

Environmental Management Accounting for Corporate Sustainability: A Case from a Sri Lankan Automobile Company

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ABSTRACT

Today, environment is one of the critical areas in corporate social responsibility. To stay with in the competitive business world, corporate entities are incorporating the environmental elements in their business operations. Therefore, the objective of this study is to identify the contribution of Environmental Management Accounting (EMA) for corporate sustainability. The concept was originally developed in early 1990s with the importance placed on accounting for sustainable development. So, EMA is an emerging system in accounting and management which assesses costs and benefits made by the eco system to a business entity. Qualitative methodology is adopted in this study which includes interviews and document reviews as methods of data collection. Through this study, the researcher has deeply concentrated in explaining the concept of EMA, its current practices and disclosures in a Sri Lankan automobile company and the study summarized from the review findings that EMA is a vital issue for sustainable development. This will provide entrepreneurs and business managers the insights for future to implement or further develop EMA practices as in Sri Lankan context as only a very few are properly following such practices.

1. INTRODUCTION

Increased public concern on environmental issues during the recent years has resulted in enhancing the social accountability of business organizations through the disclosure of environmental information. With the increased community attention, corporate stakeholders have demanded more information relating to the impact of firms' activities on society besides the economic activities (Khan, Halabi, & Samy, 2009). Accordingly, environmental concerns have become a highly influential factor to businesses worldwide. In this regard, Institute of Directors in South Africa

(2002) mentioned that the entire society has come to a level where they place more importance on non- financial issues compared to financial issues, where the aspects of financial concerns were a major concern in the past. Consequently, the integration of accounting with management tools and increased concerns on the environment and various types of environmentally favorable practices have generated a set of management tools and techniques identified as EMA. Bennett, Bouma, and Walter (2002) state that despite the absence of a precise scope or a unique definition, EMA is acting as an intermediary in managing the link between management accounting and environmental management.

The term EMA emerges under the broad concept of CSR, and Ofori and Hinson (2007) illustrated that the Corporate Social Reporting (CSR) activities have gained the attention of wider community and as a safeguard against the competition businesses are now trying to incorporate the CSR element in to their business processes. EMA being an integral part of business operations, business enterprises are actively disclosing environmental information as they realized that such practices are adding an extra value in improving their corporate citizenship behavior. The development of environmental management and related accounting systems are backed by this reason as companies required to gradually increase the amount of social and environmental disclosures towards interested parties (Larrinaga et al., 2001).

According to Fuller et al. (1995); as cited in Wingard (2001) the incompatibility to comply with environmental management practices would result in certain disadvantages to business organizations as they focus their attempts not purely on environmental perspective but further broadly on sustainability. Hence a separate area called sustainability is added which includes the broad areas of economic, environmental and social. Accordingly, this concept captures different levels such as individual, organizational, community and national or international.

Meanwhile, the emergence of the concepts such as Corporate Sustainability/Sustainability Development (SD) allowed the corporates to focus more on the effective consumption of natural resources and they recognized that the existing consumption patterns are diminishing the meaning of 'sustainability'. They further argued that it is necessary to implement some benevolent forms of development goals that will remain in the long-term (Herath, 2005). Gerner (2019) argues:

“...Sustainability constitutes an essential element in corporate contexts by now and adequately taking socio-cultural context into consideration may constitute a strategic and influential driving force to corporate sustainability.

He further highlights that the corporate commitment for sustainability is essentially advised in challenging times of economic turbulence and rapid changes that could provide opportunities in developing a long-lived business models...”

Dalal-Clayton and Bass (2002) and Cole (2003) offer a comprehensive list of sustainability reporting guidelines, with their advantages and disadvantages. The most widely used guidelines include: the ISO 14000 series (ISO 14031, Environmental Management- Environmental performance evaluation guidelines) and Eco-Management and Audit Scheme; Social Accountability 8000 Standard (SAI,2007); and the GRI Sustainability Guidelines (2006). The application of sustainable practices generates deeply ecological and restorative business models. It is a more challenging approach and incorporates with ecology and equity and is more strategic with long term orientation. Sustainability is directly linked to accountability and transparency of business organizations and hence it is better to develop a path to measure and disclose environmental related information. Many Sri Lankan companies are practicing such reporting procedures although it is not wholly mandatory in Sri Lanka; especially, the industries which are engaged in environmental sensitive business functions.

