Can organizations meet their environment and social reporting obligations even in a financial crisis? Towards an effective sustainability management accounting system

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Keywords-component; activity based costing (ABC), environmental management accounting (EMA), social management accounting (SMA), sustainability management accounting system (SMAS), environmental cost, social cost.

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Abstract

To achieve sustainable development, organizations need to disclose three areas of performance - economic, social, and environment - to support stakeholders' interests as well as improving internal managament decisons. This results in environemntal and social cost information that needs to be incorporated in disclouses in the form of a triple bottom line. However, as these costs have been treated as overhead by traditional accounting such activity based costing (ABC) approach, this results in cost information inaccuracies when preparing environmental and social performance disclosures. To overcome some of these dificiencies in current systems, this study develops a conceptual model for a Sustainability Management Accounting System (SMAS) to improve the identification and measurement of environmental and social impact costs. A SMAS also provides companies with a way to improve cost allocation and analysis effecency thus creating more accurate cost accounting data and meeting their reporting obligations even in hard times. The paper describes preliminary analysis undertaken to date. It would appear that most firms are focussing on reporting externally their social performance more than environmental indicators.

Keywords-component: activity based costing (ABC), environmental management accounting (EMA), social management accounting (SMA), sustainability management accounting system (SMAS), global financial crisis (GFC), environmental cost, and social cost.

1. INTRODUCTION

Nowadays, sustainable development reporting incorporating economic, social, and environmental performance is of significant concern to companies' stakeholders (Berkel 2003). Companies are required to disclose financial reporting in the form of a triple bottom line while incorporating environmental and social costs to not only support interests of stakeholders but also to enhance internal management decisions on these costs. The need of organizations is to provide more accurately cost accounting data of environment (Gadenne & Zaman 2002) and social impacts (Gray 2002) in order to more accurately prepare companies' disclosures. As a result, environmental costs need to be captured from both internal and external organizations while social expenditures need to be considered to collect as social costs. This facilitates companies becoming more environmentally and socially aware organizations while adding value to sustainable organizations to ensure corporate sustainability is achieved in the eye of stakeholders and marketplaces (Gale 2006; Jacob 1994; Sikdar 2007). In addition, as the global financial crisis (GFC) has made it harder for organizations to act responsible in their reporting disclosures, companies could face difficulties in improving their financial/economic performance. Thus, what is required is a system that is efficient and effective in data capture and reporting to not add more financial burden during the recovery phase from the GFC.

However, as traditional management accounting has collected environmental and social impact costs as overheads, this has resulted in these costs being hidden among productions and services processes (IFAC 2005; UNDSD 2001). In addition, social costs have been ignored as a measure to support working performance and develop living standard of employees, as they cause increases in total product costs (Hazilla & Kopp 1990). This creates inaccuracy in cost accounting data for environment and social impacts when incorporated in sustainable development reporting (Berkel 2003; Gadenne & Zaman 2002; Gray 2006). Companies are not

able to support stakeholders' interests based on imprecise environmental and social performance disclosures. Apart from that, a holistic system for sustainability accounting has not been widely adopted by companies as a way of ensuring their sustainability (Gadenne & Zaman 2002; Spence 2009). An effective management accounting system to capture environmental and social impact costs is needed by organizations to enhance cost measurement and identification. This could help companies to more accurately fully cost environment and social impacts to support sustainable development reporting (Gray 2006; Gray et al. 2001). In the aftermarth of the GFC, any system that reduces costs of reporting is welcomed by organizations.

Hence, this study identifies the development of a conceptual model for a Sustainability Management Accounting System (SMAS) as an effective management accounting tool for sustainable organizations. A developed SMAS aims to capture more accurate cost accounting data of environment and social impacts. Environmental management accounting (EMA) and social management accounting (SMA) concepts and practices are integrated to help in cost identification and measurement. To improve accuracy of cost accounting data, an activity based costing (ABC) approach is expanded to help in the cost allocation and analysis using cost drivers or cost centers before assigning cost information to an appropriate production activity. As a result, a SMAS conceptual model provides companies with a way to effectively measure and identify environmental and social impact costs while creating cost accounting data to support sustainable development disclosures and for enhancement of internal management decisions. Companies successfully create better relationships with their stakeholders by providing disclosures through triple bottom line and/or corporate social responsibility (CSR) reporting to support their demands. This assists companies to add value as sustainable organizations thus ensuring corporate sustainability in the eyes of stakeholders and marketplaces (Berkel 2003; Gadenne & Zaman 2002). Relevant literature is provided in the

following section to support environmental and social cost identification and measurement while identifying key terms to inform the development of a SMAS.

2. RELEVANT LITURATURE

Companies see the need to create more accurate environmental and social cost information to support sustainable development reporting, which helps create better relationships with their stakeholders (Berkel 2003). Environmental and social costs therefore need to be prepared more precisely when used for disclosures (Berkel 2003; Carbon Trust 2005; Gadenne & Zaman 2002; Hubbard 2009). This can help reduce stakeholders' pressures on the development of economic, social, and environmental performance. This study fuses three theories - deep ecology theory, Marx's labour theory of value, and stakeholder theory - to examine companies' ethical and moral obligations to provide information (Donaldson & Preston 1995; Drengson & Inoue 1995; Shaw 2009; Yee et al. 2008) of environment and social impacts.

