### 8.3.3.1 ENVIRONMENTAL RESPONSIVENESS

According to the Director of General Affairs, the consumption of electricity and water, and the generation of wastes, could cause significant environmental impacts. Therefore, the University has brought in some technical measures to achieve energy efficiency, water conservation, and waste minimisation.

The University is one of the two signatories to the Talloires Declaration in Taiwan. The two directors are both aware that the University is a signatory, but they indicated that the challenge for the University is to put in place an implementation plan<sup>124</sup> to meet the requirements of the Declaration. The Director of General Affairs admitted that being a signatory is more symbolic than practical to the University<sup>125</sup>, as the University does not seem to be striving for ensuring compliance.

Like the other two participating universities in Taiwan, the University does not undertake any environmental reporting, nor has it committed itself to an environmental policy to manage environmental costs.

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<sup>124</sup> According to ULSF (2007), without an implementation plan in place to ensure the compliance with requirements of the Declaration, it is less likely that the Declaration will have much practical meaning. Being a signatory would become a purely 'symbolic act', or the signatory may end up 'making piecemeal progress without coherent long-term goals'.

<sup>125</sup> The experience suggested that, at least in Taiwan, a university's status as a signatory to the Talloires Declaration might not be a valid indicator for the level of environmental commitments.

### **8.3.3.2 RESULTS AND DISCUSSION FOR THE FIRST RESEARCH OBJECTIVE – CURRENT ACCOUNTING PRACTICES FOR MANAGING ENVIRONMENTAL COSTS**

The University uses a standard accounting package for the purposes of financial and management accounting. Again physical information is not available in the system. Although some physical information is available (e.g. electricity and water usages), it is maintained by General Affairs, and not available to management accountants. Available evidence suggested that there is no link between systems collecting physical and monetary information, and there is also a lack of communication between key managers involved in functions of management accounting and environmental management in terms of managing environmental costs.

Two major environmental costs (i.e. electricity and water) can be separately identified in the accounting system. Waste costs are accumulated in the ‘service contracts’ account, and only include the cost to have the wastes removed. Paper is accumulated in the ‘stationery & consumables’ account. Except for paper, the major environmental costs are accumulated in the overhead account of General Affairs, which is allocated to the academic schools and administrative divisions based on an arbitrary rate. Although General Affairs carries the overhead, the Director is not held accountable for the costs incurred. For example, he said:

No, I am not held accountable. Nobody is held accountable, but we do think about what we can do to reduce the costs.... Who should be held accountable for the water or electricity costs? I think it’s not a problem to us, as these costs are required and unavoidable for campus operations (Director, General Affairs/National University of Kaohsiung).

Common to the other two participating universities in Taiwan, the University does not set up any environmental targets, or assess its environmental performance.

### **8.3.3.3 RESULTS AND DISCUSSION FOR THE SECOND RESEARCH OBJECTIVE – IDENTIFYING FACTORS INFLUENCING EMA ADOPTION**

As there were only two participants in the University, the barriers and factors identified to influence EMA adoption are less comprehensive. However, the insights and perspectives gained from the interviews were still valuable in identifying factors having impacts on EMA adoption. A summary of the EMA barriers and related factors is presented in Table 8.7. As shown, the two participants both mentioned *resource constraints* as part of the *financial* barriers, *difficulties in collecting or allocating environmental costs* as part of the *informational* barriers, and a *lack of environmental responsibility & accountability* as part of the *management* barriers. Yet, the Director of General Affairs also identified *resistance to change* as part of the *attitudinal* barriers, and a *lack of integrating the environment into strategic planning* as part of the *management* barriers. The three factors classified as

*institutional* barriers (i.e. *institutional pressure*, *stakeholder power* and *legitimacy considerations*) were not mentioned. By inference, a lack of *legitimacy considerations* being given to EMA as a means to legitimise campus operations could explain the lack of EMA adoption in the University.

**TABLE 8.7 A SUMMARY OF EMA BARRIERS AND FACTORS FOR NUK**

Barriers	Number of Participants*	Frequency of References
<b>Attitudinal Barriers</b>		
Resistance to change	1	1
<b>Financial Barriers</b>		
Resource constraints	2	4
<b>Informational Barriers</b>		
Difficulties in collecting or allocating environmental costs	2	3
<b>Institutional Barriers</b>		
Legitimacy considerations	0	0
<b>Management Barriers</b>		
Lack of environmental responsibility & accountability	2	2
Lack of integrating the environment into strategic planning	1	1

\* On the basis of *two* participants from National University of Kaohsiung

#### **8.3.3.4 LESSONS LEARNED FROM NATIONAL UNIVERSITY OF KAOHSIUNG**

An interview with the Director of Accounting & Finance revealed that accountants in the University are not involved in managing environmental costs or providing environmental cost information for decision-making. The Director indicated that it seems to her that accountants do not have a significant role to play in environment-related issues. Arguably, this perception could be due to a lack of knowledge about the roles that accountants can play to help manage environmental performance, and the benefits that embracing EMA can bring.

Different from the other two Taiwanese participating universities, the University is one of the two signatories to the Talloires Declaration in Taiwan. However, its current management and accounting practices for the major environmental costs do not seem to be different. For example, the major environmental costs are accumulated in overhead accounts, there is no link between systems collecting physical and monetary environmental cost information, and management accounting seems to play a marginal role in terms of managing environmental performance. According to Gray and Bebbington (2001), without ‘greening accounting’ some environmental initiatives just could not be implemented. Without accountants being involved in managing environmental costs, environmental initiatives could help in making piecemeal progress, but a coherent long-term environmental goal would be less likely to be

achieved.

Having presented results and findings pertaining to the four cases in the chapter and RMIT University in the previous chapter, the next section will provide overall summaries across all the five participating universities for the first and second research objectives of this study, respectively.

#### **8.4 AN OVERALL SUMMARY ACROSS RMIT UNIVERSITY AND THE OTHER FOUR CASES**

Five case-by-case presentations of the findings and results for the first and second research objectives have been given. It is important at this stage to provide an across-case summary of the findings in order to gain a broader understanding of the topic being studied.

To address the first research objective, Table 8.8 provides an overall summary of current accounting practices for managing environmental costs across the five universities. The summary revealed that a number of traditional management accounting practices in managing environmental costs are present in a majority of the five universities in spite of their different regional contexts. The common practices include (but are not limited to) a bias towards monetary information, allocation of environmental costs to overhead accounts, and misallocation and underestimation of environmental costs. In terms of performance measurement, none of the five universities have put in place any environmental performance indicators against which to measure their overall environmental performance. Key managers are not held accountable for environmental costs incurred, and they are not assessed by their environmental performance. Although some universities have started to provide environmental reporting, the reported environmental cost information is limited in scope.

For the second research objective, Table 8.9 provides an overall summary of the factors influencing EMA adoption across the five universities. The five key barriers were all supported, although the factors that constitute each of the key barriers varied for each university. Comparing across the cases, several EMA factors returned consistent results. For example, *resistance to change*, *resource constraints*, *(a lack of) legitimacy considerations*, and *a lack of environmental responsibility & accountability* were found to be impeding EMA adoption in all the five universities, and therefore they can be regarded as strong EMA factors.

**TABLE 8.8 AN OVERALL SUMMARY OF CURRENT ACCOUNTING PRACTICES FOR MANAGING THE MAJOR ENVIRONMENTAL COSTS**

	<b>RMIT University</b>	<b>AUS University</b>	<b>TIT</b>	<b>Nanhua</b>	<b>NUK</b>
<b>How are the major environmental costs accounted for?</b>	✧ Total costs for <i>electricity</i> and <i>water</i> are separately identified in the accounting system, but they are accumulated in the same overhead account.	✧ In addition to electricity and water, waste costs are also separately identified in the accounting system, and they are accumulated in the same overhead account.	✧ The major environmental costs are not separately identified in the accounting system. Costs for electricity, water and wastes are accumulated in the same overhead account.	Same as AUS University	Same as AUS University
	✧ <i>Paper</i> cost is accumulated in an overhead account.	Same as RMIT University	Same as RMIT University	Same as RMIT University	Same as RMIT University
	✧ <i>Waste</i> costs are recognised as including the costs incurred to have wastes removed.	Same as RMIT University	Same as RMIT University	Same as RMIT University	Same as RMIT University
	✧ For the major environmental costs captured within the accounting system, only monetary information is provided.	Same as RMIT University	Same as RMIT University	Same as RMIT University	Same as RMIT University
	✧ There is no link between systems collecting monetary and physical environmental cost information.	✧ A newly implemented energy data management system provides the link, but the system is not linked to the accounting system.	Same as RMIT University	Same as RMIT University	Same as RMIT University
<b>Cost allocation</b>	✧ Costs for electricity, water and waste are accumulated and allocated to responsibility centres as a single occupancy charge on the basis of floor space occupied.	✧ The university allocates electricity costs to responsibility centres based on the usages.	✧ Costs for water and electricity are allocated to administrative divisions and academic schools as a single charge on the basis of an arbitrary rate.	✧ No subsequent allocation for the major environmental costs.	Same as TIT
<b>Environmental performance measurement</b>	✧ Key environmental performance indicators of the major environmental costs are not established.	Same as RMIT University	Same as RMIT University	Same as RMIT University	Same as RMIT University
	✧ Managers are not assessed against their environmental performance.	Same as RMIT	Same as RMIT	Same as RMIT	Same as RMIT
<b>Environmental reporting</b>	✧ Environmental sustainability information is reported in annual reports.	Same as RMIT	No environmental reporting is provided.		
	✧ Environmental reporting is provided on a whole university basis.	✧ Only commentaries on improvement to the infrastructure and facilities are provided; no quantity information is available.			
	✧ The major environmental costs, electricity and water, are reported by quantities per EFTSU.				
	✧ Trend data over a four-year period is also provided.				

**TABLE 8.9 AN OVERALL SUMMARY OF THE FACTORS INFLUENCING EMA ADOPTION ACROSS THE FIVE PARTICIPATING UNIVERSITIES**

Country		AUSTRALIA		TAIWAN		
Universities		RMIT University	AUS University	Transworld Institute of Technology	Nanhua University	National University of Kaohsiung
<i>Total Number of Participants</i>		11	3	5	5	2
<b>Attitudinal Barriers</b>						
	Low priority of accounting for environmental costs	X	X	X	X	
@	Resistance to change	X	X	X	X	X
<b>Financial Barriers</b>						
@	Resource constraints	X	X	X	X	X
	Efficiency or financial considerations	X	X	X	X	
	Environmental costs are not considered significant			X	X	
<b>Informational Barriers</b>						
	Difficulties in collecting or allocating environmental costs	X		X		X
	Low physical environmental uncertainty	X	X	X	X	
<b>Institutional Barriers</b>						
	Lack of institutional pressure	X	X	X	X	
	Stakeholder power	X	X	X	X	
@	Legitimacy considerations	X	X	(X)	X	(X)
<b>Management Barriers</b>						
	Few incentives provided to manage environmental costs	X	X	X		
	Lack of integrating the environment into strategic planning	X	X	X		X
@	Lack of environmental responsibility & accountability	X	X	X	X	X
	Lack of advocacy from the university leadership	X	X	X	X	

**Notes:** X – The factor is supported to have influence on EMA adoption  
 (X) – Supporting a lack of legitimacy considerations as a barrier to EMA adoption  
 @ – A very strong factor that is supported in all the five cases

## 8.5 CONCLUSION

In this chapter the results and findings pertaining to the other four cases have been presented. Overall summaries across all the five participating universities, including RMIT University presented in the previous chapter, have also been provided. The discussion revealed that the five participating universities are lacking in terms of establishing systems to manage their environmental costs. The summaries also highlighted that a number of traditional management accounting practices in managing environmental costs appear to be common at all the participating universities in spite of their different regional contexts. It is possible that the common accounting practices would appear at other universities, and a lack of systems to manage environmental costs could also be a problem common to them.

The EMA factors identified by participants from RMIT University, the in-depth case study, were all found supported by at least two of the four other cases. The result confirmed that the EMA factors could be common to other universities, as each of the participating universities is context and country specific, but they returned consistent results. Among the potential factors, *resistance to change*, *resource constraints*, *a lack of legitimacy considerations*, and *a lack of environmental responsibility & accountability* were identified by all the five participating universities as impeding EMA adoption. Therefore, they could be influential factors for universities to embrace some form of EMA.

Intentionally, this and the previous chapters have not provided discussion on the theoretical framework proposed in Chapter Five to help identify potential EMA factors. This is the role of the following chapter to provide such discussion. The following chapter will revisit the proposed theoretical framework, and provide theoretical implications of barriers to EMA adoption.

## **CHAPTER NINE**

### **THEORETICAL IMPLICATIONS**

#### **9.1 INTRODUCTION**

Results and findings pertaining to RMIT University and the other four case universities have been provided. Overall summaries across universities have also been presented to describe current accounting practices for managing environmental costs and provide explanations about a lack of EMA utilisation within the participating universities. As theoretical propositions were used as templates with which to compare the findings of the five universities (Yin 2003b), it is important at this stage to revisit the propositions.

Building from a theoretical framework<sup>126</sup> proposed in Chapter Five, eight propositions were developed as guidance to explore factors impeding, or assisting, EMA adoption. Within the context of the five universities, the eight propositions were confirmed. The purpose of this chapter is to present a summary of findings that support the propositions and advance theoretical implications for practice. Following the discussion of theoretical generalisations and implications, a ‘way forward’ will be provided to encourage EMA to be embraced by universities. A conclusion will then be drawn, which then leads to the final chapter that provides an overall summary and conclusions of this thesis.

#### **9.2 THE THREE PROPOSITIONS DEVELOPED FROM THE CONTINGENCY THEORETICAL PERSPECTIVE**

Three propositions were developed from the contingency theoretical perspective, which highlighted the influence of environmental strategy as a moderating variable and physical environmental uncertainty on EMA adoption. The following sections will present the findings that confirm the propositions, and advance theoretical implications in relation to this theoretical perspective.

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<sup>126</sup> As discussed in Chapter Five, the proposed theoretical framework embraces four theories – contingency theory, institutional theory, legitimacy theory and stakeholder theory.

### 9.2.1 THE INFLUENCE OF ENVIRONMENTAL STRATEGY AS A MODERATING VARIABLE

Based on the contingency relationship between environmental strategies and changes in accounting information systems, it was posited:

*P1. Universities that are signatories to environment-related agreements or declarations and strive to ensure compliance with the commitment would devote attention to minimise environmental impacts and/or manage environmental costs.*

Of the five participating universities, three are signatories to either regional or international environment-related agreements<sup>127</sup>. A summary of their environmental commitments and environmental initiatives and/or programs is presented in Table 9.1. The summary provides a basis to partially confirm the proposition. Regardless of whether the participating universities are signatories to environment-related agreements, they are all engaged in some form of environmental management to minimise their major environmental impacts, and manage associated costs in a way suggested by conventional management accounting, which is subject to many criticisms as shown in Table 9.1. It appears that being a signatory and ensuring the compliance could provide partial (but not complete) explanations about the attention being devoted to reduce environmental impacts and manage environmental costs. However, other factors exist that provide explanations for the environmental responsiveness by universities who are not signatories to any environment-related declaration.

The proposition was formed on the basis of environmental strategies being a relevant EMA factor. Theoretically, a university that signed any environment-related agreement would implement environmental strategies that can be linked to the overall strategic goal of the university. The study found that RMIT University and AUS University have already adopted environmental policies to improve environmental management. However, National University of Kaohsiung (Taiwan), a signatory to the Talloires Declaration, has not yet put in place any environmental policy, or implementation plan, to ensure the compliance. An overall summary of the factors influencing EMA adoption across the five universities (see Table 8.9 on Page 193) revealed that four out of the five universities (including the three above-mentioned universities) supported a view that a *lack of integrating the environment into strategic planning* contributes to a lack of EMA adoption. This would have implications for accounting practices, which will be discussed right after the three propositions developed from this theoretical framework are all revisited.

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<sup>127</sup> RMIT University is engaged in a number of environmental agreements; AUS University participates in the Australian Greenhouse Challenge; and National University of Kaohsiung is a signatory to Talloires Declaration, whereas the other two universities in Taiwan do not participate in any international or regional agreement.

**TABLE 9.1 A SUMMARY OF ENVIRONMENTAL COMMITMENTS AND ENVIRONMENTAL INITIATIVES**

University	Environmental Agreements Signed	Environmental Initiatives and/or Programs	Criticisms of Current Accounting Practices
<b>RMIT University</b>	<ul style="list-style-type: none"> <li>✓ Talloires Declaration</li> <li>✓ Australian Greenhouse Challenge</li> <li>✓ Australasian Campuses Toward Sustainability<sup>128</sup></li> <li>✓ United Nations Global Compact<sup>129</sup></li> </ul>	<ul style="list-style-type: none"> <li>● An environmental policy in place</li> <li>● The establishment of Global Sustainability Institute</li> <li>● The establishment of a sustainability committee to ensure compliance with external environmental commitments made</li> <li>● A new position for an energy manager has been filled</li> <li>● Provide environmental reporting</li> <li>● Engaged in environmental programs to reduce energy and water usages, and minimise waste generation</li> </ul>	<ul style="list-style-type: none"> <li>● A bias towards monetary environmental cost information</li> <li>● Allocation of environmental costs to overhead accounts</li> <li>● Misallocation and underestimation of environmental costs</li> <li>● No establishment of environmental performance indicators</li> </ul>
<b>AUS University</b>	<ul style="list-style-type: none"> <li>✓ Australian Greenhouse Challenge</li> </ul>	<ul style="list-style-type: none"> <li>● An environmental policy in place</li> <li>● Employ an energy manager to monitor overall energy efficiency</li> <li>● A building automation system in place to monitor energy usages and improve energy efficiency</li> <li>● Provide environmental reporting</li> <li>● Engaged in environmental programs to reduce energy and water usages, and minimise waste generation</li> </ul>	Same as above
<b>Transworld Institute of Technology</b>	Not Applicable	<ul style="list-style-type: none"> <li>● Engaged in environmental programs to reduce energy and water usages, and minimise waste generation</li> </ul>	Same as above
<b>Nanhua University</b>	Not Applicable	<ul style="list-style-type: none"> <li>● A building automation system in place to monitor energy usages and improve energy efficiency</li> <li>● Engaged in environmental programs to reduce energy and water usages, and minimise waste generation</li> </ul>	Same as above
<b>National University of Kaohsiung</b>	<ul style="list-style-type: none"> <li>✓ Talloires Declaration</li> </ul>	<ul style="list-style-type: none"> <li>● The establishment of an environmental committee to oversee environmental management</li> <li>● A building automation system in place</li> <li>● Engaged in environmental programs to reduce energy and water usages, and minimise waste generation</li> </ul>	Same as above

<sup>128</sup> Australian Campuses Towards Sustainability is the primary forum for sustainability in the Australian and New Zealand tertiary sectors.

<sup>129</sup> Initiated by the United Nations, the Global Compact is purely voluntary and has the objectives to mainstream its ten principles in business activities around the world and catalyse actions in support of UN goals. Today thousands of organisations, both profit and not-for-profit, from all regions of the world are engaged in the Global Compact, working to advance the ten principles in the areas of human rights, labour, the environment and anti-corruption (United Nations 2007).

## 9.2.2 THE INFLUENCE OF A CONTINGENCY RELATIONSHIP BETWEEN PHYSICAL ENVIRONMENTAL UNCERTAINTY AND INFORMATION PROCESSING

The contingency theoretical perspective suggests that perceived physical environmental uncertainty would influence organisational environmental strategies, which in turn have impacts on environmental information processing. Accordingly, it was proposed:

*P2. The greater (lower) the physical environmental uncertainty perceived by senior management, the more (less) likely an EMA system will be adopted to provide relevant environmental information to reduce perceived uncertainties.*

To determine the level of perceived physical environmental uncertainty, a scale proposed by Lewis and Harvey (2001, p. 227) was used as guidance<sup>130</sup>. Using Lewis and Harvey's scale as guidance, the research found that there is a low level of physical environmental uncertainty for universities in general. For example, there is a general lack of environmental requirements or regulations imposed on universities to manage environmental costs. There is a mistaken belief that universities do *not* generate significant environmental impacts. Few stakeholders, including stakeholders with power, are interested in environmental impacts caused by universities. Issues in relation to environmental impacts caused by campus operations do not seem to affect the funding from the government and student recruitment, which are the two major financial sources for universities. The coded data also confirmed a low physical environmental uncertainty perceived by key managers within the participating universities.

If the perceived physical environmental uncertainty is low, there does not seem to be a need to collect and process more environmental cost information. It is equally true that EMA as a tool to assist in providing relevant information for decision-making does not seem to be required. Under such a low physical environmental uncertainty, it is less likely that senior managers would take the initiative to adopt an EMA system for managing environmental costs. Therefore, the proposition, which suggests physical environmental uncertainty as a potential EMA factor, was confirmed. This implies that for EMA to be utilised by universities, increased physical environmental uncertainty would be required. The implication will be discussed later.

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<sup>130</sup> A discussion of the scale proposed by Lewis and Harvey (2001, p. 227) is provided in Chapter Five.

### 9.2.3 THE INFLUENCE OF A CONTINGENCY RELATIONSHIP BETWEEN PHYSICAL ENVIRONMENTAL UNCERTAINTY AND ENVIRONMENTAL PERFORMANCE MEASUREMENT

It was proposed:

*P3. Negative financial conditions increase the pressure on universities to improve financial performance, and therefore an EMA system that incorporates environmental cost information as part of performance measurement would be relatively less emphasised.*

The large majority of Australian universities are directly funded by the government, and are accountable to government for their financial performance. Government funding has been reduced over the past decade (Moll 2003). The reduction in funding increases financial pressure for universities, which creates greater pressure on managers to improve financial performance. When universities incur financial deficits, the pressure is greater. For example, a track record of financial deficit at RMIT University for the past few years imposes much pressure on the University to improve its financial performance. The similar phenomenon is observable in Taiwan, where universities have suffered from the reduction in government funding in recent years. The pressure from an uncertain economic condition drives universities to focus more on financial performance.

An across-university summary of EMA factors (see Table 8.9 on Page 193) revealed that *resource constraints* and *efficiency or financial considerations* provide strong explanations about a lack of EMA adoption. Under negative economic conditions, the influence of 'efficient choice' would be even stronger. For example, the Vice-Chancellor and President of RMIT University, who is under greater pressure to improve the University's financial performance, stressed:

... So do I want my schools worrying about their overall energy costs, when in fact, a lot of what will affect those is our infrastructure? So if it's not in their control, why shouldn't I be concentrating on the work that reduces the overall costs around energy or water and the likes by improving our infrastructure, which is the priority, and where we're spending a lot of money on, or should I be attempting to send a signal to someone who's actually got very little control over it? And even if everybody did turn off the lights, it would make almost no difference (Vice-Chancellor and President/RMIT).

The pressure to improve financial performance would direct senior managers' attention towards what they think would be the most efficient way to manage environmental impacts. Although EMA has the potential to improve environmental performance, which in turn will improve financial performance, it is relatively less emphasised. The findings pertaining to RMIT University confirmed the proposition, which stresses *efficiency or financial considerations* as an important factor in making the decision to utilise EMA as a means to

improve environmental performance. The implication is discussed in the next section.

#### **9.2.4 IMPLICATIONS AND FURTHER DISCUSSION OF THE CONTINGENCY THEORETICAL PERSPECTIVE**

The contingency theoretical framework embraced in this study suggests perceived physical environmental uncertainty as an important variable to influence environmental strategies, and explains changes in management accounting practices (including information processing and performance measurement). Although with some caveats, results and findings pertaining to the five universities provide evidence that supports the three propositions developed from the suggested contingency relationships. A discussion of the theoretical implications follows.

##### **■ ENVIRONMENTAL STRATEGY**

Evidence shows that there is a general lack of integrating the environment into overall strategic planning in the participating universities. Although three universities are signatories to environment-related agreements, they have not yet implemented any environmental strategy that could be linked to the strategic goal of the universities. It is true that they all have undertaken some environmental management initiatives, or programs, to reduce their major environmental impacts. However, a literature review suggests that without integrating the environment into strategic planning, some progress would be still made but it is less likely that environmental initiatives may be conducted strategically (e.g. Herremans & Allwright 2000). This seems to be the case for the participating universities.

Perhaps as a result of this lack of strategic environmental management, key managers in the participating universities are not held accountable for their environmental performance, and few incentives have been provided to manage environmental costs. As noted by Macve (1997), a challenge for strategic environmental management is to construct a new environmental accountability that is linked to real incentives. The study would suggest the use of EMA to provide the linkage and help construct the new accountability. As explained by Gauthier et al. (1997), an EMA system provides environmental costs to the eyes of managers, helps set achievable environmental goals, ensures environmental performance follow-up, and holds managers accountable for their environmental performance. This process would contribute to form coherent environmental strategies.

In particular, lessons learned from the participating universities indicate that the setting of budgets could be an important means of implementing strategic objectives. The implication is to ensure that financial performance measures reflect environmental considerations. This could be achieved by setting up a responsibility-centred budgeting system for environmental

costs (i.e. allocating budgets for the major environmental costs to responsibility centres, and assessing environmental performance against the allocated budgets). The suggestion is based on the belief that if costs are not allocated to appropriate cost objects or budgets, they are not going to change or influence behaviour due to a lack of financial incentives. Explanations about how this could be achieved by the allocation of the major environmental costs to responsibility centres have been provided in Chapter Seven.

#### ■ *ENVIRONMENTAL COST INFORMATION PROCESSING*

The study confirmed the contingency relationship existing between physical environmental uncertainty and changes in management accounting systems for information processing. However, it was found that the influence of this contingency relationship would be reduced if there was a reduction in the perceived difficulties associated with collecting or allocating environmental costs. For example, concerns about the difficulties were explicitly expressed by the majority of RMIT participants (ten out of eleven). They indicated that the difficulties would prevent them from utilising environmental cost information for the purposes of environmental reporting, goal setting, and performance measurement. This has two implications. Internally, the involvement of individuals with the knowledge of existing and potential accounting systems is required to reduce the difficulties in information processing. Externally, a framework is essential that provides guidelines for environmental cost identification and categorisation in particular for service organisations.

In terms of internal management, the research found there is limited involvement of accountants in environmental cost information processing within the participating universities. In general, the major environmental costs are 'managed' in a way that is suggested by conventional management accounting, which is subject to the criticism of paying little or no attention to attributing environmental costs to an organisation's operations (see Deegan 2003; Epstein 1996; UNDSO 2001). The study would suggest that accountants should be involved in the process for the purpose of improving the way environmental costs are managed. All the five universities have collected physical and monetary information in relation to energy and water usages. Three of them have put in place a building automation system to monitor the energy consumption. This existing environmental cost information requires assistance from accountants to be integrated into existing management accounting systems to better manage environmental costs. This could be achieved by rearranging the chart of accounts and modifying existing systems so as to reflect physical and monetary environmental cost information for the purposes of understanding the environmental impacts, and managing associated costs. There could be a financial cost associated with the modification, but it is

relatively inexpensive in comparison with the financial and environmental benefits better information would help to generate. The point was supported by some RMIT participants and EMA-related case studies (see Deegan 2003).

