ASSESSMENT OF ENVIRONMENTAL MANAGEMENT ACCOUNTING AT SOUTH AFRICAN UNIVERSITIES: CASE OF TSHWANE UNIVERSITY OF TECHNOLOGY

Cosmas M Ambe*, Queen Ntombikayise Ambe**, Ganda Fortune***

Abstract

The overall objective of the paper is to assess the application of environmental management accounting (EMA) at Tshwane University of Technology (TUT) as a service organization and examine how the institution manages, account and report environmental cost. Data was collected by means of exploratory and explanatory research techniques using two data sets; documentary and fourteen in-depth individual face-to-face interviews employing a semi-structured questionnaire with closed and open ended questions to collect primary data. The results indicate that; the implementation of EMA and general governance for environmental responsibility and accountability is extremely weak. The potential use of EMA is neglected and, as such, EMA implementation is not considered a priority. Three barriers to the adoption of EMA within TUT were identified as: institutional pressures, a low profile of accounting for the environment, and management's attitudes. A general ledger model and action plan for the implementation of EMA at TUT utilizing the use of activity based costing has been suggested.

Key Words: Environmental Management Accounting; Environmental Costs; Environmental Impacts; Activity-Based Costing; Service Organization

** Nedbank Chair in Accountancy, School of Accountancy, Faculty of Management and Law, University of Limpopo, South Africa*
*** Director, Finance Administration, University of Limpopo, South Africa*
**** PhD Student, School of Accountancy, Faculty of Management and Law, University of Limpopo, South Africa*

1. Introduction

Despite growing concern of environmental issues including climate change and greenhouse gas emissions as demonstrated in a number of global conventions such as the recently concluded climate change conference in Lima Peru in December 2014, little attention has been paid to how the service sector impacts the environment and how related environmental costs are accounted for. Conversely, there is a general lack of consideration given to environmental impacts, environmental responsibility, accountability, environmental costs and potential cost savings within university settings (Clarke and Kouri 2009; Gray, 2010). Moreover, a review of available literature indicates that, there is little attention given to how the service sector impacts the environment and how environmental related cost is accounted for, despite the dominance of this sector in the world economy over the past decade (Creighton, 1998; Parker, 2000; Chang and Deegan, 2006; Deegan and Soltys, 2007). Therefore, there is lack of consideration given to environmental impacts, costs and potential costs savings within a university setting (Chang and Deegan, 2006; Clarke and Kouri 2009; Gray, 2010). Blair and Hitchcook (2001) assert that;

"Every activity that occupies a building uses energy in heating, lighting and equipment. Service industry 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".

It is generally perceived that environmental pressures or opportunities for the service sector are less observable or less important than other sectors, such as mining or manufacturing. Nevertheless, the fact that the impact is less obvious does not mean that they do not exist. The growing importance of the service sector implies the accompanying level of resources consumed will have significant environmental implications. Relevant environmental cost also have financial impact on the service sector and hence universities (Chang and Deegan, 2006; Evangelinos, Jones and Panoriou, 2009; Gray, 2010).

Based on the above background, ***Environmental Management Accounting is defined 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 (IFAC, 2005; Jasch, 2001; Lohmann, 2009).

The need for environmental management accounting (EMA) was conceived in recognition of some of the limitations of conventional management accounting approaches for management activities and decisions involving significant environmental costs and/or significant environmental consequences/impacts. For example, the following conventional management accounting practices might contribute to the inadequate consideration of environmental costs in internal decision-making:

- The unintentional "hiding" of many environmental costs in overhead accounts
- Inaccurate allocation of environmental costs from overhead accounts back to processes, products, and process lines;
- Inaccurate characterization of environmental costs as "fixed" when they may actually be variable (or vice-versa);
- Inaccurate accounting for volumes (and thus costs) of wasted raw materials, and
- The actual lack of inclusion of relevant and significant environmental costs in the accounting records at all (Jasch, 2001; IFAC, 2005; Schaltergger and Burritt 2009).

Furthermore, non- accounting related reasons for EMA include:

- Increasing pressure from stakeholders interested in environmental issues;
- Growing demand for integrated consideration of financial and physical aspects of environmental management;
- The concepts of sustainable development and corporate social responsibility require a combined consideration of financial, environmental and social aspects and;
- Increasing importance of environment-related costs (IFAC, 2005).

The overall objective of this paper is to assess the application of environmental management accounting at Tshwane University of Technology. This will be achieved by investigating the environmental impacts associated with the operations of Tshwane University of Technology as a service organization and examines how the institution manages, account and report environmental cost. The specific objectives of the study include:

- To investigate governance for environmental responsibility and accountability within TUT.
- To examine how environmental impacts, cost and savings are accounted for within the University;
- To determine the factors facilitating/ inhibiting change needed in the management accounting system of TUT to implement environmental management accounting (EMA).

The paper will be structured as follows: Section two that follows will present the theoretical framework of the paper and section three discuss the methodology utilized for the study. Section four will present the findings and discussions and finally in section five the paper will be concluded and recommendations for further study presented.

2. Theoretical Framework

The role of management accounting in improving both environmental and financial performance through enhanced accountability is attracting increased recognition. However, universities have typically failed to be the focus of attention, generally, because of a mistaken belief that they generate only insignificant environmental impacts (Chang and Deegan, 2008). Contrary to the lack of significance to environmental impacts by universities as attributed above, there has been a number of international initiatives promoting the consideration of environmental issues by universities. To this regard, over 600 universities worldwide have committed themselves towards sustainability by signing international agreements and convention such as the Bologna Charter, The Halifax Declaration, the Talloires Declaration and the Copernicus Charter for Sustainable Development (signed to date by over 240 European universities).

Conversely, many universities in South Africa have shown interest on environmental issues including Rhodes University, University of KwaZulu Natal and the University of Cape Town whose environmental policy statement and objectives. Different environmental management approaches have been adopted as environmental accountability attracts increasing attention within universities especially in North America, Europe and Australasia. For example, a number of universities have embarked on initiatives to increase energy efficiency and reduce wastes (e.g. Bekessy et al. 2002; Forum for the Future 2004; NWF 2004; Uhl and Anderson 2001), conducted environmental audits (e.g. Creighton 1998; Delakowitz and Hoffmann 2000; Uhl et al. 1996), provided sustainability reporting (e.g. HEEPI 2007; Towns and Cocklin 2006), and gone all the way to ISO14001 certification (e.g. Arvidsson 2004; NWF 2004; Simkins and Nolan 2004). Guides and best-practices are currently available and documented (for examples, see C2E2 2003; EAUC 2007).

Various environmental management initiatives are undertaken but a gap seems to exist between the commitment and the outcome. It is argued that at universities in both North America and Europe most of the environmental initiatives undertaken are patchy

and strategic planning for environmental management is still lacking (Dahle and Neumayer 2001; Herremans and Allwright 2000). A survey conducted by Carpenter and Meehan (2002) also points out that "environmental management cannot be considered a mainstream business activity" within Australian universities. Environmental management has found its way into universities as an approach towards sustainability but progress to move universities along the continuum of sustainability seems slow. Studies show that the majority of university staff who are deeply involved with environmental sustainability issues are from either the natural sciences or environmental engineering disciplines (Filho and Carpenter 2006).