2.1 Theoretical perspectives

Deep ecology theory is applied in the theoretical design of SMAS using shallow ecology to explain ethical and moral responsibilities of companies to measure environmental costs and to manage uses of resources, energy, and water (Devall & Sessions 1985; Jacob 1994). Meanwhile, deep ecology helps explain why measuring reductions of emissions and wastes would help to reduce negative impacts on the environment and society (Jacob 1994). Deep ecology theory was developed by Naess in 1973 to explain improvement in qualities of humans and the environment by reducing environmental pollution and avoiding extractions of natural resources (Devall & Sessions 1985; Drengson & Inoue 1995). Naess was also trying to deeply question how best ecological patterns need to be maintained in order to improve human lives, environment, and natural systems (Devall & Sessions 1985). In addition, the theory also indicates that the movement of shallow and deep ecological management

approaches seek answers to questions as to whethee ethical and moral actions are the result of taking responsibilities to reduce negative impacts on society and the environment (Barrow 1999; Drengson & Inoue 1995). Thus, by applying deep ecology theory, it helps to examine the identification of environmental cost information when providing environmental performance disclosures to support stakeholders' concerns. However, deep ecology appears to have not been used before to examine the identification of social issues (Jacob 1994). This research also uses Marx's labour theory of value to explain measurement of social impact costs.

Marx's labour theory of value helps explain measurement of social impact costs while creating surplus value or maximizing profits in selling large quantities of products in markets (Jasch & Stasiškienė 2005). Karl Marx developed a concept of surplus-value(s) to explain a company's interest in measuring costs of production processes while producing large quantities to support high consumers' consumptions in markets (Little 1986). To realize the surplus-value contained in products (under capitalism), the products must be sold in the market at a price reflecting the labour time of average (in terms of efficiency) producers (Marx 1976, 1978, 1981). Therefore, both workers and capitalist business owners are concerned with efficient production, training and skilling of the workforce, and selling products demanded by consumers (Marx 1976, 1978, 1981). Otherwise the surplus-value produced in the factory by workers cannot be realized, and even part or all of the original capital invested in production maybe wasted (Marx 1981; Yee et al. 2008). Thus, by employing Marx' s labour theory of value it helps explain measurement of social impact costs while creating surplus value or maximizing profits in selling large quantities of products in markets (Jasch & Stasiškienė 2005). Companies also need to provide cost information for social internal decision making and stakeholders' concerns. In doing so, stakeholder theory is employed to examine collecting more cost information for both environmental and social impacts.

Stakeholder theory helps in the identification of a company's stakeholders and explains the ethical and moral obligations of management to consider the interests of these stakeholders (Freeman 1984; Freeman & Reed 1983). This research applies stakeholder theory to explain associating disclosure with economic and social performance by combing three dimensions – stakeholder power, strategic posture, and economic performance (Ullmann 1985). Thus, in the design of SMAS, stakeholder theory helps determine key concerns and objectives of stakeholders while explaining ethical and moral obligations in measuring environmental and social costs. These concerns are translated into measures, which in turn will be incorporated as system characteristics for data inputs required for reporting and internal decision making. This can create more accurate cost information supporting environment and social internal decision making and external disclosures. However, as there is considerable disagreement in the literature on definitions, this study reviewed relevant literature of terminologies used to support the focus of the study in order to define key terms of accounting and its expanding roles for a developed SMAS.

Consequently, in the designed SMAS, these fused theories help in creating more accurate cost information for internal management decisions thus fully costing products and/or services. Companies can also prepare financial disclosures to create better relationships with their stakeholders when disclosing through the form of a triple bottom line and/or corporate social responsibility (CSR). However, there is some confusion in the literature on definitions in relation to terminologies used to support the focus of the study. This paper therefore provides relevant literature to define key terms of accounting and its expanding roles for a developed SMAS.

2.2 Accounting and its expanding roles

2.2.1 Activity based costing (ABC)

Traditional management accounting has been widely used to measure cost of inputs (materials and labour) while treating all other costs as overheads. It usually adopts activity based costing (ABC) to help in cost allocation and analysis. For environmental costs, management accounting has historically treated these as overheads (Hill, McAulay & Wilkinson 2006) using the activity based costing (ABC) approach for cost allocation based on cost drivers. ABC has not (to date) separately identified the costs associated with environmental and social impacts recognizing these costs as overhead costs. Thus they are hidden among other production and service processes (IFAC 2005; Milne 1996; UNDSD 2001). Companies are now having difficulties in measuring (for example) reductions and control of environmental costs and contaminants (Bose 2006; Gale 2006; IFAC 2005; Pramanik, Shil & Das 2007; Qian & Burritt 2007; UNDSD 2001). As a result, companies are not able to successfully fully cost products and services for setting correct prices (Englund & Gerdin 2008; Lamberton 2005; The Sigma Project 2003). Thus, extending the application of the ABC approach to separately identify environmental and social impact costs from overheads before allocating to individual product costs is appropriate for this study (Cãpusneanu 2008; IFAC 2005; Sendroiu et al. 2006). This can create more accurate cost information to support internal decision-making and flow on to external reporting and disclosures as they then incorporate sustainability accounting concept.