Externally, there seems to be a lack of an environmental cost framework that suits the needs of universities. There are some guidelines which provide directions towards reducing the difficulties in identifying environmental costs (e.g. IFAC 2005; USEPA 1995b). However, they are typically focused on manufacturing industries. Issues in relation to environmental cost identification and categorisation by the service sector, which includes universities, receive less attention, both in practice, and research. For example, there are few EMA case studies on educational institutions. The results of this study would suggest that an environmental cost framework is required that takes into consideration special needs of service organisations. In practice, GRI has started to develop sector supplements for industries facing unique needs and requiring specialised guidance to report sustainability information (GRI 2007). Sector supplements for financial services are now available in pilot version. Given various environmental costing schemes (e.g. the USEPA cost scheme) and approaches (e.g. ABC and materials flow accounting) are available, they could be tailored to suit specific needs of universities for adopting some form of EMA. However, this could not be achieved without more and active participation from both researchers and practitioners in this neglected area.

#### ■ *ENVIRONMENTAL PERFORMANCE MEASUREMENT*

Environmental performance is an area of growing concern to business. Due to the increasing environmental incidents and disasters, organisational environmental performance is of particular interest to both external and internal stakeholders (Gray & Bebbington 2001). The increasing importance and concern of managing environmental performance has led to the rapid development of environmental performance measurement. However, this is still an area attracting little attention within universities, although universities do generate significant environmental impacts. Arguably, it is mainly due to the fact that universities are generally not assessed on their environmental performance, and key managers are not held accountable for environmental costs incurred.

The study would suggest that key managers of universities be assessed against their environmental performance. The issue arguably has to be addressed internally by the senior managers of universities, as ‘what gets measured gets done’. Indeed, more needs to be done before holding key managers responsible and accountable for environmental performance, as environmental accountability requires data. Without a system providing better environmental

cost information, it is less likely that this could be achieved. An EMA system in place would be required, but top management support and leadership commitment is essential to the success of implementing such a system.

Further, given the role of higher education for the environment (again education itself and internal practices), universities should practice what they preach. With little doubt, if universities take the responsibility to provide environmental education, then they should practice what they preach to manage related issues, which include accounting for internal management. Criticisms about conventional management accounting have been addressed. The next step is for universities to take actions and overcome the criticisms in improving the management of environmental costs. Again, this requires an individual associated with senior management who could 'champion' the actions.

Having provided implications on the contingency theoretical framework, the following sections will move to the propositions developed from the institutional theoretical perspective and associated implications for practice.

### **9.3 THE INSTITUTIONAL THEORETICAL PERSPECTIVE**

According to institutional theory, changes in the institutional environment of organisations may result in homogeneity, which would stimulate, or hinder, the adoption of new organisational practices, such as EMA. DiMaggio and Powell (1983) suggest three mechanisms through which organisational changes can occur that lead to institutional homogeneity. The three mechanisms are coercive pressure, mimetic pressure, and normative pressure, from which three propositions were developed.

#### **9.3.1 GOVERNMENT PRESSURE AS THE COERCIVE PRESSURE**

It was posited that:

*P4. The greater (lower) the government pressure on universities to provide an environmental account in relation to the use of funds, the greater (lower) the likelihood that universities would put in place an EMA system to account for environmental costs.*

This proposition was confirmed. In Australia, universities are required to provide an educational profile<sup>131</sup> to the government (Moll 2003). The purpose of the profile is to strengthen a financial accountability relationship between universities and the government as

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<sup>131</sup> The profile can include a university's strategic plan, a range of student and staffing statistics, new programs, research and research training management plans along with a range of research performance measures, capital spending plans, equity considerations, indigenous portfolios, quality assurance systems, and flexible learning updates.

well as to secure funds and grants from the government. An environmental account is not a required part of the profile submitted to the government. The decrease in government funding has forced universities to ensure that resources are consumed in an efficient manner and to focus on their financial status. However, a need to discharge environmental accountability fails to be part of the focus, as providing an environmental account is not mandatory for Australian universities. Seven of the eleven RMIT participants indicated that government pressure plays an important role in promoting environmental initiatives or reporting practices, but they feel no pressure from the government to account for environmental costs. Comments by the senior manager of AUS University also reflected this lack of government pressure on universities. In Taiwan, six participants of the three universities indicated that they have to ensure the efficient use of government funding, but providing an environmental account is not an issue on their management agenda. This lack of attendance to providing an environmental account appears to be mainly due to a lack of government pressure from the Ministry of Education.

With the pressure to provide a financial account for justifying prudent use of government funds, universities voluntarily choose to adopt some technical measures to increase energy efficiency as part of demonstrating their efforts to use the funds more efficiently. For example, all the five participating universities have adopted some initiatives to increase energy efficiency so as to spend the cost savings on somewhere else. However, without the pressure to provide an environmental account, universities fail to focus on accounting for environmental costs. The coded data revealed that the priority of implementing a system to account for environmental costs is low within the participating universities. Available evidence suggests that government pressure is required to motivate universities to account for environmental costs. If the government, as a main fund provider, would request an environmental account, universities would have no choice but provide this account to secure the government funding.

### **9.3.2 MIMETIC PRESSURE INDUCED BY RECOGNISING THE IMPORTANCE OF ENVIRONMENTAL COSTS WITHIN THE UNIVERSITY'S ORGANISATIONAL FIELD**

It was proposed that:

*P5. The decision to mimic best practice for managing environmental costs is contingent upon the recognition of the importance of environmental costs within the organisational field of universities. If the importance of environmental costs were not recognised in the organisational field, mimetic pressure would not be present, and it would be less likely that a university would adopt an EMA system to manage environmental costs.*

An investigation of environmental responsiveness within the five participating universities revealed that the adoption of some environmental management measures is recognised as a means to achieve environmental sustainability in the organisational field of universities. For example, all the five universities have undertaken some environmental programs, or initiatives, to improve energy efficiency, water conservation, and reduce waste generation. Further, three of the five participating universities have implemented building automation systems to collect energy information and monitor energy usages. Indeed, when a university intends to pursue environmental sustainability, it is natural that the above mentioned environmental management practices would be copied or mimicked.

However, the importance of environmental costs (at least at absolute amounts) incurred by universities does not appear to be recognised by key players within the organisational field. For example, four participants from two of the three Taiwanese universities explicitly said that environmental costs are *not* considered significant. Participants from the two Australian universities made frequent references to a lack of interest from students and staff in environmental issues, such as managing environmental costs. This lack of interest was also common to the three Taiwanese universities.

Evidence suggests that the proposition was confirmed. An across-university summary of EMA factors revealed that a *low priority of accounting for environmental costs* is a strong factor explaining a lack of EMA adoption in four out of the five participating universities. The low priority is mainly due to the fact that environmental costs are relatively low compared with other costs, such as personnel costs, incurred by universities. Although best EMA practices are currently available, universities would not mimic the practices for the purpose of better accounting for environmental costs. Arguably, it is in large part because key players within the organisational field of universities do *not* consider environmental costs as significant. For universities to embrace some form of EMA, it seems to be required to demonstrate the significance of environmental costs incurred by universities. A literature review (e.g. HEEPI 2007b) and evidence found in this research suggest that electricity would represent the most significant environmental cost incurred by universities. To reveal how significant environmental costs could be and attract interests of key players within the organisational field, perhaps more attention should be directed towards electricity consumption and its absolute dollar amounts. The research would suggest that additional case studies with a focus on energy consumption (in particular electricity) by universities should be undertaken. These studies should reflect both physical and monetary information about the energy consumption by universities so as to highlight relevant environmental cost information.

### 9.3.3 NORMATIVE PRESSURE INDUCED BY TOP MANAGEMENT INDIVIDUAL CONCERNS

It was posited:

*P6. The greater (lower) the normative pressure imposed on key managers within universities to account for the environment, the greater (less) the likelihood that a university would put in place an EMA system for the purpose of managing environmental costs.*

The research found if a key manager associated with senior management has knowledge of environmental accounting, the manager would probably become a vehicle to drive changes in accounting practices for managing environmental costs. For example, the chief accountant of Nanhua University (Taiwan) was involved in EMA project before he joined the University. His past experience has strong impacts on the implementation of a building automation system in the University. The system generates both monetary and physical environmental cost information, and the information is building specific.

However, if key managers were not exposed to environmental accounting, they might think within existing accounts, and the chance to implement an EMA system for the purpose of managing environmental costs would be lower. Transworld Institute of Technology (Taiwan) has recently implemented an integrated enterprise resource planning system. The accounting module contained in the new system provides similar information, as did the accounting system previously used. Physical environment cost information, which is important for managing environmental performance, is still not made available. An interview with the Senior Accountant at TIT reflected a general lack of knowledge about environmental accounting. This lack of knowledge jeopardised the opportunity for TIT to incorporate financial and non-financial measures for environmental costs within the new system at a low (or even zero) cost. Conversations with two key managers in directing environmental management at TIT revealed that poor collaboration and communication exists between managers involved in management accounting and environmental management. Although the two managers were exposed to environmental accounting (but more from an engineering perspective), their knowledge has no influence on system changes in relation to accounting. Insights gained from the two universities supported the impacts of management knowledge and experience in shaping accounting practices for managing environmental costs, which provide the basis to confirm the proposition in relation to the influence of 'professionalisation'. This implies that increased normative pressure on the role of accountants in environmental management would be required to promote EMA.

### 9.3.4 IMPLICATIONS AND FURTHER DISCUSSION OF THE INSTITUTIONAL THEORETICAL PERSPECTIVE

The three propositions suggest that government pressure, demonstration of the significance of environmental costs incurred by universities, and increased involvement of accounting managers in improving environmental performance be critical for EMA to be embraced by universities. A discussion of the theoretical implications follows.

#### ■ *GOVERNMENT PRESSURE*

The research found that the Australian and Taiwanese governments do not currently require a great deal of environmental accountability to be demonstrated by universities. Although universities in the two countries are required to provide a financial account to secure government funding, they are not required to provide an environmental account to demonstrate their environmental accountability. The coded data revealed that the governments do not seem to exercise pressure on universities to reduce the consumption of environmental resources, or manage associated environmental costs. This lack of environmental accountability required by those at government level flows through the various accounting and reporting systems within universities in the two countries. Traditional management accounting practices, which are subject to criticisms in managing environmental costs, appear common in the systems currently being used by the participating universities.

Arguably, it is incumbent for the Australian and Taiwanese governments to address this issue. For example, the UK government revised the *Building Regulations*<sup>132</sup> which require at least 90% of the estimated annual energy consumption by all new buildings to be accounted for (Bennett, Hopkinson & James 2006). As a result, the number of universities embracing metering technologies to achieve this established goal is increasing (see HEEPI 2007b). It appears that universities strive to meet this goal as they expect that the pressure from their government would otherwise be increasing.

As predicted, if the government, as a main fund provider, would require universities to provide an environmental account for justifying prudent use of the funds, universities would put in place systems to collect relevant environmental cost information, and provide environmental reporting to discharge their environmental accountability. By doing this, the government sends an important message about prudent use of not only financial but also

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<sup>132</sup> The *Regulations* implement part of the *European Energy Performance of Buildings Directive* (EPBD), which sets minimum requirements for the energy performance of all new buildings and large renovated buildings, and requires energy certification of all buildings and the display of information on energy consumption and carbon dioxide emissions of public buildings (HEEPI 2007b). The regulations have a major impact on the higher education Sector in the UK.

environmental resources, whereas universities would demonstrate their environmental accountability in order to secure their funding. An EMA system that helps to collect and report relevant information would be more likely to be embraced by universities.

#### ■ *DEMONSTRATION OF THE SIGNIFICANCE OF ENVIRONMENTAL COSTS*

As predicted, if the importance of environmental costs is recognised by key players within the organisational field of universities, managers would mimic best management practice for environmental costs. If not, the chance to copy best EMA practice for the purpose of managing environmental costs is less likely to happen. The latter is the case for the participating universities – there is a general lack of the utilisation of EMA. To motivate universities to copy best EMA practices for the purpose of managing environmental costs, it would be required to demonstrate the significance of environmental costs incurred by universities.

As costs tend to be considered on the basis of their relative size, environmental costs do not attract much attention, and the need to manage these costs is not emphasised. Perhaps more attention should be directed at the absolute amounts of the major environmental costs incurred by the increasing number of universities. Collectively, the costs are significant and need to be managed. This is particularly true for energy related costs. According to Bennett, Hopkinson and James (2006), operating and maintaining campus facilities can account for a significant amount of a university's annual budget, of which energy related costs constitute an important part. Indeed, all the five participating universities recognised that electricity is the highest among the major environmental costs. An understanding of current environmental responsiveness by universities also revealed that energy efficient measures are often considered first when universities embark on some form of environmental management. At the early stage of EMA for universities, the focus on electricity cost would possibly make the case that demonstrates better management and accounting would generate significant financial gains and environmental improvements.

#### ■ *INCREASED INVOLVEMENT OF ACCOUNTING MANAGERS*

In terms of the influence of professional associations on EMA (normative pressure), evidence gained in the two Australian universities indicated that reporting on the environment-related costs is made possible by the promotion of TEFMA<sup>133</sup>. TEFMA is now working with the Australian Green Building Council (a not-for-profit organisation) to develop a green star tool

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<sup>133</sup> TEFMA requires participating universities to report annual environment-related information (e.g. cleaning and waste management services, and energy consumption) for benchmarking purpose. Most Australian universities are members of TEMFA.

for educational buildings, which would have further influence on participating universities in improving environmental management. The normative pressure from TEMFA has driven some changes in universities in terms of environmental reporting. However, the pressure is placed on environmental managers, as they assume the responsibility to compile required information for the purpose of TEFMA reporting. No such pressure is imposed on accounting managers. Given that information provision is one of the main functions that management accounting supports, accounting managers in universities should have an important role to play in the process of preparing and reporting environmental information. From an internal management perspective, the involvement of accounting managers in the reporting process would provide required skills that help to achieve the goal of integrating the environment into strategic planning. For external reporting, the collaboration between managers with environmental and accounting functions would turn current TEFMA reporting practice into strategic environmental management. The reporting practice could also be used to strategically manage stakeholders, such as the government, if it becomes a requirement to provide an environmental account as a supplement to the financial account required at present.

It becomes clear that EMA requires a greater degree of awareness and action amongst individual managers, in particular individuals with an accounting function. Their participation and collaboration is key to the success of EMA implementation. In addition to normative pressure from professional associations with a focus on environmental management, perhaps actions would also be required from professional accounting bodies. It was indicated by a number of participants with an accounting function, or accounting educational background, that the management of environmental performance does not seem to be relevant to accounting. They did not expect they have a significant role to play in the process. To help raise environmental awareness in the accounting profession and overcome some of the informational barriers to their involvement that currently exist, the research suggests that much more would need to be done locally. For example, the information should be made available and promoted about what EMA is, how EMA can be applied to manage environmental costs, what role accounts can be playing in environmental management, and relevant EMA case studies. By doing this, more examples about how accountants can be involved in environmental management would emerge. In a broader sense, this is also necessary to encourage and legitimate the involvement of accountants in what is now a peripheral topic – accounting for the environment.

The next section will provide discussion and implications on the legitimacy and stakeholder theoretical perspectives.

#### 9.4 THE LEGITIMACY AND STAKEHOLDER THEORETICAL PERSPECTIVES

According to legitimacy theory, it was proposed:

*P7. The greater (lower) the community concerns on environmental impacts caused by universities, the greater (lower) the likelihood that universities would put in place an EMA system to manage the wider community and gain legitimacy.*

The proposition in relation to stakeholder theory is:

*P8. The greater (lower) the concern of powerful stakeholders about the environmental impacts of a university, the greater (lower) the likelihood that a university would put in place an EMA system as a means to legitimise its internal practices.*

The two propositions appear similar in that they both stress legitimacy considerations and stakeholder influence on EMA adoption. According to Deegan and Blomquist, ‘there is much overlap between stakeholder theory and legitimacy theory and to treat them as sharply discrete theories would be wrong’ (2006, p. 349). Yet, the former proposition assumed there is a relationship between a university and the wider community where it operates. Universities consume natural resources (and generate environmental impacts) as part of the process of providing services, and the wider community grants them a ‘right’ to operate based on the legitimacy of their operations. If managers considered the implementation of an EMA system to be a way to justify their legitimacy, they would put in place such a system to gain, or maintain, legitimacy. In other words, EMA would be adopted to demonstrate the legitimacy of operations and manage the wider community. On the other hand, the latter proposition emphasised the need to manage powerful stakeholders that control resources (e.g. funding) required for campus operations. If stakeholders with power were concerned about the environmental impacts caused by universities, universities would perceive a need to put in place an EMA system and manage environmental performance so as to demonstrate the legitimacy of their operations.

According to the participants, the wider community is concerned more about the teaching quality and research output, than about the environmental performance of universities. Failure to control or manage environmental costs would not represent a ‘threat’ to ‘revoke’ a university’s ‘licence to operate’ by the wider community. Legitimacy considerations do not seem to be a driver to adopt EMA by universities.

The coded data revealed that eight participants explicitly said legitimacy considerations could drive accounting changes, but the majority of the participants did not mention at all the influence of legitimacy considerations on EMA adoption. By inference, a lack of legitimacy

considerations could explain a lack of EMA adoption in the participating universities. Therefore, proposition seven, based on legitimacy theory, was confirmed. The wider community does not appear to pay much attention to the environmental impacts caused by universities, and universities do not seem to perceive a need to appear legitimate by implementing systems that help to reduce environmental impacts, or manage environmental costs.

Proposition eight stressed the influence of powerful stakeholders on EMA adoption. From a financial perspective, the government, as a main fund provider, is the most obvious stakeholder demonstrating power over universities. Although the government as a powerful stakeholder controls a large amount of funding and grants to universities, it is not perceived to be particularly interested in the environmental performance of universities. There are some other stakeholder groups interested in improving the environmental performance of the participating universities (e.g. the Global Sustainability Institute at RMIT University, a group of middle management at AUS University, and some environmental management researchers at TIT). However, they are not particularly 'visible' or 'powerful', and their influence is limited. Although they are interested in campus environmental management and expect universities to demonstrate their environmental accountability, their 'power' is not significant enough to drive their universities to make accounting changes. It is equally true that universities do not perceive EMA adoption as conforming to the expectations of the government. Without pressure from the government, the powerful stakeholder, implementing an EMA system is not regarded as a means to legitimise campus operations. Therefore, proposition eight was confirmed in that a lack of pressure from the government, a powerful stakeholder for universities, provides explanations for a lack of EMA adoption.

To sum up, proposition seven was developed from legitimacy theory, which implies there is a social contract between the wider community and universities. The desire to appear legitimate and manage the wider community does not seem to be a driver for EMA adoption. Rather, a lack of legitimacy considerations provides explanations on a lack of EMA adoption. Proposition eight was formed from the stakeholder theoretical perspective, which stresses the 'power' of stakeholders as a driver to changes in organisational practices. The government as an influential stakeholder has the formal power to force universities to change their accounting practices for managing environmental costs. However, as this pressure from the government, a powerful stakeholder, does not exist, EMA is less likely to be adopted.

#### **9.4.1 IMPLICATIONS AND FURTHER DISCUSSION OF THE LEGITIMACY AND STAKEHOLDER THEORETICAL PERSPECTIVES**

The two theoretical perspectives suggest that a lack of legitimacy considerations could provide explanations for the lack of EMA adoption within universities. The importance of environmental costs does not seem to be recognised in the organisational field of universities. Key stakeholders, such as government, the wider community, students, staff, senior managers and other universities, do not appear to be interested in the issue of accounting for environmental costs. Powerful stakeholders, in particular the government, do not impose any pressure on universities to manage their environmental costs. Failure to adopt accounting measures to manage environmental costs does not constitute a breach of the ‘social contract’ of universities.

The results again stress the importance of government pressure to coerce universities for implementing systems to manage environmental costs. Therefore, actions from the government, a key stakeholder with power, are required to accelerate the progress for universities to put in place EMA systems that could be used to legitimise operations. As mentioned, this could be done by government requesting universities to provide an environmental account for discharging their environmental accountability. Arguably, the government should place this issue on the agenda, as part of efforts to address ongoing environmental degradation.

#### **9.5 THE WAY FORWARD**

The results of this study indicate a general lack of implementation of EMA in the participating universities. This lack of utilisation of EMA could be explained by the theoretical perspectives embraced in this thesis. With little doubt, there is an overlap among the different theories, or the theoretical perspectives. Different factors suggested by different propositions would also have common implications for practice. However, collectively the factors suggested by the proposed theoretical framework offer more compelling explanations of the lack of EMA adoption, and provide valuable implications for practice to increase the uses and applications of EMA within universities. For example:

- There appeared to be a lack of integrating the environment into strategic planning. Proposition one predicted that an organisation would modify specific aspects of its accounting information system to match certain defined environmental strategies (if any) so that environmental management programs would be conducted strategically.

- There appeared to be a low level of perceived physical environmental uncertainty. Propositions two and three predicted that a high level of physical environmental uncertainty would be required to trigger universities to process more relevant environmental cost information, and incorporate the environment into performance measurement. Government pressure is a major source of this physical environmental uncertainty.
- There appeared to be a lack of pressure from the government, a powerful stakeholder. Propositions four and eight predicted that actions from the government with formal power would lead to responses by universities to put in place systems for collecting and reporting required environmental cost information.
- It appeared that environmental costs are *not* considered significant by key stakeholders within the organisational field of universities. Proposition five predicted that increasing the perceived importance of environmental costs is critical in creating pressure that encourages the management of environmental costs.
- There appeared to be a lack of involvement of accountants in the process of managing environmental performance. Proposition six predicted that normative pressure would be required to encourage and legitimise the involvement of accountants in the process.
- It was found that a general lack of legitimacy considerations being given to EMA as a means to reduce environmental impacts and manage associated costs within universities. Propositions seven and eight predicted that the utilisation of EMA as a means to appear legitimate would lead to the implementation of EMA systems for the purpose of managing environmental costs.

With the above in mind and building from the proposed theoretical framework, for EMA to be embraced by universities, the research would arguably require:

- *Integration of the environment into strategic planning:* This would require the participation of a team with a mix of skills within a university. This team should at least take in an accounting manager with the knowledge of existing and potential accounting systems, an environmental manager who understands the environmental resources used by various activities, an information technology person who can provide feasible changes to data collection procedures, and a senior manager to support the integration and champion this process.

- *Increased government pressure for universities to be accountable for their environmental performance:* This would be achieved by the government requiring universities to provide an environmental account as a supplement to the financial account currently required for discharging accountability.
- *Increased normative pressure to legitimise the involvement of accountants in strategic environmental management:* This could be done by the participation of accounting professional bodies in promoting EMA and conducting EMA case studies at a local level.
- *Active involvement of accountants in the process of reducing environmental impacts and managing associated costs:* This would require accountants to think beyond the framework of existing accounts for effectively managing environmental costs, and to be involved in preparing environmental reporting for the purposes of both internal benchmarking and external reporting.
- *More attention to be directed towards the energy costs incurred and associated environmental impacts caused by universities:* This could be achieved by more researchers and practitioners conducting related research and studies in this neglected sector that highlight their significant environmental impacts, and the financial costs associated with the consumption of energy.

Without the integration of the environment into strategic planning, environmental programs or initiatives would be less likely to be conducted strategically. Without pressure from influential and powerful stakeholders, EMA would be less likely to be embraced by universities for the purpose of managing environmental costs and minimising environmental impacts. Without legitimising the involvement of accountants in environmental management, accountants would not recognise their importance in improving environmental performance, and they would not be actively involved in the process. However, more importantly, without attention being directed towards the most significant environmental impact and the largest environmental cost – energy consumption and related costs, EMA is less likely to be adopted for the purpose of strategic environmental management, in particular from the perspective of *efficiency*.

## **9.6 CONCLUSION**

The chapter has revisited the proposed theoretical framework derived from four theoretical perspectives – contingency theory, institutional theory, legitimacy theory and stakeholder theory. It appeared that the eight propositions were confirmed by the findings of this study. Together, the four theoretical perspectives provide plausible explanations about the lack of

utilisation of EMA by the participating universities. Building from the theories, the thesis has also provided theoretical implications for practice, and a 'way forward' for EMA to be embraced by universities. To conclude the thesis, the following chapter will provide an overall summary and conclusions of the results and findings relating to the two research objectives of this study. Limitations of the research, and areas for future study, will also be covered.

## CHAPTER TEN

### SUMMARY AND CONCLUSIONS

#### 10.1 INTRODUCTION

In this study current accounting practices for managing the major environmental costs within five case universities have been investigated. The investigation revealed that there was a lack of utilisation of environmental management accounting. Derived from four theoretical perspectives, a theoretical framework was proposed to explore factors that provide explanations of the lack of EMA utilisation in the context of universities. Having presented results and findings in relation to the five case universities, the chapter will provide an overall summary and conclusions to this thesis.

The chapter will begin with the issues that motivated this study. The next section will revisit the study from the research objectives through to the results and findings. Lessons learned, suggestions for changes in accounting practices for managing environmental costs, and theoretical implications for EMA to be embraced by universities will all be summarised. Research limitations will then be provided, followed by suggested areas for future study and final concluding remarks to this thesis.

#### 10.2 THE ISSUES

Changes to the natural environment are never ending; some are due to the nature itself, but, with little doubt, some are caused by business activities (see Stern 2006). With climate change becoming a global issue, the environmental damage various business activities have caused has gained increasing attention. At an international level, issues in relation to the balance between economic growth and environmental sustainability have become part of the agenda in international forums. For example, the recently held Asia-Pacific Economic Cooperation (APEC) forum has proposed '*Sydney APEC Leaders' Declaration on Climate Change, Energy Security and Clean Development*' (*Sydney Declaration*<sup>134</sup>) to address the issues in relation to global warming. At a local level, business organisations have undertaken cleaner technologies to reduce environmental impacts, and some of them have implemented systems to manage associated environmental costs from an accounting perspective.

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<sup>134</sup> See <http://www.apec2007.org/> for details.

The role of management accounting in improving environmental and financial performance through enhanced environmental accountability is attracting increasing recognition. However, universities have typically failed to be the focus of this attention and interest. It is true that universities cause less obvious environmental impacts than do manufacturing organisations. Nevertheless, universities still contribute to the environmental problems, such as global warming and greenhouse gas emissions. In view of the numbers of universities around the world and the increasing importance of service organisations in the world economy (of which universities are part), the accompanying level of environmental impacts is significant. The associated environmental costs therefore need to be managed.