2.1. Accounting for Environmental Cost

Gray and Bebbington (2001) argue that "without a 'greener accounting' many environmental initiatives will simply not get off the ground." Unfortunately, the potential contributions that accounting can make have not gained much attention and accountants are not as widely involved in the environmental agenda as they could and should be within universities as will be further explained on accounting for environmental cost that follows.

There is growing evidence internationally on the application of Environmental Management Accounting in organizations and by applying Environmental Management Accounting methodology, some organization have been able to track close to 20% of total annual operating costs not currently recognised as environmental costs and could realise the large imbedded savings potential and revenue gains. Managing and avoiding environmental costs requires recognizing that these costs exist, ensuring that the costs are recognized by the parties responsible, and provides incentives to reduce these costs (Conway–Schempf, 2003). According to van Heeren (2001) (citing Bennet and James 1997) there is an increase potential for environmental – related management accounting to make a substantial contribution to both business success and sustainable development.

The dominance of the service sector in the world economy has grown in the past decades, and according to Chun–chang and Deegan (2006) literature reviewed brings to light that little attention has been paid to how the service sector impacts the environment and how related environmental costs are encounted for. It is generally perceived that sustainability pressures and opportunities for the service sector are less observable and less important than other sectors in the economy. For the fact that the impact is less obvious does not mean that they do not exist (Chun–chang and Deegan 2006). Chun–chang and Deegan (2006) state that, "a review of available research shows there is a general lack of consideration given to environmental costs and potential cost savings within university settings.

In Australia, a comprehensive survey of all 38 universities was conducted in 2002 to determine the current progress towards sustainability within Australian universities. The results returned that 47% of the universities have an environmental management system in use and 69% of the universities have energy reduction programmes in place; however, only 32% of these universities believed that their programmes are quite or 'very' effective (Chun-Chang and Deegan 2006) (citing Bekessy et al. 2002). Environmental Management Accounting enables universities to focus on hidden environmental cost drivers and potentially manage cost savings. Estimating the environmental impacts of universities demands taking stock of the diverse materials 'consumed' in the process of campus operations. "Previous efforts stressed conducting campus audits as a means of impact estimation. However, such simple measures neglect the impacts both 'upstream' and 'downstream' that are associated with these resources. Taking a life cycle approach to material flows provides a better understanding of environmental impacts, enabling campus decision makers to conceptualize better how their decisions translate into the 'ecological footprint' of the campus" (Eflin, 2005).

In the United States, alone, there exist over 4,000 colleges and universities that represent an important sector of the nation's economy. As in any sector, each institution has inputs and outputs of materials, energy, information, and people, and each has pronounced environmental impacts – which may or may not reflect those of their surrounding communities or the nation at large. It is apparent that universities use a considerable amount of papers, electricity, oil, natural gas, water and chemicals and may be the largest user in the community in the region where the university is located (Creighton 1998). To date, however, few universities have completely understood what their major environmental impact is, or have tried to reduce the impact and taken the opportunities to save resources and money. If relevant environmental costs were unknown, actions would be taken to manage the costs. Implementing EMA within universities, relevant environmental costs necessarily need to be made available.

To date some universities have started to monitor their environmental impact. For example the United States, Pennsylvania State University has issued a comprehensive report on one of its major buildings about how the building environmental impact could be significantly reduced with detailed knowledge of physical environmental costs and cost saving data presented as well. Another example is the University of Florida, who is the first university in the world to disclose social, ecological and financial metrics according to the international guideline

developed by Global reporting Initiative (GRI) (Newport and Chesnes 2001). The literature reviewed clearly pointed out that these universities related project or cases typically involve people within environmental management functions rather than those within accounting functions. Further, environmental information, if any, provided by those studies tends to be aggregated. Without further breakdown, the aggregated information is of less use in improving environmental performance. Without accountants' involvement, further breakdown of the aggregated environmental information also seems problematic.

In the business world, accounting is not the most obvious place to start when seeking to manage environmental impact. This holds true for universities as well. However (Gray and Bebbington 2001) argue that "without a 'greener accounting' many environmental initiatives will simply not get off the ground". Their argument might provide a possible avenue towards addressing the ineffectiveness of environmental management programmes within Universities. Problems with environmental related costs being accumulated or 'lumped in' with overheads are well documented, such as in (Ditz, Ranganathan and Banks, 1995) for manufacturing industries (Deegan, 2002) for service industries. It is evident that managing environment will remain a difficult challenge for universities if environmental costs are unknown and effectively hidden from management decisions. From an accounting perspective, external sustainability reporting and environmental auditing have received some attention for discharging environmental accountability by universities. However the potential of EMA in this regard is still neglected.

Accountability requires data, not only external environmental reporting but also for internal management. (Parker, 2000) argues that not enough attention has been paid to the improvement of environmental accountability through management accounting and reporting for internal decision makers in the world of business. Although (Adams, 2002) observes that organizations producing social and environmental reporting develop better internal control systems and better decision-makings, Parker (2000) indicates that "*while considerable information on corporate environmental disclosure practices in annual reports is now available, little is known about the internal environmental decision and control information systems in use, and corporate attitudes particularly to environmental costing".* Parker's argument highlights an imbalance deserving attention, giving that while accounting can play a role in post hoc environmental reporting; it has the potential to make a significant contribution to the ex ante decision process involved in managing environmental impacts and improving environmental performance (Parker, 2000)

Environmental management approaches such as Life Cycle Analysis (LCA) have been employed to identify the impact associated with campus operations. However, those approaches typically do not go further to be used in financial management decisions, like capital decision (Epstein, 1996). To improve environmental performance, integrating environmental information into management decision is critical. If the fundamental purpose of environmental management is considered to control environmental impact, then improve environmental impact and then improve environmental performance, it increases the apparent need for the more aggressive involvements of accounting professions.

Chang and Deegan (2008) uses a case-study of an Australian university to demonstrates that there is a general lack of consideration given to the management of environmental costs and related cost-savings, due partly to a perceived lack of appreciation by senior management of the extent of environmental costs being incurred. Further, in the absence of relevant environmental cost information, although environmental sustainability itself is promoted as important, efforts to improve internal environmental accountability from an accounting perspective are lacking. This study shows that perceived institutional pressures and a low profile of accounting for the environment, and management's attitudes influence the adoption of EMA within universities.

3. Methodological Framework

The paper made use of Tshwane University of Technology as case study. Data was collected by means of exploratory and explanatory research techniques in this research using two data sets as follows:

Documentary data to establish an understanding of the environmental issues at Tshwane University of Technology and along with the literature review will formed the basis of the interview questions. Documentary and interview data was transcribed and reduced through descriptive statistics and a process of selection, focusing, simplification, abstraction and transformation of the data enabling categories, themes and patterns to be identified.