2.2.2 Sustainability accounting (SA)

Sustainability accounting is a new approach to accounting and reporting to facilitate companies' developments in three dimensions – economic, social, and environment (Ball 2002; Milne 1996). Sustainability accounting has recently supported disclosures using a triple bottom line report in order to improve internal decision making and to inform stakeholders

(Ball 2002; Bennett, Bouma & Wolteres 2002; Taplin, Bent & Aeron-Thomas 2006). A number of current studies, (e.g. (Lamberton 2005; Schaltegger & Wagner 2006; Taplin, Bent & Aeron-Thomas 2006), have examined sustainability accounting in terms of physical and monetary measurement to improve financial management. Nonetheless, Gray (2006) pointed out that sustainability accounting should incorporate improvements in social and environmental reporting as external disclosures in order to create shareholder value for sustainable organizations. Furthermore, sustainability accounting provides a company with measurement of all costs so full cost accounting is implemented to support internal and external disclosures through sustainability reporting and corporate social responsibility (CSR) reporting (ICAEW 2004; Lamberton 2005; The Sigma Project 2003). As a consequence, the sustainability accounting concept is appropriate for this study to support a developed SMAS, as it is concerned with environmental and social cost measurement for disclosures of environmental and social performance. In a design of SMAS, sustainability accounting involving environmental accounting (EA) and social accounting (SA) concepts is considered using environmental management accounting and social management accounting to support the theoretical framework of a SMAS.

2.2.3 Environmental management accounting (EMA)

Environmental management accounting (EMA) is a subset of environmental accounting (EA) that is used to provide environmental costs information to support internal decision making (IFAC 2005; Bent and Richardsen 2003` cited in Pittman & Wilhelm 2007; The Sigma Project 2003). As environmental accounting helps in evaluating internal and external costs of the environment while providing environmental disclosures for management decision, EMA is employed for cost identification and measurement (UNDSD 2001). By UNDSD (2001), it was mentioned that EMA aims to reduce negative impacts on the environment while improving material efficiency (thus adding value to an organization).

EMA is mainly measured in both physical units such as materials, energy, water and wastes, and monetary units such as environmental costs, earning and savings (UNDSD 2001). However, environmental management accounting practices were uncovered by Gadenne and Zaman (2002) in Australian companies as well as accountants' perceptions in providing EMA information for reporting purposes. Claims were made by Gadenne and Zaman (2002) that Australian companies appeared to develop business strategies to meet the requiements of socially and envirnemntally sensitive organizations. However, they identified the need for envirnemntal costs recording using ABC to be intergrated in financial reports as well as a need to develop appropriate EMA systems (Gadenne & Zaman 2002). In discovering the relationships between environmental performance and economic performance of an electricity company in the United States, Burnett and Hansen (2008) found that decreasing pollution enabled the company to create eco-efficiency. Furthermore, they found that it is better if the implementation of environmental accounting included an environmental management accounting systems (Burnett & Hansen 2008). This enables companies to measure environmental costs from unit inputs (raw materials, energy, and water) as well as non-product outputs (wastes and emissions) (Gale 2006), while evaluating reductions of these costs and contaminants (IFAC 2005).

Thus, by employing EMA concepts and practices, companies can identify and measure environment costs and allocate to the individual product costs while providing more accurate information on these costs (Burritt, Herzig & Tadeo 2009). Companies can also improve environmental performance (UNDSD 2001) while promoting themselves as environmentally aware organizations (Burritt, Herzig & Tadeo 2009). Essentially, environmental cost information is able to support business decision making in managing resources by recording the use and flows in physical (resources, energy, and water) and monetary (financial, cost savings, and earnings) units (Burritt, Herzig & Tadeo 2009). This study therefore considered

environmental management accounting (EMA) concepts and practices as appropriate for the development of a SMAS conceptual model. EMA is applied to identify costs of environmental impacts, use and flows of resources, energy, and water as well as to measure reductions of contaminants. EMA records environmental costs information more accurately to support disclosure of environmental performance but currently does not cover social issues (IFAC 2005), which is a key contribution of this study. Therefore the study integrates social management accounting (part of social accounting approach) into the development of a SMAS. This may assist companies to become more involved in sustainability management accounting (Jasch & Stasiškienė 2005).

2.2.4 Social management accounting (SMA)

Social management accounting (SMA) facilitates companies' recording and measurement of social costs for internal decision making and supports disclosures of social performance, which is a subset of social accounting (SA). Social accounting has been introduced to organizations concerned with improvements in negative impacts on society, humanity, and (to some extent) the environment thus creating cost information to support corporate social responsibility reporting (CSR) (Cullen & Whelan 2006; Richmond, Mook & Quarter 2003). In relation to this, social management accounting provides companies with a way to measure cost accounting data of social impacts to enhance social internal decision-making as well as preparing costs for social performance disclosures. Companies disclose social performance of organizations while providing more accurate cost information on significant concerns to stakeholders (Gray 2002; Gray et al. 2001). However, social costs have not been measured much because they are sometimes recorded as a company's overheads or other expenditures rather than as costs of products (Hazilla & Kopp 1990) if at all. Social costs have historically been ignored by traditional management accounting (using ABC to identify and allocate to product costs). This has resulted in companies not using social accounting to improve their

social performance (Mobley 1970). Thus, disclosers on social performance in the form of corporate social responsibility (CSR) reports have become more complex as costs of social impacts have recently been captured (Tinker, Lehman & Neimark 1991).