It is recognised that some environmental management initiatives and programs have been introduced to address environmental issues within universities, but accounting for the environment does not appear to be what university leadership is interested in. Arguably, it is in large part due to a general lack of knowledge about the benefits that embracing EMA can bring. This thesis aimed at extending the uses and applications of EMA in service organisations in general, and in universities in particular. The following section will explain how this could be accomplished through revisiting the research.

### **10.3 REVISITING THE RESEARCH**

The two major research objectives, the role of theories in conducting the research, research methodology and methods, and results and findings of this study will be summarised below.

#### **10.3.1 RESEARCH OBJECTIVES**

As there is a general lack of EMA utilisation within universities, an understanding of current practices to manage and account for the major environmental costs is required before exploring factors influencing the adoption, or non-adoption. Therefore, the two main research objectives of this study are:

- Understanding current accounting practices for managing the major environmental costs within universities; and,
- Identifying factors influencing EMA adoption within universities.

#### **10.3.2 THE ROLE OF THEORIES IN IDENTIFYING FACTORS INFLUENCING EMA ADOPTION**

Four theoretical perspectives were utilised to explore factors influencing EMA adoption within universities. They were drawn from contingency theory, institutional theory, legitimacy theory, and stakeholder theory. Building from the four theories, eight propositions were developed, and areas of concern and potential EMA factors were highlighted. This theoretical

framework was employed as the main vehicle to direct and focus the research efforts. It should be stressed that the framework was used as a guide to remain flexible so as to allow other factors to emerge from the interview data.

### **10.3.3 RESEARCH METHODOLOGY AND METHODS**

Five universities participated in this study, namely RMIT University and AUS University (a pseudonym) in Australia as well as Transworld Institute of Technology, Nanhua University, and National University of Kaohsiung in Taiwan. The primary method of data collection was in-depth interviews held with participants from the participating universities. Other data were also collected through reviewing annual reports, organisational documents, and web-page information to supplement the main data collection method. As the degree of access varied, the numbers of participants from each university ranged from two to eleven, with RMIT University having the most participants, this being eleven. Due to greater access, RMIT University was studied in greater depth than the other four cases. However, the scope of the study and the interview questions asked were the same for all the five universities.

The interview data were coded by using the qualitative research software package NVivo7. Building from the theoretical framework and environmental management literature relating to the higher education sector, an initial coding structure was generated and utilised to categorise the data. The process delivered two sets of coded data that matched this study's two research objectives – one relating to management and accounting for the major environmental costs, and the other describing the factors influencing EMA adoption. The first set of data comprises three subsets – (i) how the major environmental costs are accounted for within accounting systems, (ii) how the major environmental costs are managed, and (iii) the suggestions from participants for universities to embrace EMA. The second set of data consists of five subsets – *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers, which represented five key themes that emerged from the final coded data to explain a lack of EMA utilisation within the participating universities. Each key barrier contains some factors that provide further explanations about how that barrier would influence EMA adoption. A full record of the coded data is provided in Appendixes A and B.

### **10.3.4 RESULTS AND FINDINGS**

The first set of coded data formed the basis to address the current accounting practices for managing the major environmental costs, whereas the second set returned potential factors that provide explanations of a lack of EMA utilisation. The following two sections provide summaries for the purpose of addressing the study's two research objectives.

#### **10.3.4.1 ACCOUNTING AND MANAGEMENT FOR THE MAJOR ENVIRONMENTAL COSTS**

A review of the coded data revealed that there was a great deal of similarity between the cases in terms of current accounting practices for managing the major environmental costs, and the limitations existing in current accounting systems. The following practices and limitations were common across the five participating universities.

- The general ledgers allowed for automatic generation of total costs for electricity and water, but costs that arise in relation to the use of paper were hidden (commonly accumulated in overhead accounts) by existing accounting systems.
- In general, waste costs were grossly understated because the costs of brought in resources, that were included in the waste, were not considered. Waste costs typically reflected the amounts paid to subcontractors to remove or dispose of the waste.
- Physical information on the type or quantity of goods or services procured (e.g. electricity and paper) was not available within the existing accounting systems. There was a general lack of linkage between systems for collecting physical and monetary data.
- Operating costs, including energy, water, paper and waste removal, were combined as part of overhead accounts used for the whole university, and commonly they were not allocated to responsibility centres. Managers would not know the extent of environmental costs incurred, as a further breakdown of these costs was not available.
- A responsibility-centred budgeting system for environmental costs was not yet implemented. The only exception was that AUS University (Australia) allocated electricity budget to all its academic schools and administrative divisions on the basis of actual usages.
- Key managers were generally not held responsible and accountable for environmental costs incurred, except for the environmental manager (e.g. the General Manager of Facilities Management at RMIT University).
- Few incentive schemes were put in place to encourage managers to manage environmental costs.
- Where universities indicated that they had undertaken some form of environmental accounting, the most common practices were green purchases, and the consideration of energy or water related costs in capital investment appraisal process. However, they were often conducted in a superficial manner (no policies or implemented action plans were available). Environmental cost allocation and environmental performance measurement

were areas where little had been done.

- There was poor communication between managers involved in the functions of environmental management and management accounting. They seldom shared or communicated environmental information (if any).

#### **10.3.4.2 FACTORS INFLUENCING EMA ADOPTION WITHIN UNIVERSITIES**

Emerging from the final coded data, five key barriers were identified that could provide explanations of the lack of EMA utilisation within universities. They were *attitudinal*, *financial*, *informational*, *institutional*, and *management* barriers, with each comprising some factors that describe how the barriers influence EMA adoption.

The *attitudinal* barriers refer to a *low priority of accounting for environmental costs* and people's *resistance to change*. The *financial* barriers can be *efficiency or financial considerations*, the belief that *environmental costs are not considered significant*, and *resource constraints*. The *informational* barriers include a *low physical environmental uncertainty* and *difficulties in collecting or allocating environmental costs*. The *institutional* barriers highlight a *lack of institutional pressure*, a *lack of legitimacy considerations* being given to EMA, and the influence of *stakeholder power*. The *management* barriers reflect *few incentives provided to manage environmental costs*, a *lack of advocacy from the university leadership*, a *lack of environmental responsibility & accountability*, and a *lack of integrating the environment into strategic planning*.

Except for the factor, *environmental costs are not considered significant*, all of the above-mentioned EMA factors were referred to by participants from RMIT University, the case that was studied in greater depth due to greater access. Further, each factor was found supported by at least two of the other four cases. The findings confirmed that the EMA factors identified in this study could be common to other universities, as each of the participating universities is context and country specific, but they returned consistent results. Among the potential factors, *resistance to change*, *resource constraints*, a *lack of legitimacy considerations* being given to EMA, and a *lack of environmental responsibility & accountability* could be strong and influential factors, as they were identified to be impeding EMA adoption by all the five participating universities.

## **10.4 CONCLUSION OF THE RESULTS AND FINDINGS**

For universities to embrace some form of EMA, lessons learned from the case universities, suggestions for changes in accounting and management for environmental costs, and theoretical implications for dissolving the existing barriers are summarised in the following discussion.

### **10.4.1 LESSONS LEARNED**

There were a number of lessons learned from this study. In general, the following points could be related to all the participating universities.

- The study recognised that environmental costs were relatively low in comparison with other costs (e.g. personnel costs) for universities. This made it more difficult to build a business case to implement EMA if such a case was to be based on financial reasons alone. Other drivers would be required to assist in building the business case for EMA, for example increased institutional pressure. Other benefits would also be required for EMA to be embraced by universities, such as reputation and educating future leaders in an environmentally responsible manner.
- The research found that key managers were generally not held responsible or accountable for the environmental costs incurred. Without environmental costs being allocated to responsibility centres, it would be less likely that key managers would embrace a responsibility to control the costs, and to be accountable for the resources and services consumed. Their potential to influence behaviours, and minimise environmental costs, would be significantly reduced.
- A responsibility-centred budgeting system for environmental costs would provide motivation for managers to control the costs. A suitable allocation basis was essential for the success of implementing such a system. Therefore, an audit might be required to determine the basis if relevant information is not otherwise available. However, subsequent reviews are required to ensure the basis used is still applicable.
- There were certain difficulties associated with the collection or allocation of environmental costs required for implementing EMA. It was essential that the scope of environmental costs considered in the early phases of EMA implementation be reasonably limited to those that contribute most to the environmental impacts caused. EMA is probably more successful when it is introduced in an incremental manner.

- Introducing technical solutions (e.g. metering technology) would help reduce the difficulties associated with environmental data collection, and associated cost allocation. The technical support is readily available, and could be used in a cost effective manner to manage environmental costs.
- Physical environmental cost information is important in terms of environmental management. However, it was not common for universities to adopt, or innovate, accounting systems that incorporate physical information for the purpose of managing environmental performance. Further, it was often considered financially unfeasible to do so. Therefore, a good time for universities to incorporate physical information into accounting systems would be when their systems are due to be innovated or upgraded. However, this is likely to happen only when key managers have the knowledge about accounting's potential in managing environmental performance.
- Collecting information is important, but ensuring the relevant costs, that will assist environmental and financial decision-making, are highlighted for the purposes of management decision-making is even more important. Without collected information being brought to the attention of decision-makers, the value of the information is lost.
- Without accountants being involved in managing environmental performance, environmental initiatives or programs could help in making piecemeal progress, but a coherent long-term environmental goal would be less likely to be achieved.

#### **10.4.2 SUGGESTIONS FOR CHANGES IN ACCOUNTING AND MANAGEMENT FOR ENVIRONMENTAL COSTS**

The research found that senior managers were usually provided with aggregated environmental cost information (if provided), and they were generally not held accountable for environmental costs incurred. There were few universities that put in place any incentive schemes to encourage the management of environmental costs. To overcome the problems, a fundamental change would be required in the thinking behind routine decisions of university administration, staff, faculty and students, as well as the government and the wider communities. Although such a goal might seem difficult to achieve, universities might find that once an EMA mechanism is set in place, it could incrementally support and reinforce further plans and actions aimed at integrating the environment into strategic planning. For universities to embrace EMA, the study advanced the following suggestions:

- Restructuring accounting systems to link monetary and physical environmental cost information; and,

- Introducing a responsibility-centred budgeting system that charges costs back to responsibility centres on the basis of their actual or allocated usages of resources with environmental implications, in particular energy.

The above suggestions do not need a complete change to the current management accounting systems, but will require some minor changes, for example the inclusion of an additional field into the systems to provide physical information. The inclusion could also provide benefits in terms of being able to monitor resource consumption and facilitate environmental reporting. EMA research supports that such a minor change incurs fairly minor or low cost, but could lead to significant improvement in terms of providing relevant environmental information (e.g. Deegan 2003). Further, the suggestions are merely applications of advanced management accounting techniques to the environmental management area. For example, the focus on both monetary and physical environmental cost information can be seen as a form of applying the ‘balanced scorecard’ approach advocated by Kaplan and Norton (1996), and a responsibility-centred budgeting system can be implemented by applying activity-based costing that focuses on the environment as a key cost driver.

However, better communication between managers involved in the functions of environmental management and management accounting is vital to ensure the success of implementing the above suggestions. This can be achieved by involving environmental managers in important accounting changes, and engaging accounting managers in the appraisal processes of capital investments with significant environmental implications. In particular, the following deserves further consideration by such a cross-functional team:

- Considering the major environmental costs during project appraisal;
- Improving the identification and management of the major environmental costs;
- Exploring opportunities for initiatives on waste minimisation and paper reduction;
- Making greater use of accounting data and expertise in enhancing environmental accountability; and,
- Assessing the environmental performance of key managers against specified performance criteria.

#### **10.4.3 THEORETICAL IMPLICATIONS FOR BARRIERS TO EMA ADOPTION**

Building from the theoretical framework embraced by this study, the following implications for practice were provided.

- Information from the cases reflected a low level of physical environmental uncertainty, primarily due to a lack of government pressure for universities to be responsible for the

environmental impacts caused by their operations. The proposed theoretical framework predicted that a high level of physical environmental uncertainty, in particular from the government (a powerful stakeholder), would be required to create pressure that leads to responses by universities to put in place systems for minimising environmental impacts, and for accounting for environmental costs. The study would suggest that governments impose pressure on universities to be accountable for their environmental performance. This could be achieved by requesting universities to provide an environmental account as a supplement to the financial account currently required for discharging accountability.

- It was found that key stakeholders within the organisational field of universities did not perceive environmental costs incurred by universities as significant. The proposed theoretical framework predicted that perceived significance of environmental costs would be required to create institutional pressure that could trigger universities to manage environmental costs. In view of efficiency, the study would suggest that more attention be directed towards energy costs incurred and related environmental impacts caused, as energy related costs were identified by participants of this study as the most significant environmental cost incurred by universities. This would require more researchers and practitioners to conduct research, or case studies, in this area.
- There appeared to be a lack of active involvement of accountants in the process of managing environmental performance. The theoretical framework predicted that this could be due to a general lack of legitimacy considerations being given to management accounting as a means to manage environmental performance, or a lack of normative pressure for accountants to be involved in that process. The study would arguably require the participation of accounting professional bodies in promoting EMA, and in conducting EMA case studies at a local level for the purpose of increasing environmental awareness of accountants, and legitimising their involvement in managing environmental performance.

## **10.5 RESEARCH LIMITATIONS**

Qualitative research has long been subject to criticisms due to some inherent limitations, such as researcher-related problems, and fundamental design limitations. Research that employs in-depth interviewing as the primary inquiry method is also subject to the same criticisms. During the coding process, interpretations and judgements by the researcher were required to categorise the interview data. Subjectivity was therefore unavoidable, which could lead to possible bias in the results. To reduce the level of this subjectivity, efforts were undertaken to ensure consistency while conducting interviews, and the analytical procedures of this study

were well documented.

In addition to researcher-related bias, participants could also introduce bias into the results. Their opinions, comments, or perceptions collected during the interviews can never be fully tested for accuracy or truthfulness. The picture emerged from the interview data is only a snapshot in time, and it does not necessarily reflect accurate accounts of particular realities. Although attempts were made to overcome this limitation by asking open-ended questions of key managers with different management roles at different universities located in two different countries, it is unlikely to overcome the limitation completely. However, the inherent subjectivity and participant-related bias must be weighted against the richness of data captured and collected in the in-depth interviews. In this research, this enquiry method was deemed appropriate for the research topic, and it is believed that the benefits outweighed the possible bias.

Another limitation was involved in translating the interviews conducted in Mandarin by the researcher herself. The concern about ‘the researcher being the translator’ is not new. Following Marshall and Rossman (2006), it is argued that this is not a problem for this study, as more interpretation issues would appear when someone other than the researcher performs the task. As the researcher is fluent in Mandarin and English, ‘the researcher being the translator’ posed no real problems, but instead provided the advantage of constructing the meaning in a consistent way for the study.

## **10.6 FUTURE RESEARCH DIRECTIONS**

Due to the exploratory nature of this study, there remains a plethora of areas in which future research can be directed. The following are some examples of future study that could stem easily, and directly, from this research.

There appeared to be a lack of institutional pressure on universities to account for their environmental costs. The research approached this issue from the perspective of key managers within universities. It would help reveal why the pressure is not present by understanding the perspectives provided by different institutions, such as governments and the wider community.

The research found that the priority of accounting for the environment remained low in the context of universities. In addition to a lack of institutional pressure, it was also due to a lack of participation by key managers, with an accounting function, in the process of managing environmental performance. Given the role of information provision, management accounting has an important role to play in this process, as discussed in this thesis. Future research could

address this issue by seeking ways to encourage and legitimate the involvement and participation of accountants in the management of environmental performance.

A literature review highlighted a lack of EMA-related case studies in a university setting. Additional case studies in this area appeared essential. By doing this, best practice examples of the ways in which management accountants can be involved in environmental management will emerge, and benefits arising from embracing EMA will be reported and established.

It appeared that guidelines tailored to suit the special needs of universities in managing environmental costs are also required. The research found that the informational barriers, such as difficulties associated with collecting, allocating, and reporting relevant environmental information, would retard EMA adoption. Research into the classification and categorisation of environmental costs, or the development of an environmental reporting framework specific for service organisations, such as universities, would help to overcome some of the informational barriers that currently exist.

The research proposed a theoretical framework to explore factors influencing EMA adoption within universities. However, the research findings were generalisable only to the extent of the theoretical dimensions, or substantive contexts, that were captured within this study. The research focused on universities in two countries, Australia and Taiwan, due to the interest in investigating specific concerns about EMA implementation in relation to these contexts. Arguably, Australia and Taiwan are different in terms of cultural dimensions that were not investigated in this research. The interactions between cultural differences and motivations for organisational accounting changes could be instrumental in furthering the richness of the proposed theoretical framework. Further, if other cultural contexts, such as those of Europe and the US, were chosen, different insights of factors influencing EMA adoption might have been generated.

## **10.7 FINAL CONCLUDING REMARKS**

The role of universities for environmental sustainability involves two issues – education itself and internal practices. There is no doubt that universities, as education providers, should provide environmental education, but do they practice what they preach? This thesis has demonstrated what is achievable for universities in terms of implementing accounting systems for managing environmental costs. However, research results and findings revealed that there was a general absence of systems designed to manage environmental costs within the universities investigated. Arguably, this is not a problem specific to the cases, but is one that is possibly common to many other universities.

It should be borne in mind that this study focused on RMIT University as an in-depth case study. Although the results can be generalised to the other four case universities, they are perhaps somewhat critical of RMIT University. Indeed, it is somewhat surprising that RMIT University, which in many other facets of environmental practices leads the way, has not led the way in this area of accounting for the environment. However, key staff are ready to consider the issues as shown by the openness and transparency demonstrated in this thesis. In concluding, the results of this thesis do highlight the potential uses and applications of environmental management accounting, and its ability to improve environmental sustainability within universities. Let's wait and see which university takes the necessary lead in accounting for the environment!

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## APPENDIX A

### THE CODED DATA – MANAGEMENT ACCOUNTING FOR THE MAJOR ENVIRONMENTAL COSTS WITHIN UNIVERSITIES

#### How environmental costs are accounted for

**Name:** Management accounting for the major environmental costs\How the major environmental costs are accounted for

< RMIT University >

Participant	Type of Role	Quotation <sup>1</sup>	Interpretation
Graham Bell	Environmental Management	<p>Reference 1</p> <p>¶64: We don't go that far. I mean the waste is assembled now. We've got the salary of the supervisor, contract costs, other costs like toilet consumables, and the cost for waste removal. That's probably all in the cleaning area. That gets assembled, and then that comes out in this report [TEFMA Report]. It's not specific to a building.</p> <p>¶65: <i>Why not?</i></p> <p>¶66: We can drill down to a certain degree with our contractors, because we have them in what we call 'parcels' - so there's a cleaning parcel on this side of Swanston street, there're 2 cleaning parcels on the other side of Swanston street, there's a cleaning parcel for building 108.... So we can get down to a campus detail, but we don't drill down any further than that. I'll keep on extending it.... With some additional efforts, we could probably get down to a more specific cost, for example the activity per sq meter. But whether it would save you in the long run, it might be better to sort of reverse it and go with the cultural change and find why the area's messy.</p>	<ul style="list-style-type: none"> <li>Waste is part of the 'cleaning &amp; waste management services' overhead account, which includes the costs for cleaning staff, cleaning materials, and cleaning and waste removal contracts. The information is required to be reported in the TEFMA report.</li> <li>Although a further breakdown of waste management cost is achievable, the manager doubted whether it would help in driving the cost down.</li> </ul>
Paul Stockwell	Management Accounting	<p>Reference 1</p> <p>¶6: Waste management is included in the service contract. It's basically contracted out, externally contracted. As you will see on the other list where we got an internal order, which is what we separate out the accounts we use for the various sites for the waste management. We have a removal contract for waste here, so any of the costs related to waste management might be a contractor's cost or hiring something. They are identified under the internal orders and then the cost elements, more than likely would be the service contract, which is basically we contract the payment, because we don't have internal service for that. It's all done by special waste removal people.</p>	<ul style="list-style-type: none"> <li>Waste management cost is included as part of the costs incurred to pay for the service contracts.</li> </ul>
		<p>Reference 2</p> <p>¶14: Well, because Property Services coordinates all the cleaning, whatever in the Property Services is predominately the total for the university.... So I think you pick up all from here and that will be almost 98%.</p>	<ul style="list-style-type: none"> <li>Property Services is in control of the budget for cleaning &amp; waste management costs.</li> </ul>

<sup>1</sup> To better reflect current accounting practices explained by the participants, conversations between the researcher (in italics) and the participants were used as direct quotes for the purpose of the thesis.

		<p>Reference 3 ¶19: They're the orders done through 'Corporate Express', basically pretty much the stationery as well as printing paper. As I mentioned the other day, that category is a bit difficult to be broken down. Probably, it could be done if you want to work out the total paper cost, but you might be able to get some information from Phil [Financial Services]. At the university level, you will be able to get some information from him. I will be able to give the total numbers, but only monetary values.</p>	<ul style="list-style-type: none"> <li>♦ Decentralised purchasing and tracking of paper purchase</li> <li>♦ Paper is ordered through one service provider. The purchasing officer might have the quantity and monetary information, but only the monetary information is available within the accounting system.</li> </ul>
		<p>Reference 4 ¶38: From our side, it's probably paper cost. I think we as a university use a maximum amount of paper. I don't know how many areas using recycled paper. I think that's the main one I can identify. Obviously, water is something everywhere is charging and encouraging reducing usage, but I don't think we are a huge water user. We try to help with that. Electricity is probably our biggest cost. Yes, it's probably our biggest cost. It's about 5 million dollars a year.</p>	<ul style="list-style-type: none"> <li>♦ Electricity cost is the biggest among the major environmental costs for the University. It's about 5 million a year.</li> </ul>
		<p>Reference 5 ¶123: So for the academic areas, they will receive overhead costs for Financial Services and Property Services. They have a breakdown on what makes up those costs, so they will be able to see, 'Ok, Property Services, it's costing us X'. But it doesn't really go down to the level of all the electricity, electricity costing you such and such amount.... From that perspective, our Property Services (a little bit selfish) have all those electricity costs in their budget. It's up to them to manage, not really up to us.</p>	<ul style="list-style-type: none"> <li>♦ Lack of a responsibility-centred budgeting system</li> </ul>
Anne Stewart	Management Accounting	<p>Reference 1 ¶84: I guess the paper usage is down within the consumables. So consumable materials are where all the paper would come up in those categories.</p>	<ul style="list-style-type: none"> <li>♦ Paper is included in the 'stationery &amp; printing' account.</li> </ul>
		<p>Reference 2 ¶94: We're meant to use just one supplier - Corporate Express. They would have usage records of how much we use, so you can look at them. But they would record as a client server. They would record how much paper we've ordered through them. I would go back to them and manage that relationship and ask them for that information.</p>	<ul style="list-style-type: none"> <li>♦ Decentralised purchasing and tracking of paper purchase</li> </ul>
		<p>Reference 3 ¶95: <i>The paper is ordered on a whole university basis or on a school basis?</i> ¶96: School's.</p>	<ul style="list-style-type: none"> <li>♦ Separate identification of paper cost on a school basis seems to be achievable.</li> </ul>
Wayne Poole	Management Accounting	<p>Reference 1 ¶49: So the way that they're accounted for at the moment is the usage is not accounted in the system but the value that is driven by the usage. They are accounted in the general ledger both on receipt of invoice, and the invoice may be building specific, or it may to a master account. The master account is then processed in the ledger as an expense item, like water, and that master account is then distributed to cost centres as part of the Property Services charge. The Property Services group, which manages our \$1,000,000,000 of the property, they basically have a charge back system, which they charge certain schools and portfolios and service centres occupancy charge, which encompasses the physical space, the usage of power, water, gas, etc. and repairs and maintenance. It's like a leasing charge.</p>	<ul style="list-style-type: none"> <li>♦ Accumulating costs to overhead accounts</li> <li>♦ Subsequent allocation of the accumulated costs to schools or portfolios is usually done on the basis of floor space occupied</li> <li>♦ Few incentives provided for schools or portfolios to reduce the level of resource consumption</li> </ul>
		<p>Reference 2 ¶109: <i>Is there a system to link monetary and physical environmental cost information?</i> ¶110: No. They have to be compiled independently.</p>	<ul style="list-style-type: none"> <li>♦ For the environmental costs captured within the accounting system, only the monetary information is provided. Information on the type or quantity of goods or services procured is not currently available within the system.</li> </ul>

		<p>Reference 3</p> <p>¶115: It would be possible to augment the accounting system to have a notional general ledger, so non-values [or physical information]. I've got my invoice from AGL. I would input kilo-watt/hours used and the value, so then I could report upon that. If it would be a system change, it wouldn't be a huge system change.</p>	<ul style="list-style-type: none"> <li>• The cost required to introduce an additional field in the accounting system would not be high.</li> </ul>
		<p>Reference 4</p> <p>¶117: It wouldn't be too high. That's just another set of data that has to be entered into the system.</p>	
R2	Academic School	<p>Reference 1</p> <p>¶61: If it's just a small job, we'll do it here. Otherwise we have to get a quote from the print shop, and compare with, you know, a quote from anywhere else. They don't specify the cost of the paper. A lot of it is now outsourced, which makes it difficult to identify or separate the costs.</p>	<ul style="list-style-type: none"> <li>• Difficulties associated with allocating paper cost</li> </ul>
		<p>Reference 2</p> <p>¶64: We can do it, but we don't. Well, we have a chart of accounts, which is the university's chart of accounts. Therefore, the finance manager in the school just puts things where she's told to put them. Yes, so we don't separate them out.</p>	<ul style="list-style-type: none"> <li>• Reviewing the chart of accounts and analysing overhead accounts might be a key procedure when embarking on an EMA project</li> </ul>

### < AUS University >

Participant	Type of Role	Quotation <sup>2</sup>	Interpretation
Anonyms (V2 & V4)	V2: Environmental Management V4: Management Accounting	<p>Reference 1</p> <p>¶168: V4: Well, we monitor the cost and we ascribe the cost to each of the building users and we actually try and contain the volume use by saying this is the fixed budget you get for electricity. Now we've actually been able to hold that position for over five or six years.</p> <p>¶169: V2: Yeah.</p> <p>¶170: V4: ... where they got a fixed amount ...</p> <p>¶171: V2: Based on the usage five years ago ...</p> <p>¶172: V4: Yeah.</p> <p>¶173: V2: ... we budgeted ... gave them the budget and said, 'all right, we'll claw it back off you, anything that you save, you can keep'.</p> <p>¶174: <i>Okay.</i></p> <p>¶175: V2: Anything that goes over what you normally use, you'll pay for.</p>	<ul style="list-style-type: none"> <li>• The University initiated the practice five or six years ago. If the actual usage is less than the budgeted one, the users can keep the budget, but anything over, the users have to pay out of their pockets.</li> </ul> <p>A good practice</p>

<sup>2</sup> As the two participants of AUS University were interviewed at the same time, conversations between the researcher (in italics) and the two interviewees (shown as V2 and V4) were used as direct quotes.