Documentary data: Internal from TUT (e.g., Institutional operational plan, environmental related policies and procedures waste management procedures, and financial reports) and external (e.g., print media, industry associations).

The second set of data was derived from fourteen in-depth individual face-to-face interviews employing a semi-structured questionnaire with closed and open ended questions to collect primary data. The interviews were conducted with personnel of two main divisions involved with EMA related information Building and Estate and Finance.

Interview data: from 14 different personnel's of TUT including staff from estate and planning,

finance, residence, procurement, and top management.

Face to face individual interviews are preferred to a mail questionnaire for the purpose of this study, as the mailed questionnaire was less likely to enable the collection of exploratory type of information to be gathered using interviews. Data for this study was transcribed by recording the word-by-word conversation between the interviewer and interviewees. These data was reduced through descriptive statistics and a process of selection, focusing, simplification, abstraction and transformation of the data enabling categories, themes and patterns to be identified (Miles and Huberman, 1994:12).

This study made use of content analysis that entails categorizing, ordering, manipulating and summarizing data and describing them in meaningful terms. As the data that was collected are verbal of nature, content analysis using open coding was done according to (Creswell 1994). According to Strauss and Corbin (1990), open coding is when the data are divided into segments and then scrutinized for commonalities that reflect categories or themes. Data analysis began during the data gathering process. The raw data is kept with the researcher. Data was collected in terms of how TUT treats environmental impacts and account for environmental cost. Analysis in qualitative studies involves the examination of words. According to Mouton (2001), the aim of analysis is to understand the various constitutive elements.

In this study, validity was achieved by using multiple sources of evidence for triangulation, establishing a chain of evidence and having the draft findings of study reviewed (Yin 1994). To ensure reliability in this study, an overview of the project was developed prior to and through the data collection phase illustrating the emerging findings. Notes detailing the names of the interviewees, their job position, and the date, time and location of the interview were kept in the researcher's journal. Once each interview transcript had been prepared and reviewed it was noted, as such, in the researcher's journal. When the interview questions were being prepared a form of checklist was used to assist in the refinement of the questions. A report framework was compiled illustrating the preliminary plan of how the findings would be presented.

The study database allows for the collection and collation of all of the data obtained for the study. It consists of at least four levels (Yin 1994; Brownell 1995): case notes, documentation and artifacts, tabular materials and narratives. In this study, the case notes were hand-written into the researcher's journal and include thoughts on the un-transcribed and transcribed interviews, the different documentary data, and journal as the data was refined. The documents that were collected include those from annual reports, information from government web sites and documents and media releases from industry associations. The narratives in this study were the transcribed interviews of 14 interviews. A spreadsheet, which allowed easy access and analysis to the summary data, was maintained. Prior to the interviews, a pilot interview was performed. This ensured timing of the interview to be reviewed along with the refinement of questions to improve readability and comprehension (Yin 1994).

4. Findings And Discussion

The case study population for this study comprises of 14 respondents working for TUT. Figure 4.1 to 4.4 below provides the demographics of the respondents based on work specialization, longevity of service, age and gender.

Majority of the respondents (64%) as presented in figure 1 below were from the Building and Estate Division that includes institutional planning, landscaping, logistical services, transport and printing, while 36% of interviewees were from the finance division. It was important to make use of both financial and environmental specialist to solicit a balanced perspective of both the technical and monetary aspects of EMA.

Figure 1. Work specialisation

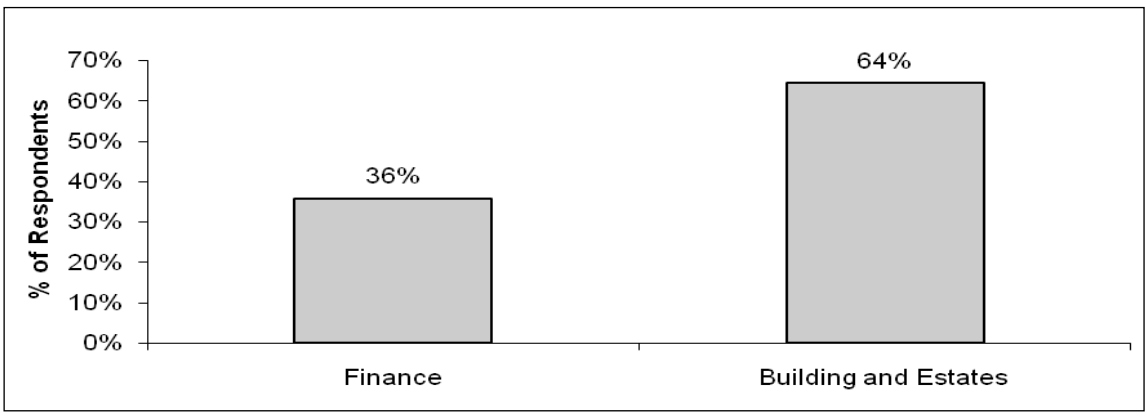
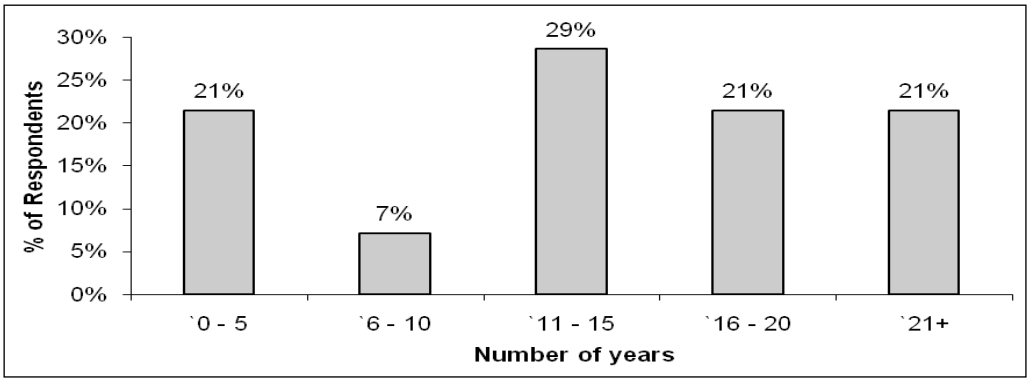


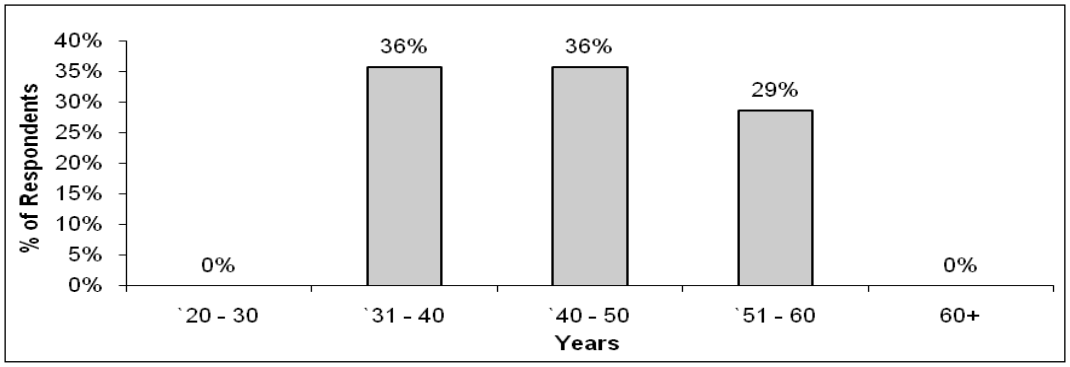
Figure 2 below depicts longevity of services of the respondents. The analysis show that more than 70% of the respondents have worked for TUT for more than 10 years. This imply that most of the opinion provided during the interviews can be trausted to come from authoritative minds and people who know the operations of the organization.