Pyatt and Roe (1977) developed a social accounting matrix (SAM) framework to improve the whole area of wage rates in Sri Lanka, they found that employing SAM to improve qualities of life of employees and labourers in Sri Lanka was successful as a new way to develop economic performance. However, SAM did not include development of social performance (Quarter & Richmond 2001). Consequently, western organizations have disagreed on the ability of social accounting to reduce social impacts to support stakeholders' concerns (Tinker & Gray 2003). In addition, social accounting has not been successfully employed by companies as it is seen purely as raising production costs, particularly in the GFC environment. Thus a new conceptual model or framework for accounting for social costs is needed (Mook, Richmond & Quarter 2003), this is not seen as a cost but rather adds value as firms recover from the GFC. The proposed SMAS conceptual model therefore should integrate economic and social performances to add value to enhance sustainability of organizations (Mook, Richmond & Quarter 2003). Apart from that, due to increased concerns of stakeholders, companies are being pushed to improve qualities of society, humans, employees, and the environment by measuring social costs in order to support disclosure of social performance (Geibler et al. 2006). In doing so, companies can create better 'green' and 'social' qualities of products and services while gaining greater benefits from higher economic performance in the long-term (Sendroiu et al. 2006). This also improves social internal decision making (Borga et al. 2009; Jasch & Stasiškienė 2005). Spence (2009) also suggested that further study should be undertaken in social accounting to consider incorporating social impacts of organizations to add value to their social and economic performance. Combining environmental and social issues could go a long way to improving accounting's approach to

these concerns (Gray 2002). If social accounting could be developed and incorporated into an accounting framework or model, it could assist companies to become more socially and environmentally aware organizations (Gray 2002).

As a consequence, social management accounting (SMA) should be applied in measuring social impact costs which are related to improvements for society, employees, humanity, and the environment. This would provide companies with a way to create more accurately cost information to support internal decision-making and disclosures of social performance. Companies could also become more socially and environmentally aware organizations while creating positive reputations as 'green and socially responsible producers' in the eyes of stakeholders and market places. As a result, environmental management accounting, social management accounting, and activity based costing concepts and approaches become key motivators for this study while underpinning the theoretical framework of a Sustainability Management Accounting System (SMAS) (**Figure 1)**.

2.3 Gaps in the literature

As an activity based costing (ABC) approach appears in traditional management accounting has recognized **environmental costs** as overheads (in the main), this results in companies having difficulty in measuring environmental cost information from both internal and external organization sources (Beer & Friend 2005; Bose 2006; Gale 2006; IFAC 2005; Qian & Burritt 2007; UNDSD 2001). Thus, **ABC** needs to be further developed (within the proposed conceptual model) in order to more accurately analyze cost (and quantity) information on the environment before allocating to a single production activity (Gadenne & Zaman 2002; Hubbard 2009; Nachtmann & Al-Rifai 2004). Although, environmental management accounting is an appropriate accounting tool designed for environmental costs management (Burnett & Hansen 2008; Burritt & Saka 2006; Sendroiu et al. 2006), it rarely incorporates **social impact costs** which are becoming significant concerns for stakeholders and the public

(IFAC 2005). This results in social costs being ignored but if measured could significantly cause increases in production costs (Hazilla & Kopp 1990; Mook, Richmond & Quarter 2003) while possibly identifing benefits in the form of added social value. In addition, based on the literature review, it is purported that there was no complete holistic model identified that contained the necessary characteristics of the proposed SMAS.

To fill these gaps, this study proposes to develop a conceptual model for a Sustainability Management Accounting System (SMAS) into a holistic system combining **environmental management accounting (EMA) and social management accounting (SMA)** to help in the identification and measurement of environmental and social impact costs. SMAS will also apply an **activity based costing (ABC)** approach to help cost analysis and allocation or cost drivers, as suggested by previous studies (Gadenne & Zaman 2002; Hubbard 2009; Nachtmann & Al-Rifai 2004; Sendroiu et al. 2006; Snoo 2006). As these concepts are not widely explored in the literature, particularly in relation to social performance, an integration of EMA and SMA within a SMAS could fill part of the gap to help in cost identification and measurement. In the meantime, applying activity based costing (ABC) concepts in relation to allocating cost of environmental and social costs to a single product has not been completely successful. Additionally, **environmental costs** need to be separately identified and allocated to individual costs of products in order to expose them rather than being concealed in overheads while measuring reductions of these costs and contaminants (benefits). Meanwhile, **social impact costs** need to be measured in order to develop social performance reporting addressing significant concerns of companies' stakeholders. Companies are now seeking appropriate accounting approaches and systems to relate existing financial reports to **triple bottom line reporting** to more accurately and fully disclose social and environment performance to interested stakeholders.

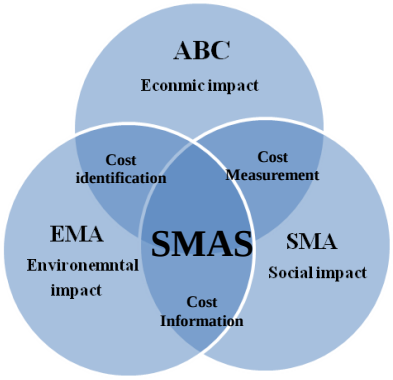

Figure 1. Accounting concepts underlying the Sustainability Management Accounting System (SMAS)

3. RESEARCH DESIGN

3.1 Research questions and propositions

One main research question was posed to fill the key gaps identified from the literature that aimed at investigating system characteristics within companies that could be employed for environmental and social identification and measurement. Without a holistic system this is difficult to accomplish. In order to be able to conceptualize an information system, system characteristics need to be identified and evaluated so that the most appropriate characteristics can be built into a SMAS. This would give more realistic costs on which to support disclosures as the costs of products or services could be more fully captured. To develop the conceptual model for a SMAS, it is necessary to enunciate the systems characteristics required that meet the informational needs of sustainable organizations drawing on best environmental and social management practices while being consistent with accounting concepts. Thus the main research question solicits these system characteristics for a SMAS.