	<p>Reference 2</p> <p>¶257: <i>So are you considering to extend the practice to water usage?</i></p> <p>¶258: V2: Yes.</p> <p>¶259: <i>What else?</i></p> <p>¶260: V2: And gas.</p> <p>¶261: <i>And gas.</i></p> <p>¶262: V2: Yeah. Our main ...</p> <p>¶263: V4: And heating.</p> <p>¶264: V2: Heating is part of the electricity</p> <p>¶265: V2: Because heating is mainly from the waste heat of the co-generation plant, it's been a little bit messy in terms of how do you actually split the costs. We've come up with a model at the moment that I'm reviewing, which may allow us to do that, okay.</p>	<ul style="list-style-type: none"> <li>♦ The University is considering to extend the practice to allocate the costs associated with water and gas.</li> </ul>
	<p>Reference 3</p> <p>¶268: V2: So they're the next steps but part of that is also to put in meters for each building of those services and that's sometimes a little bit more difficult to ..., it's not just one pipe in, so we have to look at how best to do that.</p> <p>¶269: <i>If you consider extending this practice, how about extending it to waste?</i></p> <p>¶270: V2: Good question. At this stage, that's the lower priority. Certainly I wouldn't discount it but I haven't really had it on the radar, on the agenda.</p>	<ul style="list-style-type: none"> <li>♦ The importance of metering technology has been recognised.</li> </ul>
	<p>Reference 4</p> <p>¶334: V4: We've talked about the electricity, which on this campus is generated internally, so we have a profit centre for that, all of the costs that go towards the reduction of that electricity, including the amortisation of the plant and the staff costs, and the gas supplied and all the rest of it and the maintenance is included in the cost of the generation, so that's included there and then we talked about how we bill that out to the various areas.</p> <p>¶335: V2: The other ones are done in what is called a 'first charges of general overheads budgeting approach' for gas, water, waste is not. Waste is actually included in under maintenance costs. But the rest of it is done on 'first charges funds allocation' for all of the campuses and so they're identified separately. It's in a fund management accounting sense.</p> <p>¶336: V4: That's right. I was going to say each of the other campuses, particularly for energy, has separate energy agreements for gas and electricity and they are measured and recorded separately in the accounts under gas or electricity, and there's ... I think there's a slight distortion on water because there's water and water rates and then on waste management ...</p> <p>¶338: V2: ... We have a single contract for electricity across all campuses but they are accounted for separately in the accounts.</p>	<ul style="list-style-type: none"> <li>♦ Electricity, gas and water are identified separately and measured on a campus basis.</li> </ul>
	<p>Reference 5</p> <p>¶343: V2: Waste management costs?</p> <p>¶344: <i>Are they included in the maintenance cost?</i></p> <p>¶345: V2: Yeah, it's separate but it is within those budgets that are handled over an operations point. Maintenance and waste management and cleaning are all separate but they're under that one umbrella ...</p>	<ul style="list-style-type: none"> <li>♦ Waste management and cleaning are all separate, but they are recorded as the maintenance cost.</li> </ul>
	<p>Reference 6</p> <p>¶667: V4: ... as you identified, the electricity costs are ... there's an element of self control there or management control in each of those departments or faculties because there's a cost [electricity cost] ascribed to them, yeah.</p>	<ul style="list-style-type: none"> <li>♦ Benefit of cost allocation</li> </ul>

< Transworld Institute of Technology >

Participant	Type of Role	Quotation	Interpretation
Chih-Cheng Chang	Environmental Management & Senior Management	<p>Reference 1</p> <p>¶47: Basically, waste management can be divided into two parts, one is recycling and the other one is waste removal contract. We have part-time student workers to conduct recycling activities. In this regard, we pay about 2 million per year. For waste removal, the contract cost is about 600 thousand per year. Only the contract cost is recorded as waste management cost.</p> <p>¶48: <i>How about the water cost?</i></p> <p>¶49: It's about 2 million per year.</p>	<ul style="list-style-type: none"> <li>Waste management cost is predominantly the service contract cost. No quantity information is available.</li> </ul>
Hsia-Ching Weng	Management Accounting	<p>Reference 1</p> <p>¶29: Electricity cost might be the biggest.</p>	<ul style="list-style-type: none"> <li>Electricity cost is the highest among the four major environmental costs.</li> </ul>
		<p>Reference 2</p> <p>¶33: <i>How much is the electricity cost per year?</i></p> <p>¶34: About 13 million dollars.</p> <p>¶35: <i>How about the water cost?</i></p> <p>¶36: About 200 thousand per month for the 2 campuses together. That's not much.</p> <p>¶37: <i>Ok...</i></p> <p>¶38: As we have wastewater recycling system at Chia-Dong campus, the water cost here is lower. It's about half the cost of Hu-San Campus.</p> <p>¶39: <i>How about the waste management cost? Is the cost of part-time student workers included in the waste management cost?</i></p> <p>¶40: No, that's not included. Every month we pay 50 thousand to get the waste removed out of the campuses. The total cost for such service contract is 600 thousand per year.</p> <p>¶41: <i>Do you know how much paper the whole university uses per year?</i></p> <p>¶42: It's about 400 to 500 thousand, but that doesn't include printing cost or paper purchased and paid by each department. We have separate accounts for paper usage and printing cost.</p>	<ul style="list-style-type: none"> <li>Electricity cost/year: NT\$13,000,000 (AU\$510,000)</li> <li>Water cost/year: NT\$2,400,000 (AU\$95,000)</li> <li>Waste removal cost/year: NT\$ 600,000 (AU\$24,000)</li> </ul> <p>[The above costs are on a whole university basis.]</p> <ul style="list-style-type: none"> <li>Paper is tricky because the number provided is a budgeted figure, and it is only for the printing department in the University. Paper ordered by each academic department is not accounted for.</li> <li>Decentralised paper purchasing</li> </ul>
		<p>Reference 3</p> <p>¶91: We have separately accounted for the costs of water and electricity usages, but within the accounting system, they are combined and recorded under the account of 'water &amp; electricity'. We have a separate budget pool for paper cost, but not a separate account. It is included in the account of 'office expenses', which comprises paper, printing cards, service contract for waste removal, and so on. As we have many students and they do consume a significant amount of water and electricity, we allocate water &amp; electricity proportionally to 'teaching' and 'administrative management', 80% to teaching and 20% to administrative management.</p> <p>¶92: <i>How is the allocation rate determined?</i></p> <p>¶93: Our previous Director determined the allocation rate and we did what he said. As it's hard to determine which allocation basis is more reasonable, we use an arbitrary rate determined by personal judgement.</p> <p>¶94: <i>Do you use this 80%-20% rate to allocate waste contract cost?</i></p> <p>¶95: No, the service contract cost all goes to 'administrative management'. We don't allocate it to teaching.</p>	<ul style="list-style-type: none"> <li>Environmental costs are included in overhead accounts, some of which are allocated to responsibility centres on an arbitrary basis.</li> </ul>

< Nanhua University >

Participant	Type of Role	Quotation	Interpretation
Jen-Wei Wei	Environmental Management	Reference 1 ¶36: We have separate electricity and water meters on each building. We monitor and record our usages. Besides, we have detailed cost saving information. The information is required to justify environment-related projects such as the installation of solar panels. If the cost and benefit of a project cannot be justified, it's less likely that the project will attract any funding or support.	• The importance of metering technology for providing information has been recognised.
		Reference 2 ¶48: Waste management is the responsibility of the Student Affairs Office. I know a little bit of how they manage waste, but you'd better ask them by yourself. I don't think they have the information on the total amount of waste generated. They know how much they recycled and how much they get paid for those recycled materials, but they don't record the amount of waste generated.	• Diverse source of environmental costs information
Meng-She Chen	Management Accounting	Reference 1 ¶76: Well, our current accounting system doesn't contain electricity or water cost on a building basis, but we do have this information. ¶77: <i>If I ask you how much electricity was consumed last year within this building, is the information readily available or will you have to calculate based on the invoices from the energy company?</i> ¶78: We will have to calculate. You know we private universities only collect information that is required by the Board of Directors or the Ministry of Education. If they don't ask us to provide this information, we won't collect and report it.	• Although separate electricity and water costs information is available on a building basis, the information is not compiled for internal benchmarking purposes, the reason being strong stakeholders, such as the senior management or the Ministry of Education, is not interested in such information.
		Reference 2 ¶154: We only know how much we paid for waste removal. But for recyclables, we do have both quantity and monetary information kept for internal use. ¶155: <i>How about paper usages?</i> ¶156: We universities do consume a lot of paper, which in turn generates significant environmental impacts. ¶157: <i>Do you know how much paper is consumed annually? Or what is the annual paper cost for the university?</i> ¶159: We have both the quantity and monetary information on total paper used within the university. Paper cost is not separately identified within the accounting information system. But if you request such information, our purchasing department can provide it. The purchasing department is responsible for paper procurement for the whole university.	• Decentralised purchasing and tracking of paper purchase
		Reference 3 ¶81: Yes, and separate metering was my idea. I worked for a manufacturing organisation. I know how important cost control is. Therefore, I suggested the university should have separate meters for water and electricity within each building. The suggestion was taken. I worked for the university since the university was established. That's why all our buildings are separately metered. The decision to separately metering each building is not based on the perspective of environmental management, but on the viewpoint of cost control and related savings.	• Metering technology helps monitor and control environmental costs, which in turn generates cost savings.

< National University of Kaohsiung >

Participant	Type of Role	Quotation	Interpretation
Chien-Jung Huang	Environmental Management & Senior Management	<p>Reference 1</p> <p>¶43: For example, we will have a central control system to control the electricity usages. The system is currently under construction. Once it is done, we will be able to centrally turn off the power at one point. If you still need the power, you can manually turn it on. We also have a peak-hour energy usage monitor system to make sure our total electricity usage won't exceed our contracted usage. If so, penalties will incur. Besides, we have an air conditioning control system available in every office and every classroom. The system is centrally controlled to turn off the power supply every two hours. You will have to switch it on again to resume the power supply. All those projects are targeting at reducing our electricity usages. We estimate that we will have an average cost saving of \$260,000 per month assuming 10% of faculties forgot to turn off air conditioning or lights when leaving their offices or classrooms. For controlling water usages, we also have water saving equipment installed.</p>	<ul style="list-style-type: none"> <li>• Environmental programs in place to control electricity and water usages.</li> </ul>
		<p>Reference 2</p> <p>¶46: Water is about NTD3,460,000 and electricity is NTD37,000,000 per year. Our cleaning is contracted out and the contract costs us NTD3,700,000 per year. Waste removal is also contracted out and it costs us NTD2,000,000.</p>	<ul style="list-style-type: none"> <li>• Identifiable annual environmental costs</li> </ul>

<p>Chu-Ying Lien</p>	<p>Management Accounting</p>	<p><u>Reference 1</u> ¶11: Costs for waste removal, water usage and electricity usage are assigned to an account called 'Service Costs' first, and paper purchases are assigned to an account called 'Consumable Materials'. Water and electricity costs are subsequently allocated to academic or administrative functions based on actual usages indicated by separate meters, if available, on different buildings. ¶12: <i>If separate metering is not available, what basis do you use to allocate water or electricity cost?</i> ¶13: Well, General Affairs keeps information on water and electricity usages, they will tell us how to allocate. ¶14: <i>Do you know the basis they use to allocate water and electricity costs?</i> ¶16: I am not sure and I have to check... ¶17: Our senior accountant said that we don't have an allocation basis and neither do we allocate these costs based on actual usages. Instead, we use the same method as we used to allocate water and electricity budgets to academic schools and administrative divisions. The reason for the allocation is that we think if we don't allocate water or electricity costs, the cost to run an academic school or administrative unit would be underestimated... ¶18: <i>What is the allocation basis for the budgeted usages?</i> ¶19: We use estimation. ¶20: <i>Then what is the basis for the estimation?</i> ¶22: Well, our problem is that how do we allocate water and electricity usages within public areas properly. It's not easy. Therefore, we use a fixed percentage to allocate. ¶23: <i>How is this fixed percentage determined? When do you start to use this percentage to allocate?</i> ¶24: We are a new school, just six years old. At the early time, we don't allocate them to academic schools. Water and electricity costs are all assigned to General Affairs only. We found out that costs to run academic schools will be understated if we don't assign water or electricity costs to them. Therefore, we started the allocation, but the allocation percentage is different for every year. ¶25: <i>Why?</i> ¶26: Because we didn't allocate such costs before, to decrease the impacts of allocation, we decided to increase the allocation percentage to academic schools year by year rather than used a fixed percentage for every year. It's reasonable because we are a new school and we didn't have many academic schools in the beginning.</p>	<ul style="list-style-type: none"> <li>♦ Lack of clear cost drivers to allocate environmental costs</li> <li>♦ Environmental costs, such as electricity and water, are allocated to academic schools and administrative divisions based on a floating rate adjusted yearly. The rate is an estimated number.</li> <li>♦ Arbitrary cost allocation</li> </ul>
		<p><u>Reference 2</u> ¶48: <i>Is there a system to link monetary and physical environmental cost information?</i> ¶49: No.</p>	<ul style="list-style-type: none"> <li>♦ For the environmental costs captured within the accounting system, only the monetary information is provided. Information on the type or quantity of goods or services procured is not currently available within the system.</li> </ul>

## Capital Budgeting

**Name:** Management accounting for the major environmental costs\How the major environmental costs are managed\Capital budgeting

### < RMIT University >

Participant	Type of Role	Quotation	Interpretation
Chris White	Environmental Management	Reference 1 ¶151: When we expend in capital, we look at the payback period of putting into environmental... Anything less than 5 years, we would do, and then longer than 5 years, we did make decision on whether or not we would do it or not. But anything less than 5 years, we would say yes.	<ul style="list-style-type: none"> <li>• A five-year payback period is considered in evaluating capital projects.</li> </ul>
Paul Stockwell	Management Accounting	Reference 1 ¶98: ... I am not sure of what environmental aspects they consider. I can't make an assessment on whether they do. I am not sure how far it's taken into account in terms of when the purchases are made.	<ul style="list-style-type: none"> <li>• Doubt about how far the environment has been considered in the process of capital budgeting</li> </ul>
		Reference 2 ¶145: So when we come to finalise our capital submission - capital list, you would need to have the environmental impacts as part of that. For example, are environmental aspects being considered in this purchase or is this the most environmentally efficient item? I think that would be a way of highlighting the environmental aspects a bit more.	<ul style="list-style-type: none"> <li>• Doubt about how far the environment has been considered in the process of capital budgeting</li> </ul>
		Reference 3 ¶152: Net present value? We normally do that for really large purchases, items over a hundred thousand dollars or more. It's not done on all the items.	<ul style="list-style-type: none"> <li>• Net present value is one of the assessment techniques used for larger purchases over \$100,000.</li> </ul>
Wayne Poole	Management Accounting	Reference 1 ¶181: We do, in terms of the large equipment purchases that do draw upon resources, for example the wind tunnel out of Bundoora. To make that decision to build a wind tunnel, you also have to consider the running costs. But then to make a capital decision to buy a power cord or a laptop, we're not going to consider the usage. For a certain type of asset, you have to understand the running costs, and the running costs include maintenance and also usage. So large items, the energy running costs are part of the capital decision process.	<ul style="list-style-type: none"> <li>• For larger projects, the running costs, such as energy and maintenance, are considered.</li> </ul>

### < AUS University >

Participant	Type of Role	Quotation	Interpretation
Anonyms (V2 & V4)	V2: Environmental Management  V4: Management Accounting	Reference 1 ¶495: <i>When you are making major investments, do you consider environmental costs?</i> ¶496: V4: Well, the most recent one we did. ¶497: V2: Yes. ¶498: V4: The city development, we looked at the 20-year timeframe and then incorporated the ... ¶499: V2: All the costs. ¶500: V4: All the costs of ... ¶501: <i>How was the number 20 determined?</i> ¶502: V4: How was this determined? Yes, good question. ¶503: V2: It was to do with consultancy. Our consultants, in terms of costing, but it's also got to do with the length of the loans and my life cycle costing was, I don't know about yours. ¶506: V4: I can't remember what it was ... why we chose 20 years but we ... our payback period certainly fell	<ul style="list-style-type: none"> <li>• For larger projects, the running costs, such as energy and maintenance, are considered.</li> <li>• For large projects, a longer payback period, return on investment, and net present value are all considered.</li> </ul>

		<p>within that period.</p> <p>¶508: V4: I guess it's just looking at a reasonably life cycle for developing and running a building. That's all it was, 20 years.</p> <p>¶509: <i>So besides that payback period, are there other financial indicators you used to justify spending on major investments?</i></p> <p>¶512: V4: Yeah, and we look at all the financial indicators in determining like for argument's sake the profitability of the individual profit centres that we're going to be operating in the building itself, as well as the building return on investment, as well as what we've got as an operating business like an internal landlord. So each of those, we had to make sure they were profitable in their own right.</p>	
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**< Transworld Institute of Technology >**

Participant	Type of Role	Quotation	Interpretation
Chih Cheng Chang	Environmental Management & Senior Management	<p>Reference 1</p> <p>¶31: For example, purchase decisions are made based on the lowest cost or price available, which is our first consideration. Green purchase is more a slogan than a practice in the university, although efforts are taken now to make it a practice. Currently, we focus on using energy or water efficient equipments, because we want to decrease our usages of water and electricity.</p>	<ul style="list-style-type: none"> <li>• A cost-driven capital budgeting system</li> <li>• Green purchase is more a slogan than a practice in the University.</li> <li>• Investments with significant environmental implications are generally not treated differently to other proposed investments or purchases.</li> </ul>
		<p>Reference 2</p> <p>¶36: Since we don't have any formal policy, ensuring compliance remains a problem.</p>	<ul style="list-style-type: none"> <li>• Lack of a formal environmental policy</li> </ul>
Feng-Shuai We	Senior Management	<p>Reference 1</p> <p>¶19: OK. In the university, we don't have a formal policy that is focused on those costs. We don't even have ISO14000. A few years ago, we were thinking to implement ISO14000, but we didn't.</p> <p>¶20: <i>Why not?</i></p> <p>¶21: A: It costs money.</p>	<ul style="list-style-type: none"> <li>• Financial considerations</li> </ul>

**< Nanhua University >**

Participant	Type of Role	Quotation	Interpretation
Meng-She Chen	Management Accounting	<p>Reference 1</p> <p>¶40: ... That's the role we can play, through capital budgeting.</p>	<ul style="list-style-type: none"> <li>• Accountants have a role to play in helping manage environmental costs through capital budgeting process.</li> </ul>
		<p>Reference 2</p> <p>¶43: As we determine the budgets, we follow the rules that we think are appropriate. It's not a written policy, but a practice we think should be followed. In general, an increase in student number will accompany an increase in energy consumption, but that's not the case in our university. We always compare our energy usages with nearby universities. Evidence suggests that we consumed less energy even though our student number is increasing... Through capital budgeting, we made the right decision.</p>	<ul style="list-style-type: none"> <li>• Lack of a formal environmental policy</li> </ul>

		<p>Reference 3</p> <p>¶90: We focus on cost savings and cost control. We tend to adopt practices that will help us achieve the goal. This is our organisational culture and the way we run the university. I always emphasise that historical data have their value, but we can't rely solely on them to make decisions. Future oriented information is also very important. For example, when making capital budgeting, we don't just consider upfront cost, but also consider associated future maintenance cost and energy usages. This information is relevant and should be considered.</p>	<ul style="list-style-type: none"> <li>• Organisational culture directly impacts on capital decision-makings.</li> </ul>
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<National University of Kaohsiung>

Participant	Type of Role	Quotation	Interpretation
Chieh-Jung Huang	Environmental Management & Senior Management	<p>Reference 1</p> <p>¶131: We don't have any formal systems, but I think it's a common sense that everyone should consider the related environmental impacts when making purchase decisions.</p>	<ul style="list-style-type: none"> <li>• Lack of a formal environmental policy</li> </ul>
Chu-Ying Lien	Management Accounting	<p>Reference 1</p> <p>¶72: A: I don't think so. What we care about is whether we have enough money or budget for the suggested purchases or investments.</p> <p>¶73: <i>Will you support the proposals that are focused on purchasing green or energy efficient products?</i></p> <p>¶74: A: I don't think we accountants have the ability to identify whether the proposed products are really green or energy efficient. Again, I will emphasise that although we control the budget, we don't have the authority to determine what to buy.</p>	<ul style="list-style-type: none"> <li>• Lack of a formal environmental policy</li> <li>• Evidence that suggests accountants are not actively involved in managing environmental costs</li> </ul>
		<p>Reference 2</p> <p>¶91: We are just accountants. What we can do is to provide suggestions on simplifying our accounting procedures to use less paper or promote good practices such as two-side printing. We do have an important role to play in terms of capital budgeting, but I don't think we will play a major role in cost allocation or performance measurement, especial from an environmental perspective.</p>	<ul style="list-style-type: none"> <li>• Evidence that suggests accountants are not actively involved in managing environmental costs</li> </ul>

## Cost Allocation

**Name:** Management accounting for the major environmental costs \ How the major environmental costs are managed \ Cost allocation

### < RMIT University >

Participant	Type of Role	Quotation	Interpretation
Chris White	Environmental Management	Reference 1 ¶52: No, but we have in the past through the charge-back system. At the moment, it's not being carried through.	<ul style="list-style-type: none"> <li>• The University considered allocating environmental costs to responsibility centres, but the practice was not being carried through.</li> </ul>
Anne Stewart	Management Accounting	Reference 1 ¶66: ... I couldn't get it from the finance system. I'd have to get that from human resources system, which is also in SAP. But even to do that, you have to look at people's job roles, position titles, and you have the assumption that if they were resources managers, they'd be 10% environmental or something like that. It's not designed to give me that information, not in that way.	<ul style="list-style-type: none"> <li>• A lack of linkage between systems collecting physical and monetary information</li> </ul>
		Reference 2 ¶74: It's just not a focus right now. That's not to say it's not a good idea. But for the university, it has been for knowing what makes money and what doesn't make money and therefore what could be costing us environmentally. It's not like money, maybe social and environmental impacts as well. It could be a correlation. It's more important right now to understand that, just in terms of where we're around. Not to say we couldn't get into environmental, because there is something the university, the community, the participants would like to see to make money. We're here to survive financially. But if we could be capturing that and aiming to do better, then yes, we could use ABC for that. We're just not there yet. It's just not a priority right now, which it doesn't mean we're neglecting it or we are not interested in that cost. But they're just managed the way they are managed.	<ul style="list-style-type: none"> <li>• It is important to manage environmental costs, but environmental cost allocation is just not a priority for the University now.</li> </ul>
		Reference 3 ¶104: ... That would just be on the bills, but all the bills come into Property Services. We used to do a thing where we charged out space - so finance occupies so many square meters, so we would pay a charge and that charge covers the space we used, and I think it should cover the utilities that we used. And then we might say we're not actually using that office, we give it up, so environmentally we wouldn't continue to pay for something, encourage people to use less, use less space basically. We still have very good records upstairs (Property Services) about exactly who's in what space so they can allocate that, but we don't allocate costs like that anymore.	<ul style="list-style-type: none"> <li>• The University considered allocating environmental costs to responsibility centres, but the practice was not being carried through.</li> </ul>
		Reference 4 ¶107: No, that's right. We don't expect them to be kind of mindful of it, and Property Services, I think, do issue notes and things saying make sure you turn off the lights and that sort of stuff. And certainly security guards come around and turn the lights off. We don't charge them for it.	<ul style="list-style-type: none"> <li>• Schools or portfolios are not expected to be mindful of environmental costs incurred.</li> </ul>
Paul Stockwell	Management Accounting	Reference 1 ¶123: ... So for the academic areas, they will receive overhead costs for Financial Services and Property Services. They have a breakdown on what makes up those costs, so they will be able to see, 'Ok, Property Services, it's costing us X'. But it doesn't really go down to the level of all the electricity, electricity costing you such and such amount.... From that perspective, our Property Services (a little bit selfish) has all those electricity costs in their budget. It's up to them to manage, not really up to us.	<ul style="list-style-type: none"> <li>• Lack of a responsibility-centred budgeting system</li> <li>• Aggregated information discourages managers from actively managing environmental costs.</li> </ul>

Wayne Poole	Management Accounting	Reference 1 ¶180: They are lost within the data. So, there are environmental costs - usage costs, and Property Services costs are allocated based on space to individual teaching areas. But we allocate one cost, which is the entire indirect cost base.	• Environmental costs are accumulated in the overhead account of Property Services.
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< AUS University >

Participant	Type of Role	Quotation	Interpretation
Anonyms (V2 & V4)	V2: Environmental Management V4: Management Accounting	Reference 1 ¶168: V4: Well, we monitor the cost and we ascribe the cost to each of the building users and we actually try and contain the volume use by saying this is the fixed budget you get for electricity. Now we've actually been able to hold that position for over five or six years. ¶169: V2: Yeah. ¶170: V4: ... where they got a fixed amount ... ¶171: V2: Based on the usage five years ago ... ¶172: V4: Yeah. ¶173: V2: ... we budgeted ... gave them the budget and said, 'all right, we'll claw it back off you, anything that you save, you can keep'. ¶174: Okay. ¶175: V2: Anything that goes over what you normally use, you'll pay for.	• The University initiated the practice five or six years ago. If the actual usage is less than the budgeted one, the users can keep the budget, but anything over, the users have to pay out of their pockets. • A good practice

		<p>Reference 2</p> <p>¶216: <i>On what basis did you determine the budget?</i></p> <p>¶217: V2: The budget?</p> <p>¶218: <i>The budget to the actual users.</i></p> <p>¶219: V4: We did an energy ...</p> <p>¶220: V2: Analysis.</p> <p>¶222: V4: ... analysis for about 15 months, something like that and based on that analysis, we said you're using so much energy and we extrapolate that out to a financial number ...</p> <p>¶223: <i>So that's based on historical numbers.</i></p> <p>¶224: V4: Yeah, and we set the actual budget and as I say we haven't changed that budget in over five years.</p> <p>¶225: V2: We meter all their buildings and then send them a bill for what they use. They've got to pay for that out of that budget.</p> <p>¶228: <i>Okay. Does each faculty occupy a full building? Otherwise how could you ...</i></p> <p>¶229: V4: Yeah.</p> <p>¶230: V2: There are some mixed buildings and we ...</p> <p>¶231: V4: Pretty much ...</p> <p>¶232: V2: ... share or divide up the energy usage based on area but also on the type of space.</p> <p>¶233: <i>Okay, the area and the type of space.</i></p> <p>¶234: V2: Yeah, so if there's a high use of energy, then that's weighted. It's a weighted space.</p> <p>¶235: V4: But by and large most faculties occupy a full building.</p> <p>¶239: V4: ... or two buildings, you know by and large.</p> <p>¶240: V2: Yes, that's very much so.</p> <p>¶241: V4: This one ... that's a hybrid.</p> <p>¶242: V4: So that's where that gets tricky.</p> <p>¶243: V2: But the main mixes are really teaching and office accommodation, so it's not a very difficult one to split. It's usually on area basis.</p>	<ul style="list-style-type: none"> <li>♦ The University did an energy audit and then set the energy budget for the building users. The basis has not been changed since then. For mixed buildings, electricity usages are allocated by the area and the type of space.</li> </ul>
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< Transworld Institute of Technology >

Participant	Type of Role	Quotation	Interpretation
Hsia-Ching Weng	Management Accounting	<p>Reference 1</p> <p>¶57: No, we don't. We only have a single budget pool for the total electricity cost incurred by the two campuses.</p>	<ul style="list-style-type: none"> <li>♦ Lack of a responsibility-centred budgeting system</li> </ul>
		<p>Reference 2</p> <p>¶91: ... As we have many students and they do consume a significant amount of water and electricity, we allocate 'water &amp; electricity' proportionally to 'teaching' and 'administrative management', 80% to teaching and 20% to administrative management.</p>	<ul style="list-style-type: none"> <li>♦ Arbitrary cost allocation</li> </ul>
		<p>Reference 3</p> <p>¶97: Currently no, but even our new system won't have this information. It's really hard to determine a reasonable allocation basis to allocate environmental costs.</p>	<ul style="list-style-type: none"> <li>♦ Lack of clear cost drivers to allocate environmental costs</li> <li>♦ Environmental costs are accumulated in overhead accounts without being allocated down to next level.</li> </ul>
		<p>Reference 4</p> <p>¶102: I think we will use the student number as the basis. As far as I know, no other universities have done such allocation or cost control.</p>	<ul style="list-style-type: none"> <li>♦ Student number being one of the potential allocation bases</li> </ul>

		Reference 5 ¶143: Currently we don't allocate overhead cost, which includes water and electricity, but that doesn't mean they [academic schools or departments] don't use any water or electricity.	♦ Everyone should bear their share of responsibility to reduce resource usages.
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< Nanhua University >

Participant	Type of Role	Quotation	Interpretation
Meng-She Chen	Management Accounting	¶95: Allocation is not that easy. We don't have enough people to do it.	♦ The University does not allocate any of its major environmental costs to the building users.