Figure 2. Longevity of service



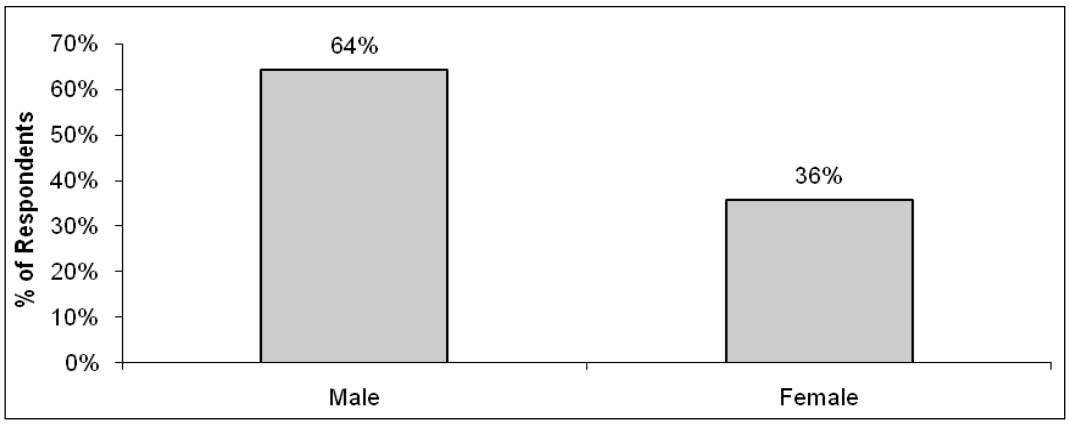
Furthermore, figure 3 below depicts that all responedents were above 30 years of age supporting the maturity of the respondents as in figure 2 above.

Figure 3. Age group



Finally on demographics of the respondents for this study, figure 4 demonstrates 64% of interviewees being male and 36% female. While the gender balance was biased, this demonstrated the configuration of the general staff population of the university and also in line with labour trends in the country and does not negatively affects the results of this study.

Figure 4. Gender



The demographical data for this study has been presented and its implication to the study discussed. The next section presents findings of the study with respect to environmental responsibility and accountability of TUT.

4.1. Environmental Responsibility and Accountability

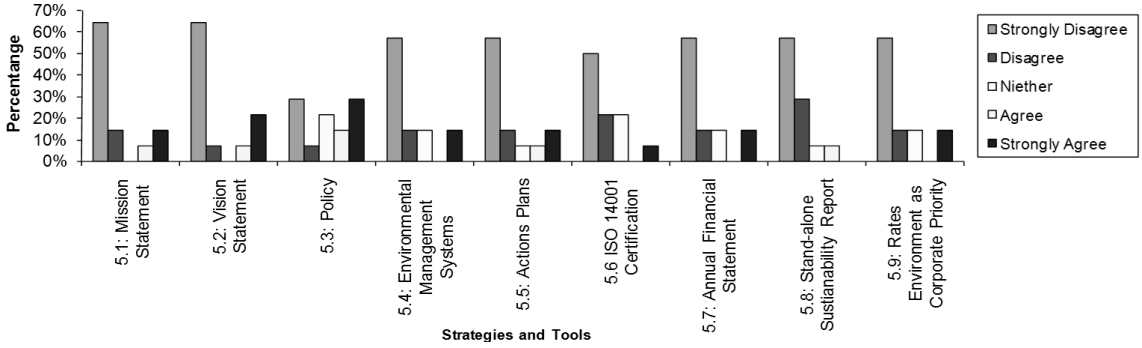
A significant objective of this study was to investigate governance for environmental responsibility and accountability within TUT. An analysis of the mission of TUT requires the university to make a significant contribution to sustainability through teaching and research. However there is no specific attention to sustainable consumption of resources such as energy, water, fuel, papers and consumable materials or to change consumption behaviour by both students and staff. Although the focus of universities is on teaching and learning, they still have to be financially sustainable and are directly accountable to government for their financial performance. From an environmental cost control perspective whether universities are operating in an environmentally sustainable way or people within universities are behaving in an environmentally responsible way should not be a secondary issue. Accountability leads to better performance (Adams 2002) but TUT practice did not mirror an attempt to make people accountable for their environmental performance.

An examination of governance for environmental responsibility and accountability was conducted by assessing environmental strategies, tools and drivers. The presentation is demonstrated in Figure 5.

Environmental Strategies, Tools and Drivers

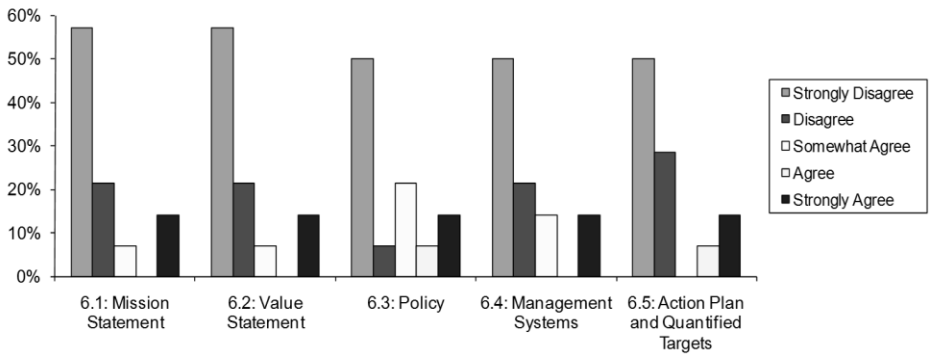
Figure 5 below indicates that only environmental management policy exist within TUT as an environmental strategy and tool, there is no environmental mission statement, vision statement, environmental management system, and environmental action plan. Figure 4.5 further illustrates that TUT is not ISO14001 certified, has no environmental section in its annual financial statement, no stand-alone sustainability report and TUT doesn't rate the environment as corporate priority. The implication of figure 4.5 is that governance of TUT environmental responsibility and accountability is weak.