RQ1: *What system characteristics could companies employ in their sustainability management accounting systems to meet the needs of EMA and SMA practices while adding sustainable value to organization?*

This study seeks to identify a set of system characteristics that could separately identify costs of environment (rather than as overheads) while measuring reductions of these costs and contaminants (IFAC 2005; Snoo 2006). Also the system characteristics identified could measure social impact costs as separately identifiable expenditures of organizations (Hazilla & Kopp 1990) to capture full costs of products and provide cost information for companies' disclosures (Bebbington et al. 2001). These characteristic capture data on metrics that are identified as environmental and social management accounting best practices. In order to arrive at the set of best practice characteristics, research sub questions need to be answered as follow.

SR1: *To what extent do current accounting systems capture environmental costs to support environmental disclosures for enhancement of internal management decisions?*

SR2: *How are companies intending to change their accounting systems to meet environment and social performance disclosure needs that will support future reporting requirements?*

SR3: *To what extent is world best practice in environment and social accounting systems and reporting being adopted by manufacturing companies in Australia?*

Answers to these research sub questions solicit current and future practices as to the characteristics of an information system and whether Australian manufacturing companies have adopted world's best practice. This study posed four propositions that focus on appropriateness of, and improvements in, employing systems characteristics solicited and comparing these characteristics with Australian and overseas firms that have adopted best practice.

P1: *Best practice companies identify costs of environment and social impacts as well as measure reductions of contaminants to reduce negative impacts on humans, society, employees and the environment.*

P2: *Best practice companies more accurately provide environmental and social costs information for external reporting disclosures to support stakeholders' demands and management decisions.*

Best practice companies employ system characteristics of sustainability accounting concepts to separately identify environmental costs from overhead expenditures before allocating to a single product. In doing so, companies are able to measure reductions in these costs as well as resources, wastes, solids, and emissions in physical and monetary units. Also, social costs are measured and controlled to reduce negative impacts on society, employees, and the environment. Best practices companies are able to provide more accurate cost information to enhance environment and social internal decision-making and to create more precise external reporting. In addition, companies are enabled to meet their reporting obligations of energy consumptions and emission abatement under National Greenhouse and Energy Reporting (NGER) requirements and Global Reporting Initiative (GRI).

P3: *A SMAS provides best practice companies with an enhanced environmental and social costs management system to create sustainable development reporting for internal management decisions while adding corporate sustainability in the eye of stakeholders.*

P4: *A SMAS provides best practice companies with a mechanism to add value in economic, social, and environment areas of performance.*

As a consequence, system characteristics of best practice companies were employed to support the development of a sustainability management accounting system (SMAS) conceptual model. A SMAS could provide companies with an accounting system to continue improvements in environmental and social cost identification and measurement. By having a SMAS, companies are more concerned about reducing negative impacts on the environment and society when reporting their progress in using less energy and emissions abatement. Companies are now able to provide triple bottom line reporting when disclosing the development of economic, social, and environmental performance to add value as sustainable organizations. In the following section, the theoretical framework developed to underpin this investigation is described as the starting point of a SMAS conceptual model.

3.2 Theoretical framework

The study sought to identify appropriate system characteristics of sustainability accounting that could be employed by companies from different parts of the manufacturing sector. Thus, **Figure 2** consolidates the appropriate literature into an integrated theoretical framework as the starting point for this study. **Firstly,** Australian manufacturing companies could employ system characteristics of sustainability accounting concepts to identify and measure environmental costs from physical inputs (quantities) such as resource extractions, energy, fuels, oils, and/or chemical (upstream) and those arising as non-product outputs such as wastes, solids, and emissions (downstream) (Gale 2006; IFAC 2005; Qian & Burritt 2007; UNDSD 2001). Companies could also measure social costs from product responsibilities and improvements in society, humans, and employees which may cause increases in total costs of products (Gray 2006; Jasch & Stasiškienė 2005; Mook, Richmond & Quarter 2003; Pittman & Wilhelm 2007). In doing so, cost information of environmental and social impacts could be used to successfully support sustainable development reporting while disclosing environmental and social performance of organizations (Berkel 2003; Gadenne & Zaman 2002; Hubbard 2009; Lamberton 2005; Richmond, Mook & Quarter 2003). At this stage of the study, system characteristics will be identified from concepts in environmental management accounting (EMA) and social management accounting (SMA) that are currently used or to be used. The most appropriate system characteristics of sustainability accounting will be drawn from best management accounting practices identified by this study to be utilized in the conceptual model of a SMAS.