< National University of Kaohsiung >

Participant	Type of Role	Quotation	Interpretation
Chu-Ying Lien	Management Accounting	¶17: We have an allocation method to assign water and electricity costs to academic schools and administrative divisions. The reason is, if we don't allocate them, the cost to run an academic school or administrative division could be underestimated. But I think we should use actual usages to allocate these costs... ¶18: <i>What is the allocation basis for the electricity and water usages as you mentioned?</i> ¶19: It's estimated. ¶20: <i>Then what is the basis for the estimation?</i> ¶22: Well, our problem is that how to allocate water and electricity usages in the public area. It's not easy. Therefore, we use a fixed percentage to allocate. ¶23: <i>How is this fixed percentage determined? When do you start using this percentage to allocate?</i> ¶24: We are a new school, just six years old. At the early time, we didn't allocate water or electricity cost to academic schools. Rather, they were hold by the General Affairs. We found out that would result in underestimation of the total cost to run academic schools. Now we allocate these costs, but the allocation percentage is different from year to year. ¶25: <i>Why?</i> ¶26: Because we didn't allocate such costs before, to decrease the impacts of allocation, we decided to increase the allocation percentage year by year rather than a fixed percentage for every year. It's reasonable because we are a new school with only a few academic schools in the beginning.	♦ Lack of clear cost drivers to allocate environmental costs ♦ Environmental costs, such as electricity and water, are allocated to academic schools and administrative divisions based on a floating rate adjusted yearly. The rate is estimated. ♦ Arbitrary cost allocation

## Environmental Performance Measurement

**Name:** Management accounting for the major environmental costs\How the major environmental costs are managed\Environmental performance measurement

### < RMIT University >

Participant	Type of Role	Quotation	Interpretation
Paul Stockwell	Management Accounting	Reference 1 ¶128: When we report the total costs, probably there might be some comparison, but it's more in terms of measuring our performance against budget, rather than actually measuring us against other benchmarks...	<ul style="list-style-type: none"> <li>The setting of budgets is an important means to implement strategic objectives, while tracking budgetary outcomes can also be a valuable means to know how well the objectives are being achieved. It seems that the University has a stronger focus on operational rather than management performance measurement.</li> </ul>
Wayne Poole	Management Accounting	Reference 1 ¶125: If the information is readily available, then it should be provided, if it would drive change. But dollar value is also a surrogate for usage, unless there's a price increase. So therefore the dollar value within the ledger has to be for accounting purposes. You could use that as a surrogate for usage. So you're going to say by inference that we're reporting the usage to the heads of schools. It's just not in terms of kilo-watt/hours or mega joules.	<ul style="list-style-type: none"> <li>The chart of environmental accounts that are different from traditional financial accounts show the category (e.g. input), the type (e.g. electricity consumption), and the quantity of environmental cost data, and it is crucial to environmental performance measurement. However, evidence shows that the importance of environmental accounts has not yet been recognised.</li> </ul>
		Reference 2 ¶127: I'm not saying money's more persuasive, but that money gives evidence to usage. Unless there's a price change, my usage this month versus last month in dollar terms is the same as my usage in terminology.	
		Reference 3 ¶132: I think paper usage should be [considered as an environmental performance indicator].	<ul style="list-style-type: none"> <li>Paper usage is recommended as an environmental performance indicator based upon the interviewee's previous experience.</li> </ul>
Chris White	Environmental Management	Reference 1 ¶103: No, not in particular. But because we report on the TEFMA benchmarking, we know where we sit.	<ul style="list-style-type: none"> <li>A voluntary compliance to TEFMA benchmarking provides a driving force for adopting some form of environmental performance measurement.</li> </ul>
		Reference 2 ¶139: It's only through the information we collect for the TEFMA benchmarking.	
Graham Bell	Environmental Management	Reference 1 ¶78: We get that money [budget], and we will spend it as responsibly as we can between the 1st of January and the 31st of December. The accountability is hitting the budget on the bar – if we're too far under, that doesn't help anyone; if we're too far over, obviously it costs the university money. We're just trying to have a soft landing and that would be the best way to describe it.	<ul style="list-style-type: none"> <li>Lack of environmental performance assessment</li> </ul>

		<p>Reference 2</p> <p>¶193: No, there probably isn't. When I have a few minutes to myself, I will do a little bit of benchmarking with odds and end that I might have. For argument's sake, the energy audit that we did last year with the chemical engineering students from Bundoora on Building 223, which is that big line of aged building that uses in excess of \$1,000 electricity per day, a lot of money. I mean your building 108 uses about the same amount of power and one that runs about 5,000 students. This runs a couple of hundred students. This is energy intensive because of the fume cupboards, air conditioning, and strict environmental control. That's my bit of benchmarking, but it's also that one building we're doing further actions with other postgraduate students looking at the efficiency of the fume cupboards...</p>	<ul style="list-style-type: none"> <li>• Lack of environmental performance assessment</li> </ul>
		<p>Reference 3</p> <p>¶117: We still see the green team, which is a social science initiative of what we used to do a few years ago. They're still working on several issues, and we helped them on a throw-out project last year. But again, it hasn't been done on a strategic basis. It's been a local idea and hasn't been put into place.</p>	<ul style="list-style-type: none"> <li>• Environmental management initiatives are not undertaken on a strategic basis.</li> </ul>
Anonym (R2)	Academic School	<p>Reference 1</p> <p>¶111: That's right. You would need to know the quantity. When my electricity bill arrives at home, we always look at the kilo-watt/hours and whatever they have to compare this year to last year, and wonder why on earth we used more this year than last or whatever. So you do need that information. It's not just a case of looking at the costs.</p>	<ul style="list-style-type: none"> <li>• Physical information is important in measuring environmental performance.</li> </ul>
		<p>Reference 2</p> <p>¶114: Yes, I think it should. I don't know that they have any environmental performance metrics at all. I haven't seen any. It would bring it to the front of people's minds.</p>	<ul style="list-style-type: none"> <li>• Lack of environmental performance indicators</li> </ul>
		<p>Reference 3</p> <p>¶188: I mean, you have to be so careful about what you settle for as performance indicators, because that can cause dysfunctional behaviour, it could push people in an entirely wrong direction... But I personally as the head of school would be happy to be measured on that part from all the other performance indicators that are in place.</p>	<ul style="list-style-type: none"> <li>• Care should be taken to choose appropriate environmental performance indicators.</li> </ul>
		<p>Reference 4</p> <p>¶195: Well, management accounting has a range of performance indicators, so they could provide all that sort of information. They can help in coming up with a rational basis for allocating costs across schools.</p>	<ul style="list-style-type: none"> <li>• The need for the involvement of accountants in ensuring that financial performance measures reflect environmental considerations.</li> </ul>
Anonym (R1)	Senior Management	<p>¶239: ... Personally I mean however you go about it, if you build it in as a key performance indicator, then you're going to get action...</p>	<ul style="list-style-type: none"> <li>• Lack of environmental performance indicators</li> </ul>
Stephen Somogyi	Senior Management	<p>Reference 1</p> <p>¶133: Well, I think if we set reasonable targets for all of us to meet and we measure it on a regular basis as part of our monthly management reports, then usually what gets measured, gets managed.</p>	<ul style="list-style-type: none"> <li>• The need to establish environmental performance indicators geared to promote environmental awareness and behaviour change at a school level, because their actions influence the overall environmental performance of the University as a whole.</li> </ul>
		<p>Reference 2</p> <p>¶142: Well, the easiest one is the utilisation of paper or the utilisation of energy.</p>	<ul style="list-style-type: none"> <li>• Paper or energy could be used as environmental performance indicators.</li> </ul>

		Reference 3 ¶187: Well, it's a balanced scorecard, so it's one of a number of issues they need to be able to manage. I don't have problems with key managers being as responsible as I am for all those balanced issues, be it to do with financial reporting or human resource reporting or environmental reporting, or anything else where we need to ensure they're kept in balance. Not one of those should be dominant.	♦ The need for a more balanced approach that measures and reports environmental performance
		Reference 4 ¶194: ... Paper usage is clearly one that almost everybody has an impact on or has an opportunity to manage. Some will have no impact or ability to manage water usage or waste management because they don't have any involvement in it, but energy usage, they may. Most of those will probably be in the hands of Property Services people. But, we may be able to design ways of allowing our business managers to monitor those issues. Our Property Services people can't be everywhere.	♦ The need to establish environmental performance indicators geared to promote environmental awareness and behaviour change at a school level, because their actions influence the overall environmental performance of the University as a whole.

### <AUS University>

Participant	Type of Role	Quotation	Interpretation
Anonyms (V2 & V4)	V2: Environmental Management	Reference 1 ¶548: <i>Does the university have any environmental performance indicators in place?</i> ¶549: V4: Not that I know of. ¶550: <i>Then how does the university measure its environmental performance?</i> ¶551: V4: We don't measure ... ¶552: V2: Not from an accounting point of view, no. ¶553: V4: But I don't think we measure our environmental performance at all.	♦ Lack of implementing an environmental performance measurement framework within the University
	V4: Management Accounting	Reference 2 ¶579: V4: But having the data and having it linked to some sort of strategic goal is the bit that's missing. I mean we've got the data there, we've got the ability to benchmark these things as well and work out how much we're spending per head and all of those sorts of values but ...	♦ Lack of a strategic focus on environmental performance measurement

### < Transworld Institute of Technology >

Participant	Type of Role	Quotation	Interpretation
Chih-Cheng Chang	Environmental Management & Senior Management	¶62: Well, I think monetary information itself is enough. The higher the costs are, the more water and electricity you consumed.	♦ The importance of physical environmental cost information has not yet been recognised.
Feng-Shuai Wu	Senior Management	Reference 1 ¶84: I don't think our accounting people consider physical information, so it would not be possible that the quantity information has been added in the new system. I think our environmental management people should make the request, but whether they did, I don't know. I guess they didn't. Two years ago, I asked some research students to investigate the water usages within educational institutions in Taiwan. Most of the schools can't provide the usage information. Even people with environmental management function have ignored the importance of quantity information...	

		Reference 2 ¶148: I don't think we measure environmental performance at all. Water and electricity usages and of course their related costs are frequently being mentioned in various meetings, but that doesn't necessarily mean that attention has been paid on environmental performance.	♦ Lack of implementing an environmental performance measurement framework within the University
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### < Nanhua University >

Participant	Type of Role	Quotation	Interpretation
Jen-Wei Wei	Environmental Management & Senior Management	¶81: Of course not. No one has been assessed against any environmental KPIs. I provide our electricity or water cost information regularly in our managers' meeting because I would like to let them know we are doing a very good job – although our student number is increasing, our electricity and water costs remain stable... It's our responsibility to monitor and control electricity and water costs. Any cost savings are certainly beneficial to the university, but they are not linked to our performance or salary bonuses. We think environmental cost control is important, but not everyone thinks that way.	♦ Low profile for managing environmental performance
Meng-She Chen	Management Accounting	Reference 1 ¶107: We universities are not evaluated based on environmental performance. It's also a critical problem needed to be addressed by the Ministry of Education.	♦ Traditional performance measurement has been challenged.
		Reference 2 ¶111: Focusing on monetary information alone is misleading and would result in wrong actions taken. When talking about performance measurement, both monetary and physical information is important. The importance of physical information should not be overlooked.	♦ The important of physical environmental cost information

### < National University of Kaohsiung >

Participant	Type of Role	Quotation	Interpretation
Chieh-Jung Huang	Environmental Management & Senior Management	¶145: No, the university is not measured by environmental performance. Every environmental effort is self-motivated.	♦ Traditional performance measurement has been challenged.
Chu-Ying Lien	Management Accounting	Reference 1 ¶94: I think monetary and physical information refers to the same thing. For example, the more water or electricity you consume, the more money you have to pay. The dollar value is also a surrogate of usage.	♦ The importance of physical environmental cost information has not yet been recognised.
		Reference 2 ¶96: Well, we universities are not like manufacturing companies. They can produce at off peak hours, but we just can't. Therefore, physical information is not that useful for us.	♦ The importance of physical environmental cost information has not yet been recognised.
		Reference 3 ¶99: I don't think it helps. General Affairs has already documented usage information. I don't think it's necessary to have the same information in our accounting information system. As it's General Affairs' responsibility to control the usages for the whole university, they should have the usage data ready if requested. Although our purchasing and accounting systems are linked together, only dollar value information is provided.	♦ Lack of the involvement of accountants in managing environmental costs
		¶38: We produce a managers' report every month. The report is discussed in the managers' meetings. Heads of schools and directors of administrative divisions take part in the meetings. They will be informed about how they performed in terms of budget control.	♦ Performance is evaluated against the budget

## Suggestions for EMA adoption and implementation

**Name:** Management accounting for the major environmental costs\Suggestions for EMA adoption and implementation

< RMIT University >

Participant	Type of Role	Quotation
Chris White	Environmental Management	Reference 1 ¶55: ... What I'm saying is I think we can get a whole lot of improvement if we actually put some good data through that and good financial information, allowing people to be beneficially resolving further affirmative action. So it's not all black, I mean there are a lot of individual pictures about those sorts of things... But I think you could really increase the performance, the sustainability dimension, by actually putting it in financial categories, which means we got the information and we got the benefit from doing it. It's not that hard.
		Reference 2 ¶63: ... So Property Services itself is a significant area, so we should know what to do with Property Services. I would push down to about the third line of the management. See we've got vice-chancellor and pro vice-chancellors. The next level is the school. It's probably the most meaningful level.
Anonym (R1)	Senior Management	Reference 1 ¶195: ... my own opinion is that you don't want to leave it to the conscience of people with power, because I mean not to put too fine a point on it, they're not to be trusted... you've got to do something structural about that, and so structures bolstered with some sort of incentive or disincentive, so that's why I think if you could get policy made internally or externally and imposed on universities that force us to comply with certain procedures, and back that with financial incentives... I think it's a bad practice to allow the policies of the university to depend upon the good will of the individuals, you have to have a structural solution.
		Reference 2 ¶211: Information and incentives, backed by incentives, because just getting information is not going to change behaviour.
		Reference 3 ¶213: Well in that case, it's straight out financial, by charging according to costs incurred. Do you know I came from the university in XXX? ¶214: Yes. ¶216: That's right, and we were getting to the point where we were getting good outcomes by attributing costs directly like this, so much so that some of the larger faculties actually employed somebody to come in after hours to turn all the lights and heating off, it turned out that they could pay ... I mean they have two advantages, one is someone else got a job and this person's job is to come around after midnight and turn off all the power and all that, so that the money they saved on the power paid him and returned the surplus...
		Reference 4 ¶230: ... but you'd need somebody to champion it through. ¶231: <i>Who would be the person?</i> ¶233: I don't know, I wouldn't like it to be me..., it would be nice if you could recruit somebody from within Financial Services, they're the ones that pull the levers really, Peter Enland or Steve Somogyi, one of them.
Joyce Kirk	Senior Management	Reference 1 ¶105: Well, it would seem to me that it would need to be most useful to me. It would be by portfolio or business unit, not by building.
		Reference 2 ¶116: ... What I want is an analysis of the data, not just the raw data. And I think the other information that's interesting would be trend data...
Margaret Gardner	Senior Management	¶26: ... We do try to use indicators that we can benchmark against other institutions, so to some extent, you need to be using indicators that are relevant, in terms of making comparisons - are you actually doing better, or are you just standing still, or are you improving? So, Financial Services can talk to Property Services about that management, and then the only other area would be depending on how we allocate and charge people for various things.

Paul Stockwell	Management Accounting	¶163: I think that all of the portfolios need to be provided, and then obviously have that information passed on to the actual schools, the individual schools. So they obviously need to be provided with the usage information. They probably need to see a trend over the last three or five years, so that they can see, 'well this is our usage as opposed to just the actual cost'. If they just see the cost, then it doesn't really mean anything other than say, 'Oh! This is how much it costs us'. I think they need to be provided with both the cost and the actual usage and quantity, and also a trend over the last few years. And also, if they can, some sort of industry average or benchmark that they can measure against other organisations, perhaps the best practice, would be good as well.
Anonym (R2)	Academic School	¶202: I think that I'd change the chart of accounts and develop performance indicators that are sensible and acceptable; otherwise people would hate to adjust. They have to influence behaviour. That's the whole point, isn't it? So they could settle on a small group of performance indicators that were acceptable by managers. They could do that, but nothing. I see no evidence of that.
Wayne Poole	Management Accounting	¶115: It would be possible to augment the accounting system to have notional general ledger, so non-dollar values... I've got my invoice from AGL. I would input kilo-watt/hours used and the value, so then I could report upon that. If it would be a system change, it wouldn't be a huge system change.

## APPENDIX B

### THE CODED DATA – FACTORS INFLUENCING ENVIRONMENTAL MANAGEMENT ACCOUNTING ADOPTION WITHIN UNIVERSITIES

#### Low priority of accounting for environmental costs

**Name:** Barriers to EMA adoption\Attitudinal barriers\Low priority of accounting for environmental costs

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	Reference 1 ¶29: But no one has ever come to me and said, ‘Tell me the environmental cost of what we do’. So the whole chart of accounts is not set up to record anything that way. We account for projects but unless I knew of a project in Property Services or in a Portfolio, I wouldn’t go and pick it out and say, ‘Here’s our environmental cost’. So it’s one thing that we’ve never been requested, even though it’s not a new concept. We’ve never been requested to provide specific information about it. So from what I see, not that I see everything, it maintains a low profile.
		Reference 2 ¶32: Also we’ve different accounts. So we think, ‘Ok, how can we capture costs properly?’ You know, at the end of the day, what are management interested in? They’re interested in how much we spend on travel and how much we spend on consumables. So would they say how much we spend on the environment? ... They never have, or it hasn’t come through to me.... They may discuss it at different forums, but it would be very hard to measure. I wouldn’t even try to do a chart of accounts. I wouldn’t expect to cost it in a ledger, nor then will I be able to give a report to someone, and say, ‘Here it is exactly and here’s an idea of it’ .... I don’t think we’re there.
		Reference 3 ¶44: The environmental stuff never got asked. I guess they assume they’ve seen the report and that’s what we’re doing on it. But they don’t say, ‘show us the cost of that’, which isn’t to say they wouldn’t, but they never have, in my experience.
		Reference 4 ¶161: Barriers are just the people that do it, and whether the information’s used or whether people want this information. It’s a good thing, but people will lose interest in that... and there are other things to focus right now. It could be useful. One day we probably will do that, but we’re just not at that place right now.
Chris Whitaker	Senior Management	Reference 1 ¶13: I mean clearly they’ve got a bottom line effect, and things like energy costs can run out of control... but to be honest with you, I don’t see that’s a particularly high profile at this time, either within the university or external to the university. It’s not something that everybody is watching, to be honest with you.
		Reference 2 ¶26: You say it’s important, but then you think, ‘well, what else should then we be doing’. I mean, to what extent are we measuring water cost and energy cost, so on and so forth? ... What’s actually more important is what then you do with that information, which you actually use for management purpose, which I think is an issue for RMIT.

		<p>Reference 3</p> <p>¶118: I think the university needs to take a little bit more timeout to actually discuss whether we see something and what we are going to do here - just measure it and report it or we are going to manage it. We only spent a few minutes on that discussion... It's actually captured in the strategic plan because it does talk about sustainability, but we haven't yet translated it to 'what does that mean in practices', just words at this moment. But the strategic plan is very new and I am sure we will get to it. I mean there is no reason why we wouldn't...</p>
Chris White	Environmental Management	<p>¶175: It might be, but I don't think it's the most critical thing.</p>
Graham Bell	Environmental Management	<p>Reference 1</p> <p>¶69: I don't think there would be too many people in this university who would know how much it costs per square meter to clean, I mean roughly.</p>
		<p>Reference 2</p> <p>¶122: I mean, it's asked recently that should the health and Safety be their responsibilities. But I think environmental responsibility... they may believe that they're working at it. But I can tell you that they haven't phoned me up and asked me for what their electricity bill was... I mean, if they knew what that was, then they'd get a pretty good idea what it costs the university to make that facility available to them... They presently don't do that sort of analysis.</p>
Joyce Kirk	Senior Management	<p>Reference 1</p> <p>¶67: It probably does. But again, I'd go back to the question of competing priorities... it's a question of again how that is prioritised in the context of what people need to do day-to-day.</p>
		<p>Reference 2</p> <p>¶74: I guess I probably am [held accountable], but in the context of the university as a whole. No one has said to me, 'You have to cut your electricity use by 50%'. So I do my bit as an individual. But as a manager, I probably also do my bit. One thing that I'm doing at the moment is actually keeping track of our expenditure in the portfolio, just so I can see how much we are spending on that. And then once I've seen what we're spending, then I'll think, 'Will we do something or not'.</p>
		<p>Reference 3</p> <p>¶81: Oh, sure, but then there are lots of important things.</p>
		<p>Reference 4</p> <p>¶119: Well, again it goes back to competing priorities - what needs to be done and what is the most urgent, and you would understand that the most urgent, even if it's not the most important, usually gets attended to first.</p>
Margaret Gardner	Senior Management	<p>Reference 1</p> <p>¶32: Oh, and then there's the question of whether they should have control of those costs, so you know, there's a bigger question here. Everybody wants to use their issue, and identify their costs to drive behaviour, and you have to make a decision in a university about how many signals you want to send. Because you can have people worrying about all sorts of things that you might not want them to be... you know, you might have other, better ways of doing it. So do I want my schools worrying about their overall energy costs, when in fact, a lot of what will affect those is our infrastructure? So if it's not in their control, why shouldn't I be concentrating on the work that reduces the overall costs around energy or water and the likes by improving our infrastructure, which is the priority, and where we're spending a lot of money on, or should I be attempting to send a signal to someone who's actually got very little control over it? And even if everybody did turn off the lights, it would make almost no difference. I think it's important that I send appropriate signals. You only want to send big signals on things where people's behaviour would make a major difference. And I would say, looking at our activities, that our first set of priorities is improving our infrastructure, because we've got a lot of old buildings, so our first priority is, 'can we get that, the basics, to a level that makes them quite efficient?' That would probably produce the biggest impact overall.</p>

		<p>Reference 2</p> <p>¶134: My first priority is what I call the gross efficiency, and that's what I've been focusing on, and we still have a lot left to do there. The second thing is where we can institute system changes that will reduce overall costs for everyone, that's our first priority, that's our first activity. And I am less in favour of turning off the fountains than I am in putting in infrastructure that will provide better overall use of water, because, as between those two things, I think the infrastructure that provides the overall use of water is better, might be more expensive, but is more important than turning off the fountains. So it's that judgment that I'm having to make. Similarly, to look at the indirect costs, first we have to get a fine enough grain, but second, we have to ask a question, 'what signals are we trying to send?' Should the benchmark be used for a science school, of energy? You don't know whether you should be trying to get them to reduce it, or they might be trying to reduce it already, so, data, in and of itself, doesn't mean anything, unless you actually know what constitutes efficient use.</p>
		<p>Reference 3</p> <p>¶146: It's not that I wouldn't go to that more detailed look at indirect costs, but of the many things I have to worry about of indirect costs, this is not the first priority in terms of looking at the indirect costs of schools. If you ask me in terms of the efficiency of our infrastructure, where I think we need to be investing, then yes, this is a priority, and we have to invest in it. And by doing that, if we get it right, we lower the overall energy cost, and we do have targets on that. That's our first priority, because that is based on a judgement that our biggest problem is that at this stage</p>
		<p>Reference 4</p> <p>¶157: It's certainly important that we manage that overall.... Well, our first priority in management is all I'm concerned about, so once you get the basic systems under control, then you go, and you have your next look, and you say, 'okay, now what can we do?' That will take us to the next stage. But until you've got what I call an efficient base, there's no point, well, there is a point around paper, things that you can get direct control over. But I'm talking here about the big ones, like energy and water, all the major improvements are not necessarily in the control of the individuals.</p>
		<p>Reference 5</p> <p>¶181: ... my complete interest in it has been around infrastructure.</p>
Paul Stockwell	Management Accounting	<p>¶1133: I think one of the problems we've got, in terms of facilities type of stuff, is that the university is a teaching organisation and most of the focus goes on teaching students, student welfare, and all of those types of things. The facilities, accounting, and other stuff like that, are not our major focus. At the end of the day, most of the things that are discussed are really around the students, the student issues, and education itself. This type of stuff is secondary. I found out that it's a secondary issue.</p>
Anonym (R2)	Academic School	<p>Reference 1</p> <p>¶184: Nothing comes down from the top to say, 'be careful to watch what you spend on electricity'. The university has come to a difficult financial period over the last couple of years.... During the time of the difficult financial situation, we all tightened our belts, some more than others.... But we didn't tighten them to that extent.... We looked at overseas conferences, staff attending overseas conferences. Why would someone want to go twice a year to the other side of the world? That's a big cost. We looked at all sorts of other things and carefully contained notes, but not the gas and electricity or whatever charge. Interesting, isn't it?</p>
		<p>Reference 2</p> <p>¶187: There were general edicts from the top to say you must operate within budget over the last two or three years. All were supposed to operate within budget. There were general edicts about being careful about spending in this area and that area, but nothing about environmental areas.</p>
		<p>Reference 3</p> <p>¶1107: If the university was really concerned about environmental costing, they would.</p>
		<p>Reference 4</p> <p>¶1119: No one, I don't ever recall anyone in the university talking about the cost of electricity, gas, water or whatever.</p>
		<p>Reference 5</p> <p>¶1124: But there is a new incentive scheme that's being developed, which means that in the future, each of the schools, if they make a surplus, they will be able to keep a portion of it. Maybe that will help drive down the costs. The bigger the surplus, the more we get. That's right, but it wouldn't be enough to make me go around and have a go at someone who's left their light on.</p>

		Reference 6 ¶135: I don't think they'd see it as important. I think they'd just shrug and say, 'you know, look, it's just a cost, it's an overhead that you have to carry and that's it'. That's what I'd think people would say.
		Reference 7 ¶150: There certainly hasn't been any signal coming out of Building 1. If we were right down to the wire on the financials, if we were really stretched, that might encourage them to do that. But then we've been stretched over the last few years, I don't see them having done that [managing environmental costs]. Maybe they just shrug their shoulders and say, 'well, they're just overheads, we'll just have to incur them and that's it'.
		Reference 8 ¶183: No, not for environmental costs. As I said, there's an incentives scheme coming for budget surplus, and also if you incur a deficit, you may have to repay that part to the university. But that's the wider thing. That's not environmental cost, no.
Stephen Somogyi	Senior Management	¶261: Because you can produce all the reports you like but if no one opens it then it won't have any impact.
Wayne Poole	Management Accounting	¶170: They're aspirational issues.... But our primary focus must be the delivery of high quality of education and research, because that's what we are as a university. We're a centre for those two products.