Figure 5. Existence of Environmental Strategies and Tools



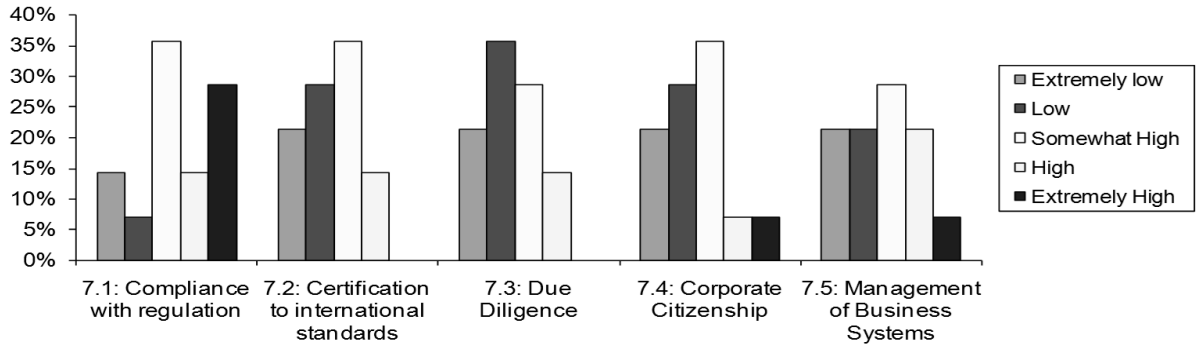
Due to the lack of environmental strategies and tools as shown in figure 5 above, TUT doesn't implement any environmental strategies and tools even its environmental management policy as depicted in figure 6 below.

Figure 6. Implementation of Environmental Strategies and Tools



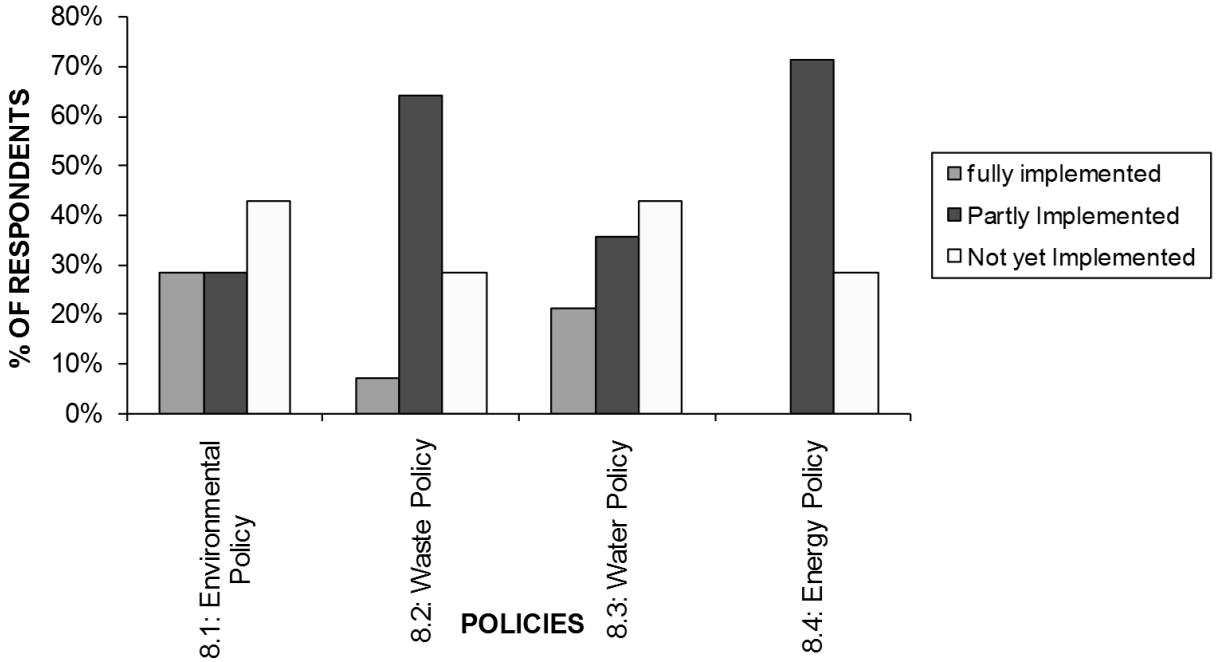
While TUT does not have a developed environmental management systems as in figures 5 and 6 above, its planning for environmental responsibility and accountability are driven by compliance to regulation, certification to international standard, corporate citizenship and management of business system as depicted in figure 7 below.

Figure 7. Drivers for TUT Environmental Management Systems



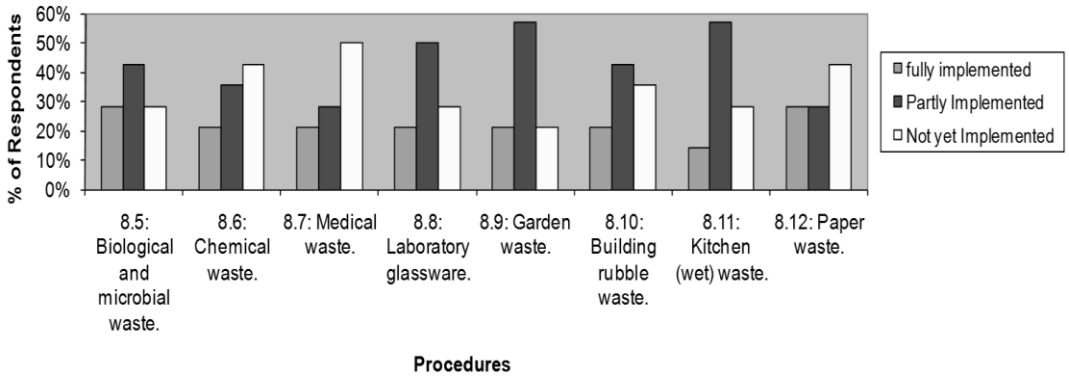
Implementing Environmental Policy and Procedures: TUT has developed environmental policies and procedures including; environmental policy, waste management policy, water policy and energy policy approved in 2005. The development of these policies and the appointment of an environmental officer depicted strong strategic direction and responsiveness to environmental issues by the university. However, figure 8(A) below depicts that by the year of study 2009-2010 (after five years), none of these policies or procedures are fully implemented.

Figure 8 (A). Implementation of Environmental Policies Developed and Approved in 2005



Further to figure 8(A), TUT's responsiveness to environmental issues has been enhanced through the development of a good number of environmental procedures such as: procedures for the disposal of biological, medical, chemical, laboratory glass ware, garden, building rubble, Kitchen and paper waste. The implementation of these procedures is either not yet or partially implemented as depicted by figure 8(B) below.

Figure 8 (B). Implementation of Environmental Procedures Developed and Approved in 2005



Figures 5, 6 7, 8(A) and 8(B) has demonstrated that, while there are evidence of some environmental policies, procedures and strategy, the implementation and general governance for environmental responsibility and accountability is extremely weak. Section 4.4 below provides an assessment of how TUT accounts for environmental impact, cost and savings.