Secondly, best practice companies identifying and measuring costs of environment and social impacts from internal and external (supplies and customers) organizations provide cost accounting data to support financial disclosures (Bartolomeo et al. 2000; Burritt & Saka 2006; IFAC 2005; Sendroiu et al. 2006), as required by environmental management accounting

(EMA) concepts (IFAC 2005; UNDSD 2001). *Deep ecology* will be employed to examine the full extent of measuring reductions in physical inputs (materials, energy, and water) to possibly reduce production costs and contaminants (emissions and wastes) (Barrow 1999). Meanwhile, to measure social costs, companies can identify expenditures for the development of social performance in relation to the quality of employees, society, and green environment (Mook, Richmond & Quarter 2003; Richmond, Mook & Quarter 2003). Based on social management accounting (SMA) concepts, companies can capture costs of social impacts to support disclosures using SMAS rather than being buried in overheads (Gray 2006; Gray et al. 2001). *Marx's labour theory of value* will be applied to help identify costs relating to improvements in skills, knowledge, and qualities of employees while maximizing profits from higher consumption (Marx 1874 cited in Keen 2001; Little 1986; Marx 1978). This could help companies to create higher profits when products are sold in larger volumes in marketplaces (Jasch & Stasiškienė 2005). As a consequence, companies collect environmental and social impact costs to fully cost products while allocating to appropriate production activities or to incorporate these costs in individual products or cost centers (activities) by expanding activity based costing (ABC) (Neumann et al. 2004).

An expanded ABC could help in the development of cost analysis and allocation while more accurately creating information to measure production costs of activities as well as reductions in contaminants and control costs (Armstrong 2006; Cãpusneanu 2008; Northrup 2004; Sendroiu et al. 2006). Companies can then employ cost information of environmental and social impact to enhance management decisions while providing disclosures to support stakeholders' demands (Nachtmann & Al-Rifai 2004). *Stakeholder theory* is applied in the framework to examine ethical and moral obligations to provide cost accounting data to disclose environmental and social performance in order to add value to sustainable organizations in the eyes of stakeholders (Freeman 1984; Freeman & Reed 1983). In doing

so, a SMAS could track and report timing of impacts that are related to movements in stocks and flows of products/services to disclose costs and benefits of operational performance of organizations. SMAS could effectively manage timing impacts in changing value of stocks and flows of materials in production processes (The Sigma Project 2003) that may have significant impacts on costs and benefits tracked from external impacts on the economy, society, and the environment (The Sigma Project 2003).Thus, the measurement of environmental and social costs need to be more accurate when providing cost information to support financial reports and disclosure of environment and social performance (IFAC 2005; The Sigma Project 2003; UNDSD 2001).

Finally, the SMAS theoretical framework provides companies with a way to disclose these three areas of performance through integrated triple bottom line reporting to stakeholders and the public (Borga et al. 2009; Schaltegger & Wagner 2006; Sikdar 2007). By incorporating three fused theories in the theoretical framework, it supports a SMAS conceptual model to fully collect direct costs from materials and labour and indirect costs of overheads as well as social and environmental costs (Bebbington et al. 2001; ICAEW 2004; Lamberton 2005). This meets the requirement of sustainability accounting concepts and practices for the enhancement of management decisions as well as environmental and social disclosures (Goodland 2002; Gray 2006; Jasch & Stasiškienė 2005). Companies could create sustainable value chains by managing the three areas of economic, social, and environmental performance (Ball 2004; Berkel 2003; Lamberton 2005; Taplin, Bent & Aeron-Thomas 2006; Wahaab 2003). Figure 2 illustrates the theoretical framework that is the starting point for the development of a sustainability management accounting conceptual model.