#### <AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	Reference 1 ¶330: I just think there are too many other issues for higher education and the university to be concerned about it at the moment. It's just not in the priority stack at the moment.
		Reference 2 ¶563: It's just not a priority of the University's.
		Reference 3 ¶568: It's possible and useful. There's just no requirement at the moment.
		Reference 4 ¶659: ... no one comes to me and says, 'look, you've got to drive it down further'.
Anonym (V4)	Management Accounting	Reference 1 ¶31: ... But we're struggling with all of the other pressures on an organisation to be successful, that is a high priority ... and I'd say it's not even on the radar for the management of the organisation at the moment.
		Reference 2 ¶140: There hasn't been a need.
		Reference 3 ¶324: I can't see it on the University's radar at the moment other than pushing it from a middle management point of view.
		Reference 4 ¶709: I'm not against the principle of keeping that data in that warehouse if you like, but it's something we're not considering at this point in time.

#### < Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	¶50: Unless it's regulated, it's very hard to force universities to do it. But another problem is, 'Is there any one who wants the information?' If nobody wants the information, why bother?
Hsia-Ching Weng	Management Accounting	Reference 1 ¶75: Well, perhaps it's not one of our priorities.

		Reference 2 ¶81: ... Environmental accounting is still an area not much attention has been given to, especially within universities.
		Reference 3 ¶128: Before you make the decision to provide this information, you have to make sure the information would be useful and valuable, but environmental information is not what everybody's interested in.
Shu-Hsiang Hsu	Senior Management	¶43: Well, in the future it might become part of the priorities, but now it is not.

< Nanhua University >

Participant	Type of Role	Quotation
Chih-Wen Ding	Academic School	¶6: Accounting has two components in itself; one is theorisation and another is operationalisation. Ideally, environmental costs, both internal and external, should be accounted for within the accounting system, but practically it's not that easy. Materiality is an important accounting concept. If a shorter-term perspective was adopted, environmental costs might not be material enough to be separately identified. But if a longer-term perspective was adopted, some environmental costs should be taken into account now. So it depends on what the priorities are for universities. As education and research are definitely the two major priorities for universities, it's natural that a shorter-term perspective on accounting for environmental costs is adopted by most of the universities. Separate identification of environmental costs or environmental performance measurement wouldn't be considered as a priority for universities. They might think environmental issues are important issues; they might have put in place some environmental programs, but they just don't think accounting for the environment is equally important.
Chung-Chiang Chen	Academic School	Reference 1 ¶8: Can you name any organisation that provides environmental cost information to its staff?
		Reference 2 ¶16: We have undertaken some environmental management initiatives to reduce consumptions of natural resources, but I don't think we have put in place any accounting controls for this purpose. Accounting information is available to some people within the University, such as the President and the Chief Accountant, but only aggregated information is provided. If you insist to disaggregate the information, you will really have a hard time. Do you think it's possible to have a meter installed in my office?
Jen-Wei Wei	Senior Management & Environmental Management	Reference 1 ¶78: We monitor usages of electricity and water. The information is documented and reported, but environmental performance measurement is just not an important issue for the University.
		Reference 2 ¶107: I don't think academic staff cares about environmental costs. I've provided related information in the managers' meeting. They are well informed, but I just don't think they care about how we control the costs. They don't even think environmental costs should be part of their operating costs.

## Resistance to change

**Name:** Barriers to EMA adoption\Attitudinal barriers\Resistance to change

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	¶107: We don't charge them for it. Whether the charge influences behaviours anyway, it is not completely confirmed.
Chris White	Environmental Management	Reference 1 ¶52: We expect to spend the resources to get the best results. So I think for the university it's better for us to look at the overall cost of the electricity and then look at ways to reduce it and do the culture change programming.
		Reference 2 ¶134: There isn't really a system apart from just really reporting on budget performance and acceptance whether that's good or bad. It's not really a bonus system, so there is no financial reward type system that can be linked. So it's mainly for tracing whether you perform within your budget, responsibly or not. So to that extent, yes, people could be held accountable, but there is no other system apart from that.
Graham Bell	Environmental Management	Reference 1 ¶66: With some additional efforts, we could probably get down to a more specific cost... But whether it would save you in the long run, it might be better to sort of reverse it, and go with the cultural change, and find why the area's messy.
		Reference 2 ¶143: Measuring it [environmental cost] certainly would help, because doing that comparison exercise would make people stand up and take notice. But at the end of the day, it's either that cultural change agents go out and start lecturing people, or we put money in the capital and bring in technological solutions...
		Reference 3 ¶130: If the cost to produce a graduate could be established, they could see how profitable it is to provide more graduates. To take a business point of view, we're making cars or bottle tops or things like that, you are trying to put out as many quality units as possible at the least operating cost. Universities do not look at their business that way. They go the whole.
Joyce Kirk	Senior Management	Reference 1 ¶185: But what's more important: the information or the change in behaviour? And it seems to me that it's the change in the behaviour, the ways of thinking, those sorts of thing. That's the primary objective, and gathering the information is just one way of doing that... I don't think that EMA is an end in itself, so I think we need to be very mindful of that. But we do need something like that to tell us how close we are getting towards a more sustainable work practice and a more sustainable work environment...
		Reference 2 ¶187: That's because we're not producing widgets.
		Reference 3 ¶223: Until we know that allocating it [environmental cost] to the whole of the university is not working, then why invent a whole raft of systems that we may not need? That's my point. I'm not saying, 'don't do it', but let's first demonstrate that what we are doing doesn't work. There is a saying, 'if it isn't broken, don't fix it'. So I guess that's my point.

Margaret Gardner	Senior Management	<p>Reference 1</p> <p>¶32: Oh, and then there's the question of whether they should have control of those costs, so you know, there's a bigger question here. Everybody wants to use their issue, and identify their costs to drive behaviour, and you have to make a decision in a university about how many signals you want to send. Because you can have people worrying about all sorts of things that you might not want them to be... you know, you might have other, better ways of doing it. So do I want my schools worrying about their overall energy costs, when in fact, a lot of what will affect those is our infrastructure? So if it's not in their control, why shouldn't I be concentrating on the work that reduces the overall costs around energy or water and the likes by improving our infrastructure, which is the priority, and where we're spending a lot of money on, or should I be attempting to send a signal to someone who's actually got very little control over it. And even if everybody did turn off the lights, it would make almost no difference. I think it's important that I send appropriate signals. You only want to send big signals on things where people's behaviour would make a major difference. And I would say, looking at our activities, that our first set of priorities is improving our infrastructure, because we've got a lot of old buildings, so our first priority is, 'can we get that, the basics, to a level that makes them quite efficient?' That would probably produce the biggest impact overall.</p> <p>Reference 2</p> <p>¶36: I am actually trying to encourage them [to do research]. So what if I send them a signal that says all the researching schools should stop, people should do less, be at work less.... That's not a good signal.... So it seems to me that my first priority is what I call the gross efficiency, and that's what I've been focusing on, and we still have a lot left to do there. The second thing is where we can institute system changes that will reduce overall costs for everyone, that's our first priority, that's our first activity. And I am less in favour of turning off the fountains than I am in putting in infrastructure that will provide better overall use of water, because, as between those two things, I think the infrastructure that provides the overall use of water is better, might be more expensive, but is more important than turning off the fountains. So it's that judgment that I'm having to make. Similarly, to look at the indirect costs, first we have to get a fine enough grain, but second, we have to ask a question, 'what signals are we trying to send?' Should the benchmark be used for a science school, of energy? You don't know whether you should be trying to get them to reduce it, or they might be trying to reduce it already, so, data, in and of itself, doesn't mean anything, unless you actually know what constitutes efficient use.</p>
Anonym (R2)	Academic School	<p>Reference 1</p> <p>¶25: The university is so concerned about the welfare of students and staff.</p> <p>Reference 2</p> <p>¶76: I suppose in the business portfolio, we haven't really needed to, because we all have a lot of international students. I'm talking generally about spending, not just about environmental costs. We really haven't needed to, in the way that some of the other faculties that don't have that same opportunity to attract international students or teach offshore. They don't have that. They've had to be more careful than we have. I suppose also in business we're not as tuned in to environmental impacts, and probably I'm talking more about external impacts, than engineering and wind tunnels and all things like that... Why do we need to worry too much about the environment?</p> <p>Reference 3</p> <p>¶79: But there are lots of other things that I would ask the finance manager to keep an eye on, like how much we are spending on overseas conferences, and how much we're spending on staff development. But things like gas and electricity and whatever, they're just standard things. And now you're making me feel guilty, but they're standard things and you'd have to incur the cost regardless.</p> <p>Reference 4</p> <p>¶188: I mean, you have to be so careful about what you settle for as performance indicators, because that can cause dysfunctional behaviour, it could push people in an entirely wrong direction...</p>
Stephen Somogyi	Senior Management	<p>¶162: So I think that's the main issue. But that's not unusual in any large organisation, because the centre always streams off new things for the business to do and the business says, 'enough is enough'.</p>
Wayne Poole	Management Accounting	<p>¶20: well, I suppose the university's prime focus is the delivery of an efficient service to our customer - the customer base being the students, because that's our prime focus. Now, periphery of our prime focus is to do that in a financially sustainable methodology, and then probably is to adopt our aspirational direction of trying to do that in an efficient resource base, which encompasses triple bottom line, social, environment as well as finance. If I had to rank those things, students always come first, financial sustainability comes second. Now financial sustainability by using less resources fits into that.</p>

<AUS University >

Participant	Type of Role	Quotation
Anonym (V4)	Management Accounting	Reference 1 ¶709: I'm not against the principle of keeping that data in that warehouse if you like, but it's something we're not considering at this point in time. Whether it's cheap or not, it's not my experience to changing SAP.
		Reference 2 ¶734: Yeah, that's right and I wouldn't expect us to modify the system just to do those sorts of things. I think that would always be some sort of extraction. But the accounting systems, like I said, are like a set of grids, aren't they? So we do have a grid that looks after the waste removal, if you look at SAP that way, you'll have the salaries and some of the waste costs incorporated.
Anonym (V2)	Environmental Management	¶571: That's right and the question is, 'What do you do, penalise faculties for not being environmentally friendly?'

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih Cheng Chang	Senior Management & Environmental Management	Reference 1 ¶90: It could be a problem, because people usually don't want to change. Therefore, I think budget constraints and people's attitudes to changes would be the two major barriers.
		Reference 2 ¶125: Teaching and doing research is regarded as the most important for academic staff. Electricity is the basic resource they should be provided with for the purpose of teaching and doing research. If you adopt some sort of management control to reduce the usages, they would think they are being exploited.
Feng-Shuai Wu	Senior Management	Reference 1 ¶29: We don't have any environmental policy. We've undertaken some environmental initiatives, such as the student-centred environmental group, but we just don't have a formal environmental policy. From time to time, there are some people who are very interested in environmental issues and they would try to promote some environment related concepts or practices. Their actions might change the culture of the University. But by talking about culture change, you have to remember there are two ways to cultivate a culture change – one is through policy making and the other is through changes in organisational culture. Although we don't have a formal policy on water conservation, it's already a culture in the University. We are all proud of our recycling and reusing water system. Through metering and monitoring our water usage, we know we did save a lot of money by using less water. It's already a culture and I think we'll follow the practice. This is what we have done on reducing water usage. But in terms of electricity usage, we still have lots more to do.
		Reference 2 ¶32: It's not a problem of what you can do, but a problem of whether you want to do it. If we could invest more on energy efficient systems, things would be different. If energy conservation is part of the university culture, we should have energy efficient systems everywhere in the University and everyone should take his/her share of responsibility to save energy by turning off everything that's not in use. It's really a culture change issue.
		Reference 3 ¶64: Well, in this case I don't think our accounting or finance people would like to be involved. They are conservative and tend to focus on routines and daily activities they are used to do. In my experience, I don't think they are willing to take more responsibilities. They only provide what they think should be provided rather than information that needs to be provided. That's not a criticism, but an experience learned from working with them in the past. I think an environmental reporting coordinator is required for consolidating the information required for reporting purpose. Without that position being filled, things just can't get done. As I said previously, in this University although some people, but not many, are trying to push through some environmental initiatives, they are all self-motivated.
Shu-Hsiang Hsu	Senior Management	¶18: People might not want to change. If you measured their performance based on the electricity usages, they might complain about the policy or even tell you that's not a fair game. You've got to have the measurement mechanism first. But even if the mechanism is there, there are still some other barriers. For example, how can you ask academic staff doing research and saving the electricity cost at the same time?

Yu-Chuan Pang	Academic School	¶29: I think it depends on whether I think environmental issues are important or not. Because I think environmental issues are important, I agree I should be assessed against my environmental performance. If you think you are part of the environment and part of the world, you will agree you should have some form of environmental accountability.
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< Nanhua University >

Participant	Type of Role	Quotation
Chih-Wen Ding	Academic School	Reference 1 ¶4: ...The Ministry of Education has tried to promote responsibility accounting within universities, but it has encountered difficulties. Firstly, academic staff tend to think that their first priority is to educate students and do research. They always take it for granted that the University provides all the support, including facility services. They are used to having unlimited access to water or electricity, which they regard as basic resources required for teaching and research. So here comes the problem. How is the performance of academic staff assessed? They are assessed by their teaching quality and research output. If you changed the system, for example, assessing them against the natural resources they used, they would complain that the University is transferring its budget constraints to them. Ideally, we would like to monitor energy usages for every department, every floor, or even every room. But before so doing, reactions of academic staff should be taken into account.
		Reference 2 ¶8: For example, we have a centrally controlled printing room on each floor of the buildings. Every time you press 'print', the amounts you print are automatically accumulated at your account. The printing summary goes to the President, but he just keeps that as a record without taking any further action to control the paper usage. Why? Because he knows what the reactions would be if he makes the information available to academic staff. As the paper cost is still controlled within the acceptable range, he doesn't want to take the risk just for saving some money. Well, the message has been sent out and it has been taken for granted to use paper.
		Reference 3 ¶14: I think it's the academic staff. They are reluctant to change, simply because they have been trained to focus on their first priority, which is teaching and research, nothing more or less.
Chung-Chiang Chen	Academic School	Reference 1 ¶18: ...What is the purpose of separately metering each office? Have you considered the reaction? Do you think managers or heads of schools will feel comfortable seeing the meters there? I think our management philosophy is that staff should be tightly controlled but not managers.
		Reference 2 ¶20: I think environmental issues are not relevant to accounting, but they could be addressed by providing environmental education. If you are well environmentally educated, you would behave in an environmentally friendly way and you would turn off the lights when they're not in use. Research shows that monitoring cost is pretty high and the best way to protect the environment is to change people's behaviour. Therefore, I think either accounting control or management control won't help a lot in controlling environmental costs. Sometimes a tight control will result in adverse effects.
		Reference 3 ¶21: Culture change is more effective in managing those issues.
Meng-She Chen	Management Accounting	Reference 1 ¶46: I've attended many conferences whose attendants are directors of accounting offices from universities. No one has ever talked about this issue. Most of the accountants are conservative and they do what they are asked to do. They focus mainly on controlling budgets and they would not think environmental management has anything to do with them...
		Reference 2 ¶100: We don't allocate any environmental costs now, but we are considering doing it. Our Board of Directors expected us to do it [cost allocation]. However, our President also indicated that this is not an easy job, not technically but politically. Actually, he anticipated resistance from academic staff, not all but quite a lot of them. If you did cost allocation, they would have the pressure to control these costs. That's not what they're used to and not what they want to do. We accountants will have a hard time to push this through.

		<p>Reference 3</p> <p>¶102: It's not just for cost allocation itself. We always have a hard time when a new accounting policy or practice would be put in place. People just don't like changes. If there is no senior management support, chances to successfully implement an accounting policy or practice are low.</p>
		<p>Reference 4</p> <p>¶122: A: Although our current accounting system doesn't contain physical information, we are developing a new system, which incorporates accounting system and budget control system. Within the new system, both physical and monetary information is available. Currently, we accountants are not required to provide any physical information. The new system is designed in a way that we can choose which information to be included in a report and that customised report will be generated automatically for us. I know the importance of cost control. However, academic staff always has the thought that education shouldn't take costs into account. Why not? An institutionalised impression is hard to be changed, but that really has influences on what we should or shouldn't do.</p>

< National University of Kaohsiung >

Participant	Type of Role	Quotation
Chieh-Jung Huang	Senior Management & Environmental Management	¶80: It's a behaviour change issue or cultural change issue.

## Efficient or financial considerations

**Name:** Barriers to EMA adoption\Financial barriers\Efficient or financial considerations

< RMIT University >

Participant	Type of Role	Quotation
Chris Whitaker	Senior Management	Reference 1 ¶72: You know technologies are there now. It's not a big cost to get the data. If you start monitoring, making some savings, you should probably pay it off fairly quickly.
		Reference 2 ¶91: There is no reason why we couldn't do it ourselves. To be honest, there is no good reason why RMIT couldn't fund that money, but that's probably needing the convincing that it [EMA] actually leads to benefits.
Chris White	Environmental Management	Reference 1 ¶52: From our financial management point of view, that's just like internally allocating them the expenditure without a lot of return. It's certainly true if the key factors are transparent to the people, then some are going to affect their behaviour.... We can allocate a reasonable approximation of cost, but we can't do it to allocate actual cost, because not every building is metered, and not one occupant per building.... You spend a lot on metering the buildings rather than spending money on the infrastructure within the buildings, which we know will reduce the consumption. It comes down to the question – we expect to spend the resources to get the best results.
		Reference 2 ¶122: I think probably down to the school level, but not down to the building level, simply because of the cost involved in doing that.
		Reference 3 ¶131: Only if that saves money or saves cost.
Graham Bell	Environmental Management	¶152: Yeah, I would think that would be valuable, because right now we spend a lot of time with our benchmarking data. We look at the global picture for my particular area of the facilities. I don't think our finance people look at these though. They're bottom line people.
Anonym (R1)	Senior Management	Reference 1 ¶85: That would actually have the effect of pushing our indirect costs up, so that would be a kind of financial disincentive for us to get involved in it because it would make things more expensive, but then that may be offset by some of the savings that we make as it makes things more apparent, we can maybe reduce our energy consumption, paper usage and all of that.
		Reference 2 ¶227: ... but I think to be really honest, if you could convince him [Vice President Resources] and the people who report to him like Financial Services that we can drive down our indirect costs by doing this, then I'd say yes, the answer is definitely you'll get their attention.
		Reference 3 ¶251: I mean I have to say that it's going to have to pass the financial viability hurdle first.
Stephen Somogyi	Senior Management	Reference 1 ¶244: Well some of them will not improve short-term financial performance because it will cost us to capture more information. There's no doubt in the short, very short term, it will have a negative impact, but in the longer run, it will have a positive impact because our reputation will be enhanced, [and] we will attract more people who want to be attracted to an organisation that is more environmentally conscious. And over time if we can manage our energy usage, for example, we will be better off financially as well. So I've no doubt in the longer run, it will have a beneficial outcome, but in the shorter run, I'm sure it will cost us more, because you have to capture more information to educate people to manage that better.
		Reference 2 ¶258: Without measuring, you won't get it managed, but convincing people that managing it would be good for them is another element.

Wayne Poole	Management Accounting	Reference 1 ¶140: Whilst we don't do that, I think that is a good idea. To do that, there is obviously a cost associated with it: obtaining information and reporting information. That would have to be weighted up in terms of the cost versus benefit.
		Reference 2 ¶186: The major problem is having a robust data set at the start, agreeing on a methodology (I'll use a technical solution to deliver it), and then providing accurate reporting. So, the accurate reporting is pretty easy. The technical solution is, 'Can the ledger break it down to that level of detail, and then do we have a methodology to take the inputs - the bills from the supplier, and then allocate it to the ledger that is meaningful and useful to the end user?' So, again, it comes back to a cost/benefit analysis. So all that work, is that going to deliver a benefit to the organisation? And that's the challenge.
		Reference 3 ¶173: One of those expenses is the energy, so there is an indirect consequence of trying to reduce our energy consumption to meet that overall goal. So the accounting system is the blunt tool to do that. To take it to the next level is to add usages in it, because that adds another degree of precision to it to communicate our usages to a wider range of consumers within the organisation. As I said, to do that, there is a cost of doing that, and the organisation's got to understand the cost benefit analysis.

<AUS University >

Participant	Type of Role	Quotation
Anonym (V4)	Management Accounting	¶702: That's right, but I'm not against the principle of keeping data in that way. I think both of us see the advantages and also, as you say, if you know those volumes and you can control those volumes, then you can control costs up to a point and that's probably advantageous, but on the other side, on a cost side, you've got to do the development, you've got to do all the key punching and all that sort of thing, so there's a bit of an onset there as well.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Yu-Chuan Pang	Academic School	¶13: But what is the purpose of measuring environmental performance? Will measuring environmental performance help decrease environmental impacts? Or is it more for improving the image? What about costs and benefits? Are the benefits generated from adopting any EMA practice greater than the costs to implement the practice? I doubt it.

< Nanhua University >

Participant	Type of Role	Quotation
Chung-Chiang Chen	Academic School	¶18: ... Senior management is not interested in environmental cost information. Only significant costs would attract their attention and I am sure they are not environmental costs.

## Environmental costs are not considered significant

**Name:** Barriers to EMA adoption\Financial barriers\Environmental costs are not considered significant

### < Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih-Cheng Chang	Senior Management & Environmental Management	¶42: I don't think we generate any significant environmental impact.
Hsia-Ching Weng	Management Accounting	¶121: Environmental costs or expenditures, such as electricity or water, only represent a small part of our total budget. Not much attention would be paid on this area.
Yu-Chuan Pang	Academic School	Reference 1 ¶7: But for this University, I don't think we have applied any form of EMA, because there are no external pressure or internal incentives. We have a wastewater treatment and management system. Because the system is already there, we keep running the system. I do believe the system helps reduce some costs, but I don't think the cost savings are significant.
		Reference 2 ¶21: For universities, those environmental costs you mentioned are less significant compared with other costs we incur. As those costs are not significant, benefits from doing EMA would be limited.

### < Nanhua University >

Participant	Type of Role	Quotation
Chung-Chiang Chen	Academic School	¶10: Senior management is not interested in that information. What they are interested are the cost items significant enough to attract their attention and I am sure environmental costs are not that significant.

## Resource constraints

**Name:** Barriers to EMA adoption\Financial barriers\Resource constraints

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	¶156: We're bound by infrastructure. The buildings are old, and the things that run in the buildings are old, and they still work. At what point do you upgrade them at extra costs to be more efficient? Obviously that's our goal, but you've got to stage everything. You don't just throw things out.
Chris White	Environmental Management	Reference 1 ¶112: It's something we could do and I think it's useful. I think probably the only barrier is 'time'.
		Reference 2 ¶126: The barrier is really the time and to be able to actually break down the information.
		Reference 3 ¶167: Again people, because we haven't had people concentrating on the environmental area for a while. We haven't got an energy manager (will be happening shortly), and then if we get an environmental coordinator, that will solve the problem.
Graham Bell	Environmental Management	¶137: If I had someone to do it, I would do it.
Anonym (R1)	Senior Management	Reference 1 ¶117: ... It's important to consider where RMIT is. You have to have the capacity to be able to do it, and up 'til now, we haven't. So I think when you look at it in that historical context, I think provided we retain financial viability into the future, you'll see more action out of RMIT.
		Reference 2 ¶162: Yeah, that can be done, that could be done, it just needs smart people like you to figure out what is the relationship between this cost driver and this environmental impact. Now that seems to me conceptually that's not a hard thing, the devil might be in the details there, but it's at least theoretically possible, it seems to me, to make that association, but somebody needs to sit down and do it...
		Reference 3 ¶244: ... That's the major impediment. It's about financial sustainability. But if we cross that hurdle, then there would be no other major impediment other than the other extra accounting charges and all of that, there's no political impediment, the only impediment is really I think financial.
Margaret Gardner	Senior Management	¶32: ... You only want to send big signals on things where people's behaviour would make a major difference. And I would say, looking at our activities, that our first set of priorities is improving our infrastructure, because we've got a lot of old buildings, so our first priority is, 'can we get the basics to a level that makes them quite efficient?' That would probably produce the biggest impact overall.
Paul Stockwell	Management Accounting	¶87: ... There're also the time, resources and staff – if the staff has the capacity to be able to implement that as part of their work plan. That would be something we need to look at.
Stephen Somogyi	Senior Management	Reference 1 ¶119: But there is pressure from some of our academic areas, not just from people like you, but people who practice in this area, who feel that the university should do more, and to some extent I think they're right. But I'm not sure I'd go all the way to what they demand, because you've got to balance your ability to measure and manage...
		Reference 2 ¶201: Well, I wouldn't want to be so pejorative, because in a number of our new developments we are putting in whatever environmental steps we can. Remember a lot of our buildings are very old, like this one, very difficult to implement a full green environmentally conscious system in a building such as this one. There are some things you can do, but there are some things out of our control.