4.2 Accounting or Environmental Impacts and Costs

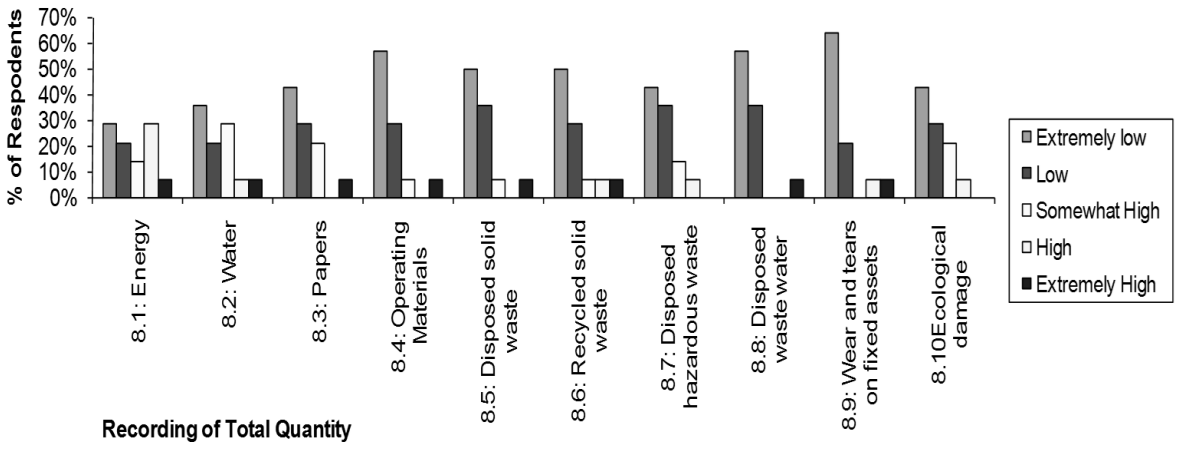
Tshwane University of Technology (TUT) has no link between the systems for collecting financial and non-financial data. Costs are captured within the financial system for the whole University but the usage data that comes with the costs information collected are not captured or included in the accounting system. When asked whether there should be a link between the systems for collecting financial and non-financial data and whether accountants could be involved in helping to analyze such information the respondent doubted whether accountants are interested:

"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"(Respondent A).

The International Federation of Accountants (IFAC) identified two types of EMA information for internal decision making – physical and monetary information. The generation and use of each of this EMA information type was investigated within TUT and the results are presented and discussed in sections 4.4.1 and 4.4.2 below.

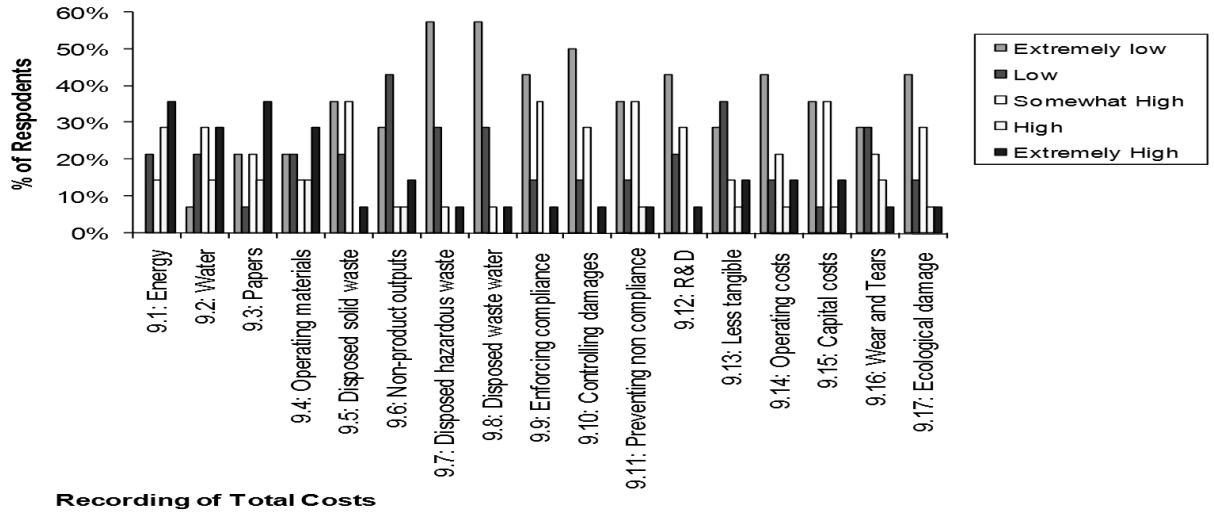
Physical Environmental Management Accounting: Physical Environmental Management Accounting (PEMA) is the generation and recording of physical data on material and energy input, material flows, products, waste and emissions for internal decision-making (Savage and Jasch, 2005). For the purpose of this study, energy, water, papers, operating materials, solid waste, recycled waste, hazardous waste, waste water, wear and tear of fixed assets and ecological damage were identified as relevant physical elements of TUT EMA information and respondents were requested to provide responses to their generation and use for internal decision making. Figure 9 below demonstrates that, the generation and use of physical information for most of the category is extremely low to low; except for energy, water and paper where the accounting for physical quantities has partial implementation.

Figure 9. Recording of Physical EMA Information



*Monetary Environmental Management Accounting***:** Monetary environmental management accounting (MEMA) is a sub-system of environmental accounting that deals only with the financial impacts of environmental performance. It allows management to better evaluate the monetary aspects of products and projects when making business decisions (Savage and Jasch, 2005). Table 10 below depicts that the recording and use of monetary EMA information for energy, water and paper are partially implemented while the implementation of MEMA relating to cost of operating materials, disposal of solid waste, non-product outputs, disposing hazardous waste in solid form, disposing waste water, implementing and enforcing environmental regulatory compliance, controlling environmental damages and activities, preventing non regulatory compliance, research and development projects related to environmental issues, less tangible environmental issues, environmental operating expenditure, wear and tears on fixed assets, and cost on ecological damage is extremely low to low.

Figure 10. Recording of Monetary EMA Information



The lack of information on environmental costs also reduces the opportunity to improve environmental accountability which is important in driving behaviour change.

Respondent M indicated that: "*Without active cultural change agents working within the organization, people become complacent. They're just blasé about how they treat the facilities and electricity consumption….At the end of the day; people have to be responsible for themselves. If people were aware to start off with, the lights and computers couldn't be left on in the first place and they could have made sure the there is no tap of water left open and the toilets are not just flushed unnecessary. It's something that management can not fully control. It's a culture change and individual discipline issue, which can be enforced by awareness and education".*

Due to limited environmental accountability, management seems uninterested in environmental cost control and the savings that could be made, which in turn, has direct implications for the demand to put EMA in place. As Respondent J explained:

"EMA is not management main focus…. It's not monitored, and is not one of their key accountabilities…. They're not really held accountable for environmental usage. If environmental sustainability is not one of their key accountabilities, then it's not going to be in their minds. They are currently only focusing on putting off fires and if environmental sustainability can be in lime light then something will be done about it".