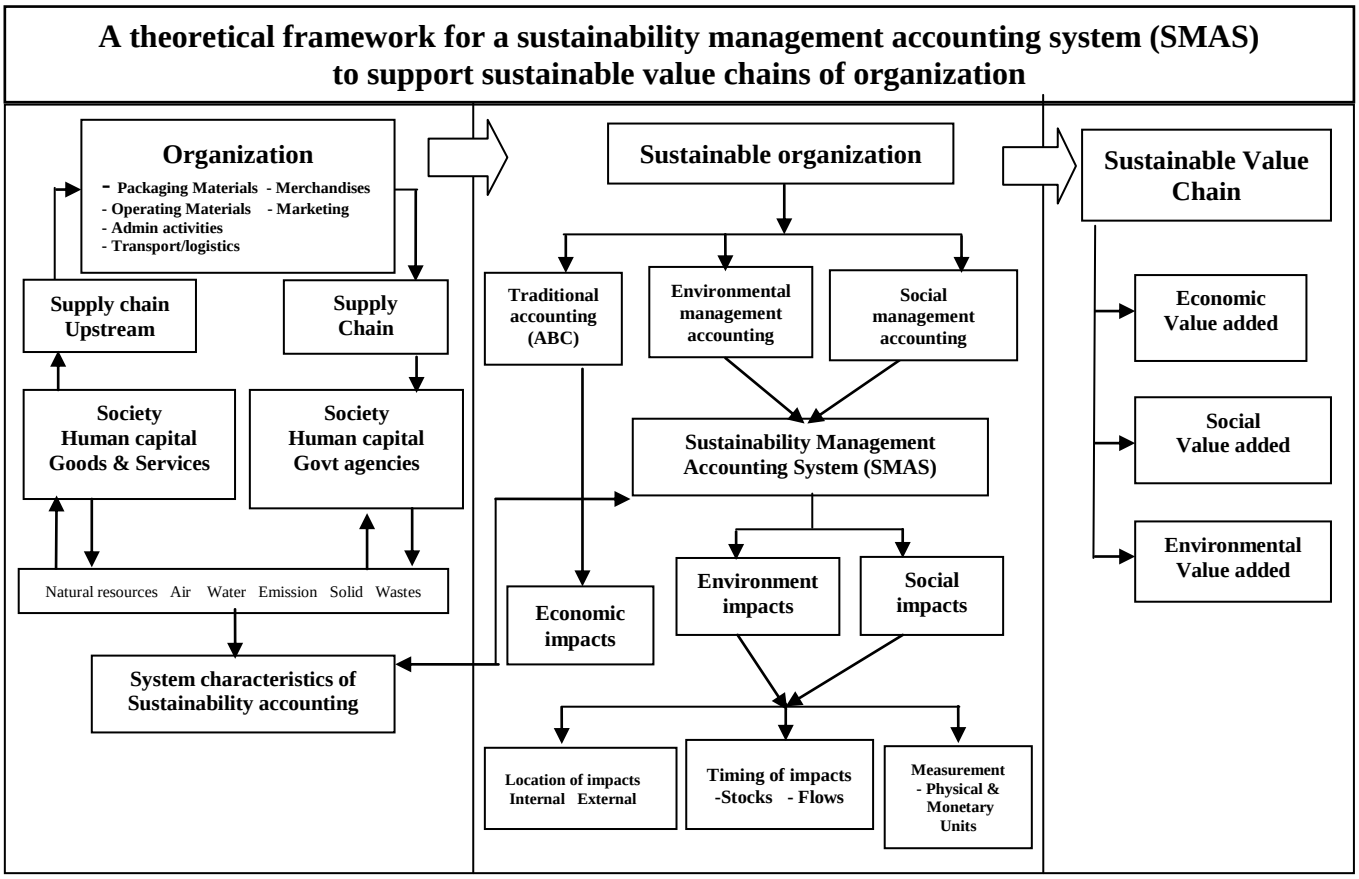

Figure 2: Theoretical framework for SMAS

4. RESEARCH METHODOLOGY

4.1 Approach

This study applies mixed methods combining quantitative and qualitative approaches to collect and analyze data using triangulation for credibility, thus avoiding social bias and building stronger results (Creswell 2009; Gorard 2004; Neuman 2006). As an exploratory study, this study employs a quantitative survey to identify system characteristics of sustainability accounting that are used and are intended to be employed by companies for social and environmental cost measurement. The results of the survey are used to compare with an analysis of management accounting best practice using qualitative methods.

Meanwhile, a qualitative approach (case studies) are used to investigate management accounting practices and system characteristics of companies from different parts of the manufacturing sector identified (from the survey) as adopting best practice.

4.2 Sample and data collection

To select a sample group, this study employed simple random sampling to select 1,000 Australian manufacturing companies from five sub-sectors (two-hundred from each sub-sector) including paper and furniture products, machinery and equipment, constructions, automobile and metal products, and mining and chemical industries (PricewaterHouseCoopers 2009) to be surveyed. Meanwhile, the company studies were selected by utilizing a purposive sampling method. Thus, manufacturing companies that apply management accounting best practice to measure costs of environment and social impacts as well as evaluate reductions of these costs and impacts were targeted. The purposive sampling method assisted this study to select appropriate cases for investigation to gain a fuller understanding of best practices used among sectoral groups (Neuman 2006; Patton 1990; Yin 2009). Management accountants dealing with environmental and social issues were appropriately targeted for data collection.

4.3 Data collection

Quantitative research methods were employed to survey 1,000 Australian manufacturing companies. A set of questions was provided using environmental and social performance indicators from Sustainability Reporting Guidelines by GRI (2006) to investigate what characteristics of sustainability accounting systems are used by organizations for environmental and social cost measurement and identification. Chief accountants, controllers, chief financial officers, and management accountants dealing with environmental issues (Gadenne & Zaman 2002) were requested to complete a survey questionnaire. The questionnaires solicited current practices and system characteristics which are being employed as well as respondents' attitudes, opinions, and points of views as to what system

characteristics should be incorporated into a SMAS for a manufacturing company and their future intentions to incorporate characteristics into their systems. Following the survey, qualitative data was gathered from fifteen companies from the same sub-sectors used for the survey using interviews of management accountants to gain a richer understanding of environmental and social cost measurement and identification.

5. PRELIMINARY DATA ANALYSIS

Based on a small sample from respondents this section describes some preliminary analysis of quantitative data received to date of writing this paper. The responses to sub-questions, SR1, SR2, and SR3, were analyzed using cluster analysis. Hierarchical cluster analysis (Hair et al. 1998; Manning & Munro 2007) was used to identify how often data was collected and reported while determining each observation belonging to each frequency group (not at all, monthly, quarterly, half yearly, and yearly). Then agglomerative methods of hierarchical cluster were employed to agglomerate all objects into individual clusters while minimizing similarities (final cluster) using the maximum distance of the complete linkage approach (Hair et al. 1998). Each object (environmental and social performance indicators) fell into its own cluster based on frequency depending on the nature of responses. The results of preliminary data analysis are interpreted below.