		Reference 3 ¶203: Well, we have 140 buildings, and most of them are old like this and under historic preservation orders. So there is very little we can do about energy escaping through porous materials. You can build this building again, with better insulation for example. It's just not possible. So, love to manage it a bit more strenuously but you've got to be conscious of the constraints.
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<AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	¶682: With appropriate resources, we will.
Anonym (V4)	Management Accounting	¶681: V... in an ideal world, we should have it published to the management, governments, the public and our constituency here in different forms to meet each audience, yeah better.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih-Cheng Chang	Senior Management & Environmental Management	Reference 1 ¶87: I think the major barrier is budget constraints...
		Reference 2 ¶90: ... I think budget constraints and attitude would be the two major barriers.
		Reference 3 ¶99: We don't even have specific information for each building, because we don't have separate meters. If you request such information, we will need to individually meter our buildings. That's a problem. It costs us to install the meters and separate metering is quite expensive.
		Reference 4 ¶122: It's hard to say. Still there's more we can do. For example, we don't have any environmental policy and we haven't made any public environmental commitments. They are just not our priorities. I think the biggest barrier is still budget constraints.
Feng-Shuai Wu	Senior Management	¶40: It's good to have separate meters on every building or even every floor, but it doesn't harm the University if we don't have them now. It's important but not urgent and it doesn't generate benefit in the short run but incurs immediate costs. This sort of thinking makes separate metering never be one of the top priorities. If we had the policy on energy control and conservation, it would become a priority, but we just don't have this policy. I'm sure it would save us more than water did, if we had treated it just like we did to water...
Hsia-Ching Weng	Management Accounting	¶77: I think the point is, as a university, we focus on student recruitment, because that is our major financial source. The other things are just not our focus right now. Besides, we don't have enough people to do such things to increase environmental awareness among students or even employees. If the top management would support the issue, then we would have more resources...
		Reference 2 ¶146: The major problem I see is the determination of a reasonable allocation base. We could provide suggestions. But here comes another problem and that is time commitment. We are worried that we don't have enough people to do it. We've got enough to do now and can't afford more.
Shu-Hsiang Hsu	Senior Management	Reference 1 ¶12: It takes time. I've discussed with some colleagues about the possibility of providing financial incentives to reduce our electricity costs. For example, part of cost savings could be used to reward the responsible centres for being able to reduce usages. Perhaps we need to sit down and figure out how to do it.
		Reference 2 ¶34: Well, in the future, but not now. It's a new area and it takes time to find out the best way to do it.
Yu-Chuan Pang	Academic School	¶33: ... Environmentally friendly products or equipments are not always cheap. We all know we should buy things that are greener, but what if you just have a fixed budget?

< Nanhua University >

Participant	Type of Role	Quotation
Meng-She Chen	Management Accounting	¶195: Not now and it's not that easy to allocate environmental costs. We don't have enough people to do it.

< National University of Kaohsiung >

Participant	Type of Role	Quotation
Chieh-Jung Huang	Senior Management & Environmental Management	Reference 1 ¶102: I am willing to give it a try, but I am not the one to make the decision. But it is a question whether we have enough people to do it. People and money are the two major concerns.
		Reference 2 ¶140: If we could get money and people, we could provide more information, both physical and monetary.
		Reference 3 ¶143: It depends on whether we've got the people with the required skills to provide the information. That brings us back to budget constraints again. If we had money, we could certainly hire someone to do it.
Chu-Ying Lien	Management Accounting	¶84: I think it's a budget issue. If we got enough budgets, we could allocate part of it to purchase energy efficient products, which in term would generate financial savings. We look at the issue from a financial perspective not from an environmental angle.

## Difficulties in collecting or allocation environmental costs

**Name:** Barriers to EMA adoption\Informational barriers\Difficulties in collecting or allocation environmental costs

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	<p>Reference 1 ¶78: ... But before we do that, we should make sure we could actually measure it properly and that would be the thing that stops us from doing that right now.</p> <p>Reference 2 ¶139: I am not sure whether the other ones have done that before.... I'm sure everyone wants to do better at it anyway. So absolutely, if we have the data, we should absolutely provide it, definitely. I think we should provide that information as long as people can do something with it to change behaviour and understand the costs.</p>
Chris Whitaker	Senior Management	<p>Reference 1 ¶26: But we are measuring it at the macro level, whole of the university level. However, the university is not managed at the more local level, like building 108, me or schools or whatever, we don't have data by a more micro unit...</p> <p>Reference 2 ¶55: What I'm saying is I think we can get a whole lot of improvement, if we actually put some good data through that and good financial information... So it's not all black, I mean there are a lot of individual pictures about those sorts of things.... But I think you could really increase the performance, the sustainability dimension, by actually putting it in financial categories, which means we got the information, we got the benefit from doing it. It's not that hard.</p> <p>Reference 3 ¶66: No, because there is no data by which to hold them accountable anyway. I don't know how well they're doing. I don't even know how well this building's rated against the other buildings. I have no idea.</p> <p>Reference 4 ¶100: Oh, yeah, but there is a proviso of that, two provisos, one, they have the information, but also they do have some means of managing it.... For example, if I was accountable, but Chris White was responsible for all the plumbing around here and so on, what can I do about it? So in a sense, managers need information but they need at least some ability to manage it. So for example, if I was responsible for electricity in here, and then I find that then what happened in the evening after I've gone home at 8:00, there is an army of cleaners coming in here, the first step is to put every lights on every floor, I mean that's what happened in the city block, there're all lights on, at 2am they go out, if you're lucky, they will remember to turn all the lights off, I think, hang on, that's probably using a huge of electricity... I don't want them to come in. I only want them to light the floor where they are working at. That's an example that I was held accountable, but the cleaners rush into making the decision.</p>
Chris White	Environmental Management	<p>Reference 1 ¶52: We can allocate a reasonable approximation of costs, but we can't do it to allocate actual costs, because not every building is metered, and not one occupant per building.</p> <p>Reference 2 ¶126: The barrier is really the time and to be able to actually break down the information.</p> <p>Reference 3 ¶137: To the extent we could have some valid information in place, then yes. But there is no point giving them KPIs against something we can't measure.... So that really depends on whether or not we get a system in place that can provide the information.</p>

Graham Bell	Environmental Management	Reference 1 ¶127: Different activities require a different level of service. To make it work properly, I would think you would need to know exactly how much it costs for each person, like you would in a commercial area. Well, each tenancy has its own power meter. As an occupier, you would know how much it costs you to occupy that business. Here, we don't have that metering, so it's very difficult to run an argument to the heads of the portfolios that they should hand over a heap of space because it's costing this much where you really can't justify it. I think it's probably unique to all the universities – big space that's grown over the years, with that intensive management infrastructure, you just haven't got total control over them.
		Reference 2 ¶130: To actually get the costs of each program accounted for, including operating costs, it's an enormous effort. It was tried a few years ago for a program called 'Activity Based Costing'. If you get a chance, talk to XXX in space management. XXX was involved with that, which tried to get right down to the... There's a group of students in a lecture theatre learning a particular subject, there was the power and the light, heating, the salary of the lecturer, and all those variables were thrown in. But it's just got too complicated to tell one portfolio that you're financially inefficient because you leave the lights on all the time. You know, we can't do that.
Anonym (R1)	Senior Management	Reference 1 ¶72: No, because they show up in our indirect costs, so a school will be charged ... Steve would be a good one to talk about this, that school will be charged indirect costs which have certain drivers in them, which are not always apparent, even to me.
		Reference 2 ¶80: ... so if you were going to move towards incorporating sustainability within our cost structures, you'd have to make this [indirect cost] apparent... the thing would be to make quite explicit the link between our indirect costs and the environmental impact of what we do, and we're not there.
Joyce Kirk	Senior Management	¶60: Every single person should be responsible for their behaviour and the impact of what they do on the environment. As a manager, I can say, 'right, we're going to reduce our electricity costs and our use of electricity by 20%'. Where does the figure of 20% come from? I don't know. I just made it up. So, if we're going to go down that path, we need information so that our actions are achievable.
Paul Stockwell	Management Accounting	¶125: We have to do something on that particular area until we are able to give specific information on building levels. Business probably is the only one where you can say ok at the moment. The Building 108 is pretty much for the business portfolio, but in the rest of the buildings, it's a mixture of a number of different schools and portfolios. So it wouldn't be very easy.
Anonym (R2)	Academic School	Reference 1 ¶52: I know it's hard to separate the costs out.
		Reference 2 ¶186: And it's very difficult to cost electricity, for example where there are a lot of common areas.
Margaret Gardner	Senior Management	Reference 1 ¶30: ... I'll give you a good example. On one of our campuses, we have a school, it's a campus that is not particularly used, this is Brunswick, it's not a crowded, not an overcrowded campus. That school gets allocated to it the costs of all those buildings that it's associated with. But it's not that that school really wants to use all those buildings, it's just that it's the only school occupying that space. So you get a certain amount of artificiality with some of these things, because there's a question to which, how much of it's in the school's control.
		Reference 2 ¶83: ... Well, the truth is, I don't know that it would be fair to allocate the costs... the school itself, in fact, probably would not be able to do anything, unless you metered each floor, and the question is, 'is that the first thing you'd do to drive down the cost of the building?'
Stephen Somogyi	Senior Management	Reference 1 ¶155: In their minds, they'll feel no control, so we need to design measures that they can control.
		Reference 2 ¶168: Well it should, once we have reliable information. One of my concerns is that at the moment the information there is patchy, you can only report on what you gather, and if you only gather part of the information, then it's not a reliable report.

		Reference 3 ¶182: I have no doubt that we should be measuring not only the cost of the environmental resources we use, but the impact we have on the community and the environment. If we cause something to occur which has a community cost, we ought to at least measure it if we can. So I have no doubt about that. But whether that's possible is a big question in my mind.
Wayne Poole	Management Accounting	Reference 1 ¶86: The major problem is having a robust data set at the start, agreeing on a methodology (I'll use a technical solution to deliver it), and then providing accurate reporting. So, the accurate reporting is pretty easy. The technical solution is: can the ledger break it down to that level of detail, and then do we have a methodology to take the inputs – the bills from the supplier, and then allocate it to the ledger that is meaningful and useful to the end user? So, again, it comes back to a cost benefit analysis. So all that work, is that going to deliver a benefit to the organisation? And that's the challenge.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih-Cheng Chang	Senior Management & Environmental Management	Reference 1 ¶83: If so, how to allocate associated labour costs would be a problem. It's hard to separate a person's time or effort into different categories, including environmental ones.
		Reference 2 ¶97: But I think it's hard to breakdown environmental cost information to a department level.
Feng-Shuai Wu	Senior Management	¶56: They should be responsible as well, but how to hold them responsible? Now we don't have any data, nor do we have a mechanism to do it. How to do it and where to start should be considered before any further action could be taken. I mean technical issues should be considered first, but it also depends on whether the University has strong commitment to make the information more transparent.
Hsia-Ching Weng	Management Accounting	Reference 1 ¶93: Our previous Director determined the allocation rate and we did what he said. Yes, we use an arbitrary rate determined by personal judgement.
		Reference 2 ¶115: In the short run, I don't think it helps, because that's not our major focus. Basically, our overall performance is measured on the basis of teaching, service and administration management. Environmental performance is not considered in current evaluation system. If we do want to measure our environmental performance on a divisional basis, how to quantify the information is a big problem.
		Reference 3 ¶146: The major problem I see is the determination of a reasonable allocation basis.
Shu-Hsiang Hsu	Senior Management	¶14: I don't think so. We don't have separate meters. If we really want to allocate costs fairly, we will have to install local meters to the buildings. That's not financially feasible.
Yu-Chuan Pang	Academic School	Reference 1 ¶9: You've made a point here. If you have a look at our chart of accounts, you will realise that environmental costs are hidden within accounts. The most difficult task is to determine what the hidden environmental costs are, because the chart of accounts is not designed in a way that makes the information available.
		Reference 2 ¶25: Well, then that's really a serious question. I think even a whole afternoon of meeting won't solve the problem about how to allocate the costs. It's really hard.

<National University of Kaohsiung >

Participant	Type of Role	Quotation
Chieh-Jung Huang	Senior Management & Environmental Management	¶112: It's possible, but the problem is how we allocate these costs precisely. For example, this building accommodates a couple of schools; some are engineering schools and some are business schools. Their electricity needs are different. How do you allocate fairly? It's possible to do the allocation and we are also thinking of doing it, but the problem is to determine a fair allocation basis. If, in the future, every school occupies a whole building, the problem can be solved.
Chu-Ying Lien	Management Accounting	Reference 1 ¶42: It is an important issue for us. If academic schools are not allocated budgets for water or electricity usages, they won't care and try to decrease their usages. They tend to think that's not their business. But we don't have separate meters, which make allocation really hard for us. Reference 2 ¶49: But again, a separate space for each school is crucial for the allocation. We are a new school and we don't have enough space now for each school to occupy a whole building. Space problem should be solved first before we can consider the allocation.

## Low physical environmental uncertainty

**Name:** Barriers to EMA adoption\Informational barriers\Low physical environmental uncertainty

< RMIT University >

Participant	Type of Role	Quotation
Chris White	Environmental Management	<p>Reference 1</p> <p>¶24: Not specifically for universities. Certainly, there has been change with the Victorian Government building regulation, which is supporting four and half star, I think, Victorian Australian greenhouse gas standard on new buildings. Some of the benchmarks have been considered in the regulations. I am also the director of TEFMA. We have been working with the Australian Green Building Council [a not-for-profit organisation] to develop a green star tool for educational buildings. That will be piloted and then become available next year...</p> <p>For this project, it's funded by the Department of Education in South Australia and Queensland. Victoria has recently come on board. They put some money in, but the major money is from South Australia and Queensland. I am not sure how much they [Victoria] are now putting into that, but they were a lagger.</p>
		<p>Reference 2</p> <p>¶75: So I think it's worthwhile and it's a way of communicating. It's important to the university. I think probably it will become more and more required from the Government as well. Before there is some sort of regulation, it will become more of a general practice. It's becoming more common now.</p>
Graham Bell	Environmental Management	<p>Reference 1</p> <p>¶81: The universities are tied to certain degree with the Government, but again in this particular corner of Australia, where there's cheap brown coal, I don't know if it'll be around – the imperative is going to come out over ten years.</p>
Anonym (R1)	Senior Management	<p>Reference 1</p> <p>¶58: Oh, they're important issues to all of humankind, and there's no doubt that the public imagination and the public interest is now skyrocketing, especially in Australia with the matter of drought and all of that. So it's so important. Now the federal government, they won't even sign the Kyoto Agreement, is suddenly all looking all green, aren't they? But there's not any evidence of it yet within RMIT, other than that green office project that's coming around. So I think we're lagging, but I'm sure there'll be more pressure brought to bear on us.</p>
		<p>Reference 2</p> <p>¶60: Well, I think they already are, if you look at the initiative that's happening now, the green office project, that's a conscious attempt by the university to at least make some kind of ... I was about to say gesture, that's the wrong word, to make some kind of response to public concern and the concern of our own staff about sustainability. So that's a pretty small thing, it's starting in a small way, but I'm sure the pressure will ramp up on us now. I think that even if we don't want to do it internally, I think we'll have external pressure brought to bear on us from especially the Commonwealth Government. We'll all be forced to take this into account.</p>
		<p>Reference 3</p> <p>¶63: You've probably seen in the newspapers that global sustainability is becoming an electoral issue, so we have the federal government trying to get behind this wind power project, not because it's going to work, but because it's showing that they are interested, because they won't sign the Kyoto agreement, so they want to have some kind of credibility, so they're jumping on any bandwagon they can find. This is very cynical way of putting it, but I think there's a bit of truth in it, I think the next step will be that the federal government, among the next steps, will require its own departments and instrumentalities to adopt, for example, green office policies, paperless offices, this kind of thing, I think we'll get more and more pressure from the federal government to do that.</p>
		<p>Reference 4</p> <p>¶82: Well, I think people like you are going to make it important, people like you and our own sustainability research group, and as I said before, I think the federal government will do it as well, they'll bring down policies that'll make us do it... that would be my prediction.</p>

Joyce Kirk	Senior Management	¶95: I guess so, but it [pressure on accounting for environmental costs] would be indirect, because government is always interested in wise use of the funds they provide.
Margaret Gardner	Senior Management	Reference 1 ¶69: I think government may lift the costs of water usage to more accurately reflect the costs, and to the extent that happens, well, let me say that, without them lifting the costs of water usage, it's a case that we are looking and have had this discussion, maybe, when we've had our building projects going forward, can we look at ways that we could build in something that could give us a sort of potential recycling, or a way of more efficiently using water, so that's something we'll have to consider, and we've certainly, in our new buildings, committed ourselves to five-star, or potentially better than five-star, but that's before they do anything about water costs, but yeah, I expect government will lift water costs.
Stephen Somogyi	Senior Management	Reference 1 ¶75: There are those people who are conscious because it's important to their business and there are those people who will become conscious because the environment is becoming more and more of a central community point. So I do believe in the longer run most people in the community, whether they're individuals or in the business or political environment, will have some impact on it and be interested in it.
		Reference 2 ¶128: I think we're accountable to our council and to the community at large. I think various government bodies, state and federal, believe that we should be accountable to them but I'm not sure they know what they want us to be accountable for yet. So I feel more pressure from the community than I do from any other source at this stage, but eventually I think it will become a bigger issue for our council and for our regulators.

<AUS University >

Participant	Type of Role	Quotation
Anonym (V1)	Senior Management	Reference 1 ¶23: No, it's not that obvious at this point in time. There's no legislative requirement other than compliance to existing laws, but there's no pressure that has forced this issue into a higher order, and I think that's going to come as a result of the global warming debate that's currently on within the community.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih-Cheng Chang	Senior Management & Environmental Management	Reference 1 ¶73: ... The Government is now promoting energy savings within universities. I think it's possible that we would be required to report our electricity usages in the near future.
		Reference 2 ¶78: Now the Government starts to collect information on the natural resources used by universities. Once benchmarking information is available, there would be some new policies coming out.
		Reference 3 ¶113: Yes, but we have to upgrade our facilities. I know some universities have started to do something about it. For example, academic staff has to pay for their electricity costs based on actual usages indicated in meters.
Shu-Hsiang Hsu	Senior Management	Reference 1 ¶22: Not really, but I think the Government will impose some requirements on waste management. For example, plastic dining wares are banned to be used at schools and recycling is becoming a compulsory activity.

< Nanhua University >

Participant	Type of Role	Quotation
Jen-Wei Wei	Senior Management & Environmental Management	<p>Reference 1</p> <p>¶27: I'm sure the Government would encourage the use of green energy within universities, for example the solar energy project funded by the Government. As part of the project, we were required to provide detailed costs and savings information for further analysis. If the result turned out to be good, the Government would continue to fund similar projects. I am sure the Government will force universities to use a certain percentage of green energy in the future.</p>
		<p>Reference 2</p> <p>¶29: I know the Government is also collecting related cost savings information so that the policy on promoting green buildings can be formalised. It's a trend, a trend that universities will be required to comply with building related regulations to reduce the impacts on the environment. We should be prepared and we are preparing for the possible regulations.</p>
		<p>Reference 3</p> <p>¶42: I think the price of water is unreasonably low in our country. In the future, there is little doubt that the price is going to be increased.</p>
		<p>Reference 4</p> <p>¶73: Although environmental awareness is still at a lower level in Taiwan, but it would be changed. Universities should expect that one day they would be requested to operate in an environmentally responsible way by the Government or the wider community. We just can't neglect that we have some form of social responsibility.</p>

## Lack of institutional pressure

**Name:** Barriers to EMA adoption\Institutional barriers\Lack of institutional pressure

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	<p>Reference 1</p> <p>¶115: I guess what other universities do. If other universities put more in their reports here and there, if there's some sort of public scrutiny of it, if something gets in the papers ... something like that, then that would put a focus on it.... Unless we have an environmental issue here, and that would be around costs, because we are interested in controlling costs anyway.... Unless there's something that went wrong, or public pressure on what we are doing, we'd just continue the way we were doing it, I guess.</p> <p>Reference 2</p> <p>¶117: ... unless we have environmental issues here, and that would be around costs, because we are interested in controlling costs anyway... Unless there was something that went wrong, or public pressure on what we are doing, we'd just continue the way we were doing it, I guess.</p>
Chris Whitaker	Senior Management	<p>¶34: No, no external pressure to the university. And there is very little discussion on it, but it's [environmental cost] been measured, as I said, at the macro level... That's interesting. So I may not think it's always a question of hearts and minds. I mean, there're one or two solutions, one is externally imposed by regulations... That's one reason you do things, because you have to. There are penalties around these consequences if you don't. The other reason is you choose to do things, but why? Mechanisms we do within the university are for societal benefits, because we want to, because we believe it... I don't see that we can register the same sort of imperative in terms of those environmental issues.</p>
Chris White	Environmental Management	<p>¶24: Not specifically for universities. Certainly, there has been change with the Victorian Government building regulation, which is supporting four and half star, I think, greenhouse gas standard on new buildings. Some of the benchmarks have been considered in the regulation. I am also the director of TEFMA. We have been working with the Australian Green Building Council to develop a green star tool for educational buildings. That will be piloted and then become available next year... For this project, it's funded by the Department of Education in South Australia and Queensland. Victoria has recently become on board. They put some money in, but the major money is from South Australia and Queensland. I am not sure how much they [Victoria] are now putting into that, but they were a lagger.</p>
Graham Bell	Environmental Management	<p>¶81: For this particular government, no, I don't think they will. But I don't think it's far off. As I said earlier, the state Government now requires us to buy 10% green energy. A change doesn't necessarily have to mean a change in government, just different thinking by the present government.</p>
Anonym (R1)	Senior Management	<p>Reference 1</p> <p>¶106: I would say, first of all, I don't know whether we're compliant within our own international agreement, that's the first thing, as to whether or not we would adopt more ... well there is one example of that happening at the moment, the green office, but that's being pushed by our own staff.</p> <p>Reference 2</p> <p>¶117: ... Well, we are a very big organisation, we have 56,000 students around the world, we have thousands of staff, we have a very big infrastructure, and so we are a producer of greenhouse gas, we must be. So to the extent that we're part of the problem, it has to be a matter of some importance to us. I think your project, the green office project, pressure is mounting on us to be more active than we have been.</p> <p>Reference 3</p> <p>¶175: If there was some component, for example, of our funding that was contingent upon environmental policies and accounting practices, then we'll do it, but doing it just because Steve and I or Margaret or somebody thinks it's a great, noble thing to do is not going to get us very far... I have to say it's going to be external pressure.</p> <p>Reference 4</p> <p>¶277: ... as I said before, external pressure will be brought to bear on us, but there's no immediate initiative to do that.</p>

Paul Stockwell	Management Accounting	Reference 1 ¶166: ... If the senior management or council has a particular interest in that, then that might increase the profile of that and push for that. It just depends on whether it's a focus. I'm sure that they would have an interest in it. If they've got a particular increase in interest in that, then that might lead to some changes. But I think it'll be like external government pressure or industry wide pressure that will lead to some changes.
		Reference 2 ¶170: It has to come from the managers like Graham Bell and others to increasingly continue to push it as an issue. If there isn't any external pressure, it will be a slow process. There's no doubt about that.
Anonym (R2)	Academic School	Reference 1 ¶119: I mean, the university's become much more business-like over recent years, because government insisted that they become so. We talk about corporate governance and all of those things that we never used to, so there's a lot of changes, but we just haven't got that far yet. So that would be, if there were external demands upon the university to identify these costs, then what choice do we have.
		Reference 2 ¶160: Not major enough. No. Because obviously they influence financial reporting, they've influenced what goes into the university's accounts, but not in management accounting. They haven't. So if there were a standard, an accounting standard on that [environmental cost], then it would obviously influence the university. If government and the accounting body... yes that's right, if there was that sort of accountability.
Stephen Somogyi	Senior Management	Reference 1 ¶108: I think there are some. I don't think they're as sharp or as focused as they will be in the future.
		Reference 2 ¶117: Some, but I think I've been here too short a time for that to provide that level of pressure.
		Reference 3 ¶119: But there is pressure from some of our academic areas, not just from people like you, but people who practice in this area, who feel that the university should do more, and to some extent I think they're right.
Wayne Poole	Management Accounting	Reference 1 ¶12: Triple bottom line is being addressed, but it's still a very peripheral issue. I think the major issue in the accounting body at the moment is harmonisation to international accounting standard, which I suppose has taken a lot of attention over the last three years.
		Reference 2 ¶97: There is and it is through the Victorian Government, through the office of training & tertiary education, what we call OTTE. They wish to see their TAFE providers, and which RMIT is one, reducing or holding static its energy costs. Now, that is an aspirational goal, but that is something that we have to manage our stakeholder's outcome for that aspirational goal. So there're external influences asking us to maintain or reduce our greenhouse gas emissions and other energy costs, and they suggest you to disclose how much you spent on energy usages... I think it's a static inference. They've asked us to do something, and our disclosure would demonstrate if we are doing something. Are they then forcing the outcome - operationalising the outcome? No, they're not.
		Reference 3 ¶105: I think it's a question of education. So I think people care about cost, but only to the fact that it influences their personal outcome. So whilst the university is a fictitious beast, it's a bunch of individuals working under one banner. So does the university have it's own personality? Yes, it does. Does the community then recognise that personality, and say yes they should be reducing their costs? I don't think the nexus is linked to the community at this point.

<AUS University >

Participant	Type of Role	Quotation
Anonym (V1)	Senior Management	¶94: No, it's not that obvious at this point in time. There's no legislative requirement other than compliance to existing laws, but there's no pressure that has forced this issue into a higher order, and I think that's going to come as a result of the global warming debate that's currently on within the community.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	¶150: It's possible but not easy. We have the cost and usage information, but we can't breakdown the cost to divisions or schools, because we don't have local meters. If an environmental regulation is imposed that requires universities install local or sub meters on all of their buildings, then it's possible. I think the regulation might be imposed some day. For example, fire hydrants are compulsory to be installed in every building, why not water or electricity meters? That's because people don't think meters are necessary. It's not regulated under current building regulations. Unless it's regulated, it's very hard to force universities to do it...
Hsia-Ching Weng	Management Accounting	Reference 1 ¶124: I've never heard of any universities, which reported any environmental information in their annual reports.
		Reference 2 ¶152: If it becomes a general business practice, then we would probably be asked to report. Especially as a university, we should practice what we preach, but as there is no pressure, no pressure from the government or the public, it's really hard. It's really hard to ask a university to report environmental information.
Shu-Hsiang Hsu	Senior Management	¶26: I wish the government would impose the requirements for reporting environmental performance on universities.
Yu-Chuan Pang	Academic School	¶7: Generally speaking, when there is pressure from the society or community, when there is a need to report some sort of information, or when it's regulated by a government agency, companies or organisations would consider adopting a new management tool, such as EMA you mentioned. But for this University, I don't think we have applied any form of EMA because there is no external pressure and there are no incentives.