Figure 9 and 10 above shows that TUT record partial physical and monetary environmental management information especially information on energy, water, papers, fuel and operating material, while waste management, research and development costs is not recorded in the system as depicted in figure 10.

Accounting for Environmental Cost: The major environmental costs were examined to determine how they were managed and treated in the accounting system. Their absolute amount (if available) and relative scale are also discussed. TUT uses Integrated Tertiary System (ITS) for the purposes of both financial accounting and management accounting.

A review and analysis of the ITS financial system (general ledger) and processes indicated the following:

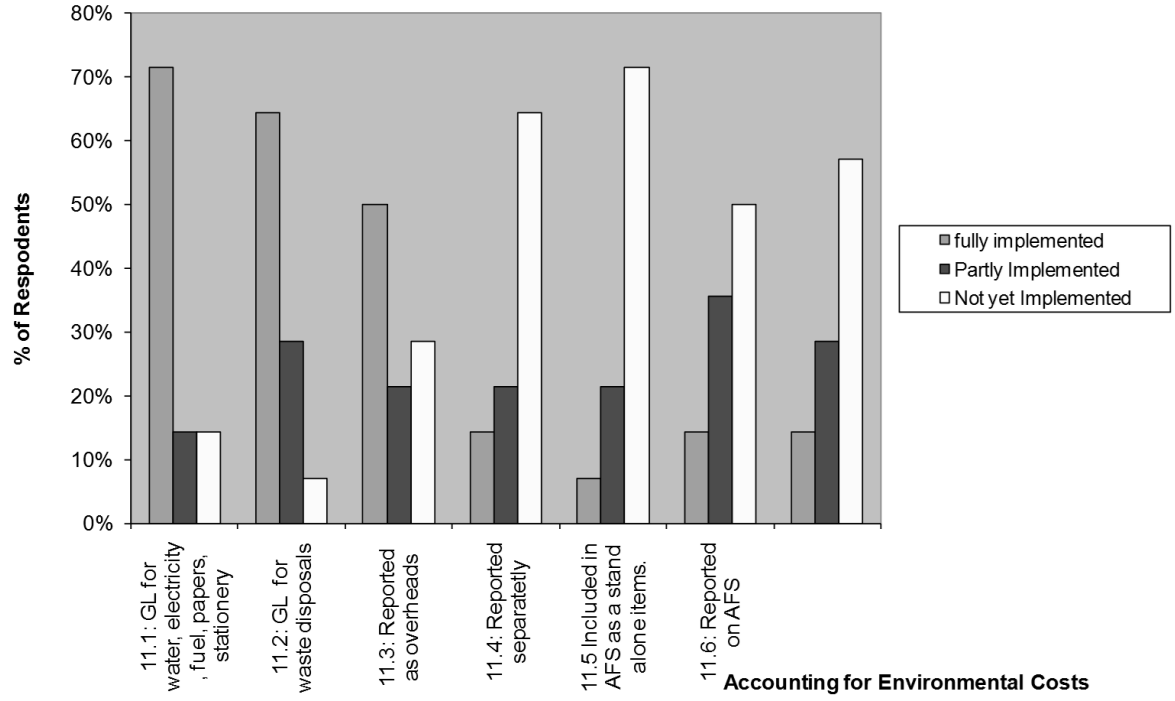
– The general ledger combines electricity, gas, water, waste removal and maintenance costs under building & estates running costs account, fuel under vehicle expense account, uses a combined 'stationery and printing' account for

paper cost, cartridges and stationery, A 'service contract' account to include costs incurred on service contracts that support facilities management and for reporting purposes all these expenditure are group together and called operating expenditure.

- For those environmental costs captured within the accounting system only financial information is provided. Non-financial information on the type or quantity of goods or services procured (e.g. electricity and paper) is not currently available within the system
- Operating costs including electricity, gas, fuel, water, and waste removal are combined as part of the 'overhead expenses' overhead for the whole University.
- Consistent with many organizations "waste costs" are recognized as including only the costs incurred in having waste removed from the organization. Waste costs are therefore understated (and therefore largely unaccounted for) because there is no explicit consideration given to the costs of bought-in resources that end up in waste

Figure 11 below provides a solid evidence on how TUT account for its environmental costs. It has a separate general ledger accounts for water & electricity, fuel, papers, stationery and printing and all those accounts are grouped and reported as overheads (operating costs) not separately as a stand-alone item in the monthly management report and the annual financial statement. TUT also doesn't have a sustainability reporting section in its annual financial statement.

Figure 11. Classification, Analysing, Recording and Reporting Environmental Costs



Management of Major Environmental Costs: As above monthly management report are produced by TUT's for reviewing current operations and assessing performance against the budget. The major environmental costs for the University (electricity, paper, water, fuel and waste management) are obscured within the accounts, for example, by being included in aggregated accounts titled 'overheads' and ' 'operating costs'. At the present time there was no further classification or analysis and no form of responsibility-centred budgeting for these aggregated costs.

The main reason for this was that there had been no prior focus on the need for environmental costs information. As one interviewee stated: "*No one has ever come to me and said: 'Tell me the environmental cost of what we do.' So the chart of accounts is not set up to record anything that way…. It's one thing that we've never been requested for, even though it's not a new concept. We've never been requested to provide specific information about it. From what I see, not that I see everything, it maintains a low profile"* (Respondent N).

Senior management across the University would not know the extent of environmental costs—however, it was not clear that the senior management would actually monitor such information. When asked if environmental costs information could be separately identified and reported Respondent N indicated: "*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 ask how much we spend on the environment (environmental cost)? … 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".

This has consequently tended to hide various environmental costs, obstruct the management of environmental performance, and reduce further the chances of uncovering potential cost-saving opportunities.

4.3. Future Direction and Opportunities

The third and final objective for this paper was to determine the factors that are facilitating or inhibiting change needed to implement EMA at TUT. TUT's practices with respect to environmental responsibility, accountability and the accounting for environmental impacts discussed above were not surprising and were common to most service-based organizations (e.g. Deegan 2003). Fortunately, guides and best practices, although limited in service-based organizations, are available. TUT has the potential to change its practices.