Table 1: Overall index of measurement indicators of environmental and social performance reporting

Overall index of measurement indicators			
Rank (%)	**CI** (%)	**CE** (%)	**FI** (%)
Max 100			
51-60			
41-50			20
31-40			
21-30	20	20	40
11-20	20		
1-10	40	40	40
No reporting	20	40	
	100%	**100%**	**100%**

***CI = Current practice – internal reporting, CE= Current practice – external reporting, FI = Future intentions**

Overall non-financial performances reporting for both current and in the future are summarized by the index of measurement indicators. Based on the indicator measures used in the survey, the maximum reportability index is 100% at which level a company reports on all indicators adopted by this study from the literature and Australian/international standards. Analysis shows that companies are at the lower end of scales currently but do significantly intend to measure costs of environment and social impacts in the future (Table1). Current reporting practices by companies appear to be biased towards reporting internally with less emphasis on external reporting (Gadenne & Zaman 2002; Gale 2006; IFAC 2005). Thus changing to a holistic accounting system that could support future intentions may help companies to more accurately report information on environment and social impacts to support environmental and social performance disclosures (Gadenne & Zaman 2002; Gray et al. 2001) while not substantially increasing reporting costs.

To analyze if there are any differences between environment and social measure being reported, the sample was further disaggregated into these two components. The environment indicators index shows that there are higher levels of reporting by some firms both internally and externally but a significant percentage do not report currently. This can tentatively be interpreted as companies showing concern about identifying and measuring environmental costs to support disclosures while having difficulties in capturing these costs, as they are hidden among production processes (IFAC 2005; UNDSD 2001). All firms indicated that they will report in the future (Table 2). Companies will therefore need to change their accounting systems in order to capture more accurate cost information to more precisely prepare financial disclosures (Berkel 2003; Gadenne & Zaman 2002). By changing accounting systems, firms could more efficiently evaluate reductions in environmental costs of contaminant such as wastes, emissions, and/or waste disposal thus reducing negative impacts on the environment and society (Burnett & Hansen 2008; Gale 2006).

Table 2: Environment measurement indicators index

Environment indicators index			
Rank	**CI** (%)	**CE** (%)	**FI** (%)
Max 100			
51-60			20
41-50			40
31-40	20	40	20
21-30	20		
11-20			
1-10			20
No reporting	60	60	
	100%	**100%**	**100%**

***CI = Current practice – internal reporting, CE= Current practice – external reporting, and FI = Future intentions**

Social indicators index reported by Australian manufacturing companies are measured social costs and impacts of doing business (Table 3). Companies currently measure costs of social impacts and report internally at a higher level than environment impacts with only 20 % not reporting any measures currently and all reporting externally. This tentatively can be interpreted as manufacturing companies are significantly concerned about measuring social costs to create more precise social performance disclosures (Gray 2001, 2006). For future intentions, companies wish to capture social costs to support social disclosers indicated by their responses that they place a higher priority over environmental measures. Again, companies need to change their accounting system for social cost measurement in order to efficiently capture these costs to support social disclosures (Gray 2006; Richmond, Mook & Quarter 2003).

Table 3: Social measurement indicators index

Social indicators index			
Rank	**CI** (%)	**CE** (%)	**FI** (%)
Max 100			
51-60			20
41-50			
31-40			
21-30	40	40	20
11-20	40	20	20
1-10		40	40
No reporting	20		
	100%	**100%**	**100%**

***CI = Current practice – internal reporting, CE= Current practice – external reporting, and FI = Future intentions**

6. CONCLUSION

An effective management accounting information system is required by manufacturing companies to efficiently measure costs of environment and social impacts. This is because there are increased concerns shown by companies' stakeholders that require organizations to provide disclosures incorporating economic, social, and environmental performance in the form of triple bottom line reporting. As a result of these tentative findings, manufacturing companies are intending to measure costs of environment and social impacts to meet requirements of environmental management accounting (EMA) (IFAC 2005; UNDSD 2001) and social management accounting (SMA) (Gray 2006; Gray et al. 2001) concepts and practices. Companies report these impacts internally and externally while creating cost information to enhance environmental and social disclosures (Burritt, Herzig & Tadeo 2009; Gadenne & Zaman 2002; Gray 2006). Nonetheless, as environmental and social impact costs are hidden among production processes, companies are having difficulty in providing cost accounting information (Gale 2006; Sendroiu et al. 2006). Thus, changing accounting systems could help companies to fully cost products/services as well as create more accurate information to support companies' disclosures (Gray 2006; Gray et al. 2001). From this very preliminary analysis, Australian companies have a long way to go to meet world's best practices and add value to be considered as sustainable organizations in the eyes of stakeholders and marketplaces. Further qualitative data to be gathered will probe companies' intentions so that this study can employ management accounting best practices adopted by companies in order to develop a sustainability management accounting system (SMAS) conceptual model.

Thus, developing a SMAS as proposed is an appropriate way to assist companies in their developments of a holistic management accounting system to support the demands of their stakeholders. With a holistic system that incorporates economic (financial), environmental, and

social data captured at sources of transaction, one time only, in both monetary and physical units will help minimizing costs of recording and reporting. Companies can then employ environmental and social information to support disclosures through the form of a triple bottom line and/or corporate social responsibility (CSR) reporting. These reports help companies to improve their internal management decisions in relation to environmental and social cost measurement and identification. The right SMAS can also provide organizations with the ability to report energy consumption and emissions under NGER and meet requirements of GRI.

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