< Nanhua University >

Participant	Type of Role	Quotation
Jen-Wei Wei	Senior Management & Environmental Management	¶105: Yes, from the Government. For example, wastewater recycling systems are required under the regulation to develop a new campus. No wastewater recycling systems; no campus development.
Miao-Sheng Chen	Senior Management	¶8: Well, as a university, we should practice what we preach. For example, should we use recycled paper although it's more expensive? When I say expensive, I mean it from our point of view, but in terms of social cost, I believe it's cheaper. It's not possible to ask everyone to pay more just for the reason of being socially responsible. There should be some sort of mechanism existing to provide the incentives required to motivate people for being environmentally responsible. Our Government should have been playing an important role here, but unfortunately, it didn't.
Chung-Chiang Chen	Academic School	¶8: Can you name any university that provides environmental cost information to its staff?

## Legitimacy considerations

**Name:** Barriers to EMA adoption\Institutional barriers\Legitimacy considerations

### < RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	Reference 1 ¶13: It would seem that some companies have taken it on themselves to report. Well, but I also have inkling, like I think it's great to provide all this information, but whether it means they're actually performing any better than anyone else, I don't know. I think It's PR. It's very good PR to be able to say, 'this is how much we've consumed and this is where we reduced our costs'.
		Reference 2 ¶142: ... If we do something that's really good and really successful, we want the good news to be run outside to the people. You know before we practice we preach. So within the boundary we can do it, because we still financially have to be very careful. What would be motivated is actually to say this is something we have achieved and link it into the public side.
Graham Bell	Environmental Management	¶84: Yes, we've signed several, Talloires Declaration, Greenhouse Gas Challenge, the Sustainable Energy Authority of Victoria... I think there're enough in there to drive us to do the right thing.
Chris Whitaker	Senior Management	¶13: And I think reputation is important, but, to be honest with you, I don't see that's particularly high profile at this time, either within the university or external to the university. It's not something that everybody is watching, to be honest with you.
Stephen Somogyi	Senior Management	¶244: There's no doubt. In the short, very short term, it [accounting for the environment] will have a negative impact but in the longer run, it will have a positive impact because our reputation will be enhanced, we will attract more people who want to be attracted to an organisation that is more environmentally conscious.

### < AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	¶331: I guess because we are doing a number of things, they feel a little bit comfortable than if we were being pointed out by the public saying you're doing nothing. You know, you're an embarrassment or something, then that will become a priority, but because we can point to a lot of things that we're doing, I think that takes the pressure of them a little bit from that.
Anonym (V4)	Management Accounting	¶446: That's an external report and I would expect when we develop our policy, we would want to elaborate a little bit more on that again, to describe our achievements as being a good energy user.

### < Nanhua University >

Participant	Type of Role	Quotation
Chih-Wen Ding	Academic School	¶10: This is a religious university. Social responsibility is an important factor to be considered while we make any decisions. Therefore, our senior management would embrace new concepts such as environmental accounting because they think it's a good thing.
Jen-Wei Wei	Senior Management & Environmental Management	Reference 1 ¶19: We are willing to pay more to construct greener buildings, because it's considered a right thing to do.
		Reference 2 ¶19: But I think looking at environmental issues from an accounting perspective is required... It helps to improve the image of the University if the University is perceived to be willing to adopt new management technologies or new concepts such as environmental accounting. I think it's not a bad idea to adopt environmental accounting.

## Stakeholder power

**Name:** Barriers to EMA adoption\Institutional barriers\Stakeholder power

< RMIT University >

Participant	Type of Role	Quotation
Chris Whitaker	Senior Management	Reference 1 ¶52: There are a few, but they are not particularly visible...
		Reference 2 ¶55: Well, we've got Global Sustainability. They worry about these things... But I have to be brutally honest and say if it's not in the senior level, it's not having a significant impact. It's not having a significant impact. I don't want to be painting a totally black picture. There're clearly some people around, including myself, who are individually trying controlling it anyway and they're trying it at home. What I'm saying is I think we can get a whole lot of improvement if we actually put some good data through that and good financial information, allowing people to be beneficially resolving further affirmative action. So it's not all black, I mean there are a lot of individual pictures about those sorts of things.
Chris White	Environmental Management	¶18: From the students we involved in some way or some of the things we do, we see more environmental science or socially responsible students doing their environmental part of effort. So we have more engagements with students.
Anonym (R1)	Senior Management	Reference 1 ¶187: Yeah, the global sustainability, that's all being led by them.
		Reference 2 ¶192: Well they have influence, but they have no formal power. That's a good point.
Joyce Kirk	Senior Management	¶93: No, I don't feel any pressure at all from stakeholders, no.
Anonym (R2)	Academic School	Reference 1 ¶141: ...Students are much more concerned with getting good teaching... I don't think they'd be concerned about the environment.
		Reference 2 ¶152: No. Obviously if heads of schools and other managers in the university demanded that sort of information [on environmental costs]... but I don't see that happening... They'd think I was rather peculiar if I did. I think they would, and a lone voice wouldn't do anything... Senior management of the university will give in if they can see the wisdom of it, but sometimes they won't. It would have to be a very strong voice to convince them, I think, and my voice alone would not do anything. Nothing. It's hard enough. When everyone's saying the same thing, they're not always convinced.
Stephen Somogyi	Senior Management	Reference 1 ¶224: Well, clearly the governments think they are key stakeholders, but in my view the most important stakeholders are the students and the researchers and we need to be driven to some extent by what they think are the key priorities. We do regular surveys on the top ten issues in the minds of our staff and students... Better student services or better classrooms, they're clearly on the top....
		Reference 2 ¶237: We don't exist just because we want to exist. We're here because people want to buy our services. They're willing to pay a price, whether to the federal government as loans for higher education or as fee-paying students and they're the people who drive what we do. The market demands certain things and we have to deliver. No doubt about that.
Wayne Poole	Management Accounting	¶167: It comes back to what impacts an individual is more important to what impacts an individual's position, and then what impacts an individual's community. So the individual should always come first. That's human nature. Ok, my tuition fee's my first point of interest. The second thing is that, 'is the university financially stable?' ... I think they're probably more important to students than how much paper and how much water we use each year.

<AUS University>

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	¶53: They're not strategic. They're used strategically on occasions but they've been really driven from the middle management's conscience basically and understanding of the regulation changes and where they're heading in terms of Government regulations, which they need to implement because they're at the coal face.... So it was driven from middle management rather than a strategic point of view. In fact, I think there is now but there was, for a long time, not even an environmental policy for the University on the strategic level....
Anonym (V4)	Management Accounting	¶324: I can't see it on the university's radar at the moment other than pushing it from a middle management point of view.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	¶67: Since no one has ever asked for it [environmental cost information], it won't be provided... But if the Ministry of Education or the Government assessed universities against environmental performance, then the story would be different.
Hsia-Ching Weng	Management Accounting	Reference 1 ¶83: Different people have different concerns, but I don't think they care about whether we are trying to decrease our environmental impacts or not, if such impacts do not directly impact their daily life.
		Reference 2 ¶100: If the Ministry of Education required us to do it, then we would, because we are subject to the special performance evaluation by the Ministry...

< Nanhua University >

Participant	Type of Role	Quotation
Chih-Wen Ding	Academic School	Reference 1 ¶12: They might think environmental issues are important, but I don't think they would think about managing environmental costs. It's partly because less attention has been paid to environmental costs, but mainly because the Ministry of Education has not requested universities to do anything about managing environmental costs or improving environmental performance. I believe if the Ministry imposes the requirements to manage environmental costs, universities will do it. But now, universities just don't have such pressure. No pressure; no action.
		Reference 2 ¶18: Because education is not free and students have to pay for their room and board and tuition. They don't care about environmental issues. They don't care about how you manage the environmental costs. What they do care is whether they can get what they want. Students are one of the major stakeholders for universities. Their concerns have to be taken into account when you decide to change any practice or put in place any policy.
Jen-Wei Wei	Senior Management & Environmental Management	Reference 1 ¶60: We are assessed against traditional KPIs such as total floor spaces and total beds in the dorm. As we are not assessed against environmental performance, we are just continuing doing things as we did before. Besides, students won't appreciate what you have done in environmental management. They expect that internet access is available in every room, the books or magazines they want will be there in the library, and all those sorts of things. Why bother doing environmental management or energy controls? They don't care. Students just don't care.
		Reference 2 ¶63: If environmental KPIs per full time equivalent student are used to assess a university's environmental performance, some universities just can't justify why they consumed so much electricity or water. You should ask the Ministry of Education why no attention has been paid in this area.
		Reference 3 ¶71: No one cares about whether universities are doing their share to protect the environment. What interests the government or the society is research output, but neglected is that universities require consumption of resources, including environmental ones, to produce research output. Are universities environmentally responsible? Even if you are, no one cares.

		<p>Reference 4</p> <p>¶109: If we are required to provide such information [environmental reporting], for example by the Government, we certainly will provide it... If we voluntarily provide such information, I think the Ministry of Education might think we don't get enough things to do or we've got more than enough resources. It won't be appreciated.</p>
Meng-She Chen	Management Accounting	<p>¶78: ... You know we, as a private university, will collect information that is required by the Board of Directors or the Ministry of Education. If they don't ask for it, we won't collect and report it.</p>

## Few incentives provided to manage environmental costs

**Name:** Barriers to EMA adoption\Management barriers\Few incentives provided to manage environmental costs

### < RMIT University >

Participant	Type of Role	Quotation
Chris Whitaker	Senior Management	¶138: So to try to make management reduction, you got to get consequences for not doing it. If I said to the heads of schools, ok, everything you managed to save on water, energy and waste management in your school, you can keep it for staff development purposes. I will give you management information, account information as to what your expending is month by month. I will tell you what it's been for the last twelve months... I will get their intention.
Chris White	Environmental Management	¶134: There isn't really a system apart from just really reporting on budget performance and acceptance whether that's good or bad. It's not really a bonus system, so there is no financial reward type system that can be linked. So it's mainly for tracing whether you perform within your budget, responsibly or not.
Anonym (R1)	Senior Management	¶198: No, absolutely not, the only way you could do it would be to ... I mean if we do have direct ... if we can attribute costs, say energy consumption, if we can meter that and attribute it, then you could (but we don't) hand back savings to those schools, that'd be a start. It's possible to do it, it's just we don't do it at the moment.
Anonym (R2)	Academic School	Reference 1 ¶76: ... I think another reason why we haven't focused on trying to reduce expenditure is because if we make a surplus in any year, we lose it. It just goes to the centre. So there's been no incentive to try to reduce costs. I mean there're all sorts of reasons and I could go on and on... There just wasn't the incentive to do it. Reference 2 ¶84: Nothing comes down from the top to say, 'be careful to watch what you spend on electricity'. The university has come to a difficult financial period over the last couple of years, two or three years.... During the time of the difficult financial situation, we all tightened our belts.... But we didn't tighten them to that extent. There just wasn't the incentive to.

### <AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	¶772: That's why I say it's self-driven.
Anonym (V4)	Management Accounting	¶769: There's no incentive... Well, there's no incentive other than the one we've put in place for the electricity... But other than that, there's no direct incentive.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	¶135: If major environmental costs could be clearly defined or a key environmental performance index could be provided and used to assess key managers' performance, they would definitely attract people's attention. Who cares about how much energy or electricity has been used? No one cares and they don't even care about any price increase in energy usages. Every year the budget for electricity usage is determined based upon usages in previous years or changes in student numbers and performance is assessed against this budget. If the actual usage is over the budget, the bill still has to be paid and no one will be held accountable. It's true that our president always says we should control our electricity usage by turning off air-conditioners or lights. It helps but doesn't help a lot, because not enough incentives have been given to change the behaviours.
Hsia-Ching Weng	Management Accounting	¶104: If the energy price keeps increasing, there will be a good reason for us to separately identify electricity cost and subsequently allocate it to both administrative divisions and academic departments. But we just don't have such a plan in the near future. There are no incentives at all and that's not our priority.

## Lack of advocacy from university leadership

**Name:** Barriers to EMA adoption\Management barriers\Lack of advocacy from university leadership

### < RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	¶32: ... We've different accounts. So we think, 'ok, how can we capture costs properly?' You know, at the end of the day, what is management interested in? They're interested in how much we spend on travel and how much we spend on consumables. So would they ask how much we spend on the environment? ... They never have, or it hasn't come through to me... They may discuss it at different forums. But it would be very hard to measure.
Chris Whitaker	Senior Management	¶31: ... I guess it's because we haven't captured the hearts and minds at the senior level... Partly we never take time to do it. Secondly, we probably have other things on our mind from time to time. Yeah, that was probably the main reason. But this sort of issues would've been identified and go to the senior executive members of the university, maybe two, three, four times a year... How much discussion do they have? Three, four minutes a year, maximum, where we probably just recorded that's very interesting and then moved on, because it doesn't seem to be any imperative or relative to the other parities.... There's no compulsion to do this [accounting for the environment].
Graham Bell	Environmental Management	¶88: ... I've been to a couple of presentations by Monash where the Vice-Chancellor gets up and talks to a lecture theatre centre full of students, staff, outsiders, all interested in improving environmental management, and he'll answer questions from them. He's not afraid of the questions out there that might be asked that might put him on the spot. RMIT's not in that field yet.

### < AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	Reference 1 ¶138: ... There hasn't been a senior management executive imperative to account for it...
		Reference 2 ¶574: ... It really is a huge area... See, it's easy to concentrate on my side, because it's easily defined and you can do it. But compared to the total picture of sustainability, it's like a big toe on a foot... in terms of accounting, they [senior management] haven't even thought about it and they're not committed to it.
		Reference 3 ¶753: You've got to get buy, you know, senior management... Absolutely. It's got to come from the top.
		Reference 4 ¶766: ... the process of getting buy-in from the chief executive is absolutely critical, otherwise you won't go anywhere in this sort of stuff.
Anonym (V4)	Management Accounting	Reference 1 ¶144: There's been no driver for it.
		Reference 2 ¶570: No pressure from the senior management.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Chih-Cheng Chang	Senior Management & Environmental Management	¶120: It's up to the top management. Commitments to the environment from the top management are very important.
Shu-Hsiang Hsu	Senior Management	¶38: It should be one of the imperatives from the top and it also depends on whether our accountants have such knowledge.

< Nanhua University >

Participant	Type of Role	Quotation
Jen-Wei Wei	Senior Management & Environmental Management	¶50: Senior management support is really important for implementing environment related policies or practices.
Meng-She Chen	Management Accounting	¶114: But we are just accountants and we won't be able to do it [accounting for the environment] without strong support from the senior management.

## Lack of environmental responsibility & accountability

**Name:** Barriers to EMA adoption\Management barriers\Lack of environmental responsibility & accountability

< RMIT University >

Participant	Type of Role	Quotation
Anne Stewart	Management Accounting	¶128: ... you are accountable through the cost itself. That's an encouragement. I know a lot of people order stationery these sorts of things, and they get wasted really quickly. So we've had a lot of cost controls over here about 3 years. With a strong cost control, we have greatly reduced our consumption, which is a good thing, because otherwise people would just get another one. So the very cost controls we've got will certainly have helped. Property Services, their budget is very tightly controlled. When it comes to the stuff that they pay out, obviously they control. They can do things to save money around water and things like that. They can't control every single tab in the place, but they can control some of that cost. That's their interest to do because people look at their budget.
Chris Whitaker	Senior Management	Reference 1 ¶28: ... but you have got to allocate the responsibilities for actually managing it and personally reducing it. We are not doing that yet.
		Reference 2 ¶38: ... I don't pay those bills. I don't pay the water bill, I don't pay the energy bill, [and] I don't pay the cost of managing all the wastes we generate, so there is no imperative there. I do, however, pay for the telephone usage, so I was interested in that and said, 'well, let's try to keep our telephone cost down, because that's better for us and increases the money for other purposes' ... So to try to make management reduction, you have got to get consequences for not doing it. I mean this is quite apart from any environmental beliefs you may have... but it's not showing up on my accounts. That's not to say it's not been evaluated, but actually we don't know what it is.
Chris White	Environmental Management	¶98: But whether or not they take on that responsibility, I think it's another thing. I say there are more people responsible, but it's more difficult to get people to take on that responsibility.
Graham Bell	Environmental Management	Reference 1 ¶10: I think that there's a collective conscience about it, but again because of the size of the place and as I explained earlier, without active cultural change agents working within the organisation, people become complacent. They're just blasé about how they treat the facilities and power consumption.... I've found in my experience a lot of people coming to universities expect that the room will be there, that the book they want in the library will be there, that the lecturer knows the answers to the questions they have will be there. It doesn't work that way. People have to work at that. They have to work at saving their energy by turning off the light when they leave. Simple things like that.
		Reference 2 ¶75: At the end of the day, probably not, because I can't control it. We're on a certainty that we can't stop the students or the staff turning everything on. What we can do is to try to make most things that they do turn on the most efficient, and then be reliant on cultural change through their community to help them drive the price down.
		Reference 3 ¶98: ... They may believe that they're working at it. But I can tell you that they haven't phoned me up and asked me for what their electricity bill was.... I mean, if they knew what that was, they'd get a pretty good idea what it costs the university to make that facility available to them.... There's another aspect of cultural change that needs to probably work more so with middle management than anywhere else. Senior management can see our expenditure that is used to save on the environment. Down at the local level, the lab technicians can see it. The middle management area gets so consumed with health and safety, getting the budget reporting, and all that sort of things, that they unfortunately cannot see a lot of costs. It's not a criticism, but it's just what happens at that level.
		Reference 4 ¶120: No, I don't think the heads of portfolios would be grilled as to why their operating costs are increased.

Anonym (R1)	Senior Management	Reference 1 ¶122: I am a member of the planning and resources committee which makes all of the financial decision in the place, so I can't totally get away with saying I have no responsibility... so to the extent that we have no policy in relation to that, then I'm at least indirectly responsible, or at least partially responsible.
		Reference 2 ¶142: ...I guess the responsibility goes right through the organisation, right down to the individual, it all gets aggregated up, and then when we come to report, the person who finally signs up on that would be the VP Resources, because Property Services reports to him, but that's not to say that Steve Somogyi personally has responsibility for it.... It seems that it's a kind of a food chain here, and so it's got to get down to the school, then it's got to get down to the program.... At the end of the day, to some extent, it's about individual decisions.... Everyone has to take some responsibility that's appropriate for their level.
Joyce Kirk	Senior Management	Reference 1 ¶167: As a PVC, I'm aware of what's in the business plan and I'm also aware of what's in the strategic plan, and the managers within the portfolio are aware of those as well. So to that extent, yes, I think we're all held accountable. But I have to say, if I use too much electricity in my office, I don't know what would happen to me.
		Reference 2 ¶171: Well, it depends on what level you're measuring accountability – whether accountability is at an individual level or at a group level, or a team level or a portfolio level, or a university level.
Margaret Gardner	Senior Management	Reference 1 ¶6: I should say, in terms of the university's overall management of particular things like water, energy, paper costs and waste management, the day-to-day management accountabilities for those rest with the director of Property Services, who reports to the Vice President of Resources, who is the Chief Operating Officer, and so that's where the day-to-day or the overall accountabilities reside.
		Reference 2 ¶10: I have overall responsibility for the university, but that's what I was saying they actually reside in our Property Services area, they're responsible for water, energy management, paper, and waste management, and they report to our chief operating officer, who reports to me.
		Reference 3 ¶24: Well, that's because that's where their responsibility lies.
		Reference 4 ¶59: They're not held accountable currently for the usage of paper, except to the extent that it's part of their overall cost, which they themselves would be trying to reduce. We do ask people to try and reduce the amount... but there's still a large amount of paper used... It's only just part of their costs actually.
Paul Stockwell	Management Accounting	Reference 1 ¶136: If they had their own budgets and their own measures [tied to particular attributes of environmental performance], then they would monitor and control that regularly. It's the nature of the way people are. If they are not being held accountable for it, then they are not really going to worry about it. They might turn the lights off to reduce our energy usage, but they are not really focusing on that.
		Reference 2 ¶175: No, it's not their main focus.... It's not monitored, and it's not one of their key accountabilities.... But they're not really held accountable for environmental usage. So if that's not in there as one of their key accountabilities, then it's not going to be front of mind in their reactions.... It's not their key focus at the moment.
Anonym (R2)	Academic School	¶186: ... but all the classrooms, they're shared. When it's a shared space, people don't have a sense of 'I'm responsible for this'.
Stephen Somogyi	Senior Management	¶131: Well, in the longer run, given that I'm the Vice President of Resources, I think it will be my responsibility to effectively manage our use of the environment and the costs of the resources we utilise, so I expect that it will come from me. That needs to be shared with everybody else in the organisation, because I can't manage that on my own.

Wayne Poole	Management Accounting	Reference 1 ¶91: No, but a budget is established, and the budget takes those costs into account... So as an organisation, from a consolidated point of view, we're accountable for our budget to variance actions. We are accountable for that. Can I drive my accountability to make change happen? I can only do that by asking people to reduce costs, especially variable costs. It's very hard to reduce fixed costs, but there's a degree of variability in energy usage so you can ask people to be more energy efficient and demonstrate there is a bottom line impact of doing that. Can I actually make that happen? It's a secondary thing.
		Reference 2 ¶103: I think it is, because again it's a community issue and the university is part of the community. Therefore, it should do its fair share to reduce what the total community spent on energy... So I think we have to do our own social responsibility, to do our part for the community.

<AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	Reference 1 ¶635: I probably shouldn't say this, but I don't believe that I'm being held accountable... No one's putting pressure on me on any of those issues at the moment, but I know that they're important, and within the resources we've got, we should try and do what we can do. I guess the budgeting process in one sense holds us accountable to some degree...
		Reference 2 ¶653: I was going to say you almost act autonomously and as long as I'm getting some results or matching the expectations, then there's no one coming over and saying, 'what's going on and can't we drive this further?' ... But if it's within those budgets, it's really me saying, 'well, let's try and drive it down further'

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	Reference 1 ¶52: I don't think it's possible to assess key managers against their environmental performance. Within this University, the environmental planning group has the pressure to control environmental costs, but they focus on controlling the budget rather than environmental performance.
		Reference 2 ¶54: Who should be held responsible? Theoretically, administrative divisions should be held responsible.

< Nanhua University >

Participant	Type of Role	Quotation
Chih-Wen Ding	Academic School	¶22: As schools or departments are not allocated any budget for electricity or water, we don't have to worry about it because it's not us who pay the bill. We are not responsible for electricity or water or whatever environmental costs incurred. We are just not held accountable for that.

< National University of Kaohsiung >

Participant	Type of Role	Quotation
Chieh-Jung Huang	Senior Management & Environmental Management	¶82: No, I am not held accountable. Nobody is held accountable, but we do think about what we can do to reduce the costs.... Who should be held accountable for the water or electricity costs? I think it's not a problem to us, as these costs are required and unavoidable for campus operations.
Chu-Ying Lien	Management Accounting	¶35: I think that's within the responsibilities of General Affairs. We accountants are just accountants and we are not held accountable for environment costs incurred.

## Lack of integrating the environment into strategic planning

**Name:** Barriers to EMA adoption\Management barriers\Lack of integrating the environment into strategic planning

### < RMIT University >

Participant	Type of Role	Quotation
Chris White	Environmental Management	¶165: I think we need to get some more systems or practices in environmental areas in place before we could get to that stage [accounting for the environment]. Reference 1
Anonym (R1)	Senior Management	¶130: ... I think that's [updating environmental policy] good because it makes it more visible, more conspicuous out there, but if I can put it this way, that sort of thing is necessary but not sufficient, because RMIT is always making policies, but does it actually mean anything? So it's not just that we make policies, the next question is, 'well, what does this mean on the ground and how are you going to implement it?' Reference 2 ¶133: So we run the same risk with an environmental policy, you can promulgate it, but will anybody do anything about it? So you have to have an implementation strategy as well, that's all I'd say, you've updated it, great, but what's the implementation plan?
Margaret Gardner	Senior Management	¶22: I certainly think that it's important that we do all these things, and I expect those areas that are responsible for them will be working hard on bringing those things forward, the other things that we do, and we've tended to do over time, we've had students involved in projects, and they bring ideas forward, and there're things that we look at, and see if we can take up, or if there are ways that we can take advantage of those, and we've got a committee that also looks at these matters in the university, and brings forward suggestions, and they all feed into that process, you know, your budget processes, into your planning processes, so you can look at what you need to do to keep going forward. So that's what I expect them to be doing, and that's what I expect ...
Wayne Poole	Management Accounting	¶43: ... You might say that there's prescribed legislative requirement to be accountable, but we do aspire in this area, and we do make reference to that in our annual report. But do we then take that to the next level? I don't think we do. So I think it's aspirational rather than directional at this point.

### <AUS University >

Participant	Type of Role	Quotation
Anonym (V2)	Environmental Management	Reference 1 ¶53: They're not strategic. They're used strategically on occasions, but they've been really driven from the middle management's conscience basically.... In fact, I think there is now, but there was, for a long time, not even an environmental policy for the university on the strategic level... Reference 2 ¶332: Yeah, as I was saying, for the sake of repeating ourselves, we understand we need a framework for this and we're going to put it in place.
Anonym (V4)	Management Accounting	¶579: Having the data linked to some sort of strategic goal is the bit that's missing. I mean we've got the data, we've got it available.... We've got the ability to benchmark these things as well and work out how much we're spending per head and all of those sorts of values.... The university hasn't actually reached that point.... And that's easy to test because you can look at the strategic plan and the documents sitting on the university's website and stuff like that.

< Transworld Institute of Technology >

Participant	Type of Role	Quotation
Feng-Shuai Wu	Senior Management	Reference 1 ¶23: If we had a formal environmental policy there, we could have done much better.
		Reference 2 ¶59: Commitment itself is not enough. There is no doubt that you should have the commitment first, but besides that, you should operationalise the commitment. I mean you need a formal policy or some procedures to achieve the goal, monitor your progress, and make required amendments to the policy. It's a closed loop. What we are lacking is environmental awareness among staff and students and strong commitment from the senior management. It's [managing environmental costs] still a soft issue for the university, although we have some environmental initiatives in place.

< National University of Kaohsiung >

Participant	Type of Role	Quotation
Chieh-Jung Huang	Senior Management & Environmental Management	¶74: I think it's not that hard to ensure compliance. The ten-point action plan is very flexible. The Declaration is voluntary, and implementing an action plan is not compulsory. Otherwise not many universities are willing to sign.