Restructure the Accounting System (General Ledger):

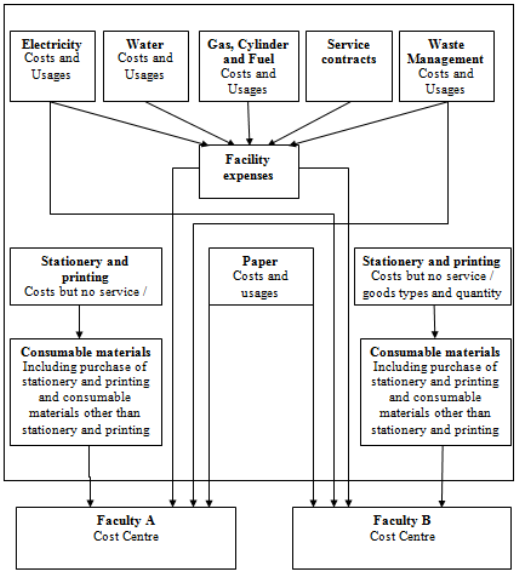
Interviewee responded by saying:

If the organization was passionate about this, they could design a process so the information was collected as the invoice came to hand…. If we need to report upon it, you can either report upon it as an ad-hoc process or design it as part of an ongoing process. As an ongoing, it's more efficient than ad-hoc (Respondent A).

Create Financial Incentives: At present there is a lack of responsibility-centred budgeting for major environmental costs because, except for Facility Management, these costs are not borne by any academic faculties, departments and even administrative and support divisions which in turn directly impacts improvement in environmental performance. The need to create incentives geared to promote environmental awareness and behavior change is evident. Two suggestions might help: *you could do it as an environmental accountability or straight out financial. You can give certain environmental targets, or you can express those targets financially, meaning you go about it if you build it in as a key performance indicator, and then you're going to get action. But you could probably do a lot of it through your financial incentives, even without necessarily introducing the notion of environmental impact. Like we were talking about before, handing back savings on utility costs would be one way, or on other office expenses that have an environmental impact, floor space, heating, paper, all that, hand it all back, any savings that are made (Respondent H).*

The ideas mentioned could be an effective solution for the excuse of budget constraint and could provide financial incentives to reduce resources used. However, the benefit could be achieved only by providing better information (actual or charged back costs for resources used) as suggested previously. Suggested changes to the financial system for achieving the benefits are shown in Figure 12.

Figure 12. TUT's Suggested Treatment of Major Environmental Costs In General Ledger



Based on interviews with the key players with different types of management roles within TUT the following three barriers were highlighted including: *Absence of Institutional Pressures; Low Profile of Accounting for Environmental Costs and Attitudes and Views of Key Players.*

It was previously acknowledged that the amounts that major environmental costs represent might not be significant enough to influence decision-making from a financial point-of-view. Nevertheless, it was also pointed out that views and attitudes might be changed if the implications of these costs are placed in the wider context of growing community environmental concern. The above quotations show that the benefits that EMA can deliver are still not well understood and as such EMA is not really an issue that captures the hearts and minds of both senior and middle management.

This section has presented the demographical data of respondents and demonstrated the extend to which TUT is responsive to environmental issues through the development of environmental policy, energy policy and water policy and a number of environmental procedures detailing the disposal of various types of waste. However while there seems to be a good number of environmental initiatives, the implementation of most of these initiative that started in 2005 has not fully been achieved. Furthermore generation, recording and use of physical environmental information for internal decision making is partial and monetary environmental information partially available for water, energy and paper but non-existent for majority of the elements of EMA. TUT need to restructure their accounting and ledger system to implement EMA. A roadblock towards the implementation of EMA at TUT includes the absence of institutional pressures, a low profile of accounting for environmental costs and negative attitudes of key players.

The next section presents the summary of the findings and conclusion of this mini-dissertation. It also provides direction for future research on EMA for Universities and other service organizations.

5. Conclusion

There is no doubt that universities as educators should provide environmental education. However, do they practice what they preach? The case-study demonstrated the potential for what is achievable at TUT but found that management accounting for environmental costs tends to be ignored especially when associated financial benefits are not readily visible and achievable in the short-term. This is not a problem unique to the organization investigated in this study and unfortunately appears common to many universities and service-based organizations. Other pressures or drivers would be required to assist in the debate for EMA as a means of managing environmental costs. Three barriers to the adoption of EMA within universities were identified institutional pressures, a low profile of accounting for the environment, and management's attitudes. Senior managers are not held personally accountable or responsible for environmental performance, which, as a result, discourages the discharge of environmental accountability. Although some institutional pressures are present they are limited and placed on people involved in the environmental function rather than those involved in the management accounting function. However, without accountants being involved in the process EMA is less likely to be adopted.

The majority of South African universities are directly funded by the government and accountable to government for their financial performance (in particular, that they do not incur large operating deficits). Unfortunately, the South African Government does not require much accountability for universities' environmental performances. This lack of accountability at the top-level flows through the various accounting systems within South African universities. Arguably, it is incumbent on government to address this issue. While some tentative conclusions can be drawn from this study it should be borne in mind that this is only a single case-study which limits how far generalisations can be made. Whilst the results are perhaps somewhat critical of TUT, anecdotal evidence suggests that other South African universities are also lacking in terms of establishing systems to manage their environmental costs and hence criticisms of TUT could equally be levelled at those other universities. Indeed, it is somewhat surprising that TUT, which in many other facets of environmental practice leads the way, has not led the way in this area too. However, key staff are ready to consider the issue, shown by the openness and transparency demonstrated in this research. In concluding, the results of the study highlight the potential use of EMA and its ability to improve environmental sustainability through enhanced accountability within universities. Let us wait and see which university takes the necessary lead.

Taken into cognizance the lack of institutional pressures, a low profile of accounting for the environment, and management's attitudes at TUT and Learning from experience, locally, internationally and through the case study participants (IFAC, 1998; Savage and Jasch, 2005) the management accountant of TUT should be involved in:

- Implementing the proposed general ledger model in Figure 12 to enhance the treatment and accounting for environmental impact and costs.
- Ensuring that its environmental strategy is fully integrated into the overall business strategy;
- Developing environmental performance measures, setting improvement targets and establishing monitoring procedures;

- Ensuring that environmental performance management systems are integrated into business management systems of TUT so that environmental impacts can be fully incorporated into business decision-making;
- Incorporating environmental considerations into capital budgeting decisions and selection of capital equipment;
- Identifying and calculating any environmental contingent liabilities;
- Identifying and estimating costs caused by the organization's activities which have to be met by others – eg the organization pours chemicals down the drain and pollutes the water;
- Producing and analyzing environmental management information. By making environmental costs more visible, managers can be made accountable for the environmental costs that they generate and environmental performance can be incorporated into management incentives;
- Identifying internal energy or water costs and allocating these to products and processes for example, rather than treating electricity as an overhead, rather ensure that there is adequate metering to enable electricity be treated as a direct cost for each department;
- Sponsoring environmental consciousness and EMA in all employees through training and communication;
- Involve employees in environmental activities.

Future research will benefit from evaluating the implementation of the model in Figure 12 and recommended action plan in Table 1 towards environmental management accounting at Universities. Investigating the role of government in promoting EMA at Universities will enhance the institutional pressures needed to support environmental responsibility and accountability by universities, increase its profile and enhance management attitudes. Another area for future research emanating from this study is the investigation of sustainability reporting by Universities. Future research will also benefit by extending this study to other South African Universities and identifying the cost savings generated from implementing EMA.

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