Under such a context, Gunarathne and Lee (2015) identified how the Sri Lankan hotel sector can develop and implement environmental management practices and to what extent EMA tools are applicable in the process of management decision making. Having improvements over the above study, this paper expands by not totally focusing on internal costs and internal decision making but also concentrates on the implementation of EMA, application of EMA tools and techniques in addressing the foremost research problem.

2. OBJECTIVES OF THE RESEARCH

This aim of this paper is to elaborate on the specific areas of EMA practices and contributions made by them in achieving the core strategic business objectives of a business enterprise. Under this broader theme, the identified specific objectives of the study are;

- (i) to examine the changes to business processes after the implementation of EMA and the level of contribution to sustainability
- (ii) to outline the areas of EMA and to investigate the specific EMA reporting practices

3. REVIEW OF LITERATURE

3.1. Origin of Environmental Management Accounting

It was observed that in recent years government regulators, environmentalists and more importantly the society in general is placing an extreme importance on the sustainability and the protection of the environment. The increasing trend towards the disclosure of environmental issues and the management of those issues have paved the way for public organizations to develop and implement management practices which will minimize the negative environmental externalities. It is obvious that private companies are intentionally emphasizing the need for sustainability and environmental management, but when it comes to public sector it is rare to see such motivations (Ribeiro & Guzman, 2010). Similarly, Latan et al. (2018) conducted a recent analysis in assessing the role of EMA. They investigated the direct impact of EMA in influencing organization's environmental performance and also the contribution made by other ecologically driven factors to impact both EMA and firm's ecological performance. After a detailed analysis of data gathered from 107 manufacturing companies of Indonesia, researchers found that EMA is a significant driving force of firm's environmental performance.

Although there are different definitions for EMA, all of them have commonly defined EMA as a set-up that performs several functions at once. It includes identification, collection, analysis and utilization of both financial and non-financial information for the purpose of environmental cost minimization and improvement of economic, social and environmental performance of a business (Schaltegger & Burritt, 2000; Deegan, 2003). Different authors differently argue on the inception of accounting practices connected with the social and environmental aspects. Many of them agreed that it comes from 1960s and 1970s (Gray & Bebbington, 2001; Parker, 2005), with further developments during the 1980s (Adams & Zutshi, 2004). The concept of EMA is a development over environmental accounting where environmental information obtained through environmental accounting is used for internal decision-making purposes as it connects the two ends of management accounting and environmental management (Bennett et al., 2002).

Parker (2000) identifies environmental costs as a main cost category that must be effectively managed and he encourages managers to integrate the environmental variables when making decisions. EMA as a powerful management accounting tool has a broader scope which encompasses the main streams of energy accounting, carbon accounting, waste and material accounting environmental activity based costing, life cycle assessment and

eco-control (Bennet & James, 1997). According to Gunarathne, Ranasinghe and Peiris (2014), EMA is a dynamic area where there are new additions to the subject and under this existing EMA practices are continually updated or new applications are tested and implemented to cater dynamic business strategies.

3.2. Motivations behind the Adoption of Environmental Management Accounting

According to Lee (2011), there are number of limitations associated with conventional/ traditional management accounting and businesses tended to apply EMA as a solution for overcoming those negativities. Conventional accounting methods usually ignore the reporting of environmental impact. But it is vital for corporations to develop a method to deal with and account for environmental concerns in order to survive in the longer term. Negash (2012) states that the accounting figures calculated based on the accrual concept ignores the environmental costs and benefits and hence the balance sheet does not provide a true picture of the firm's financial position, further it does not incorporate the liabilities that may arise due to their environmental activities. This leads to the misuse and over exploitation of environmental resources as conventional management accounting systems hide the true value of these limited resources (Swamy, 1994).

Therefore, the application of EMA provides different information for decision making which could divulge cost saving opportunities through proper waste management in ways of reducing material consumption, reusing materials and recycling (Burritt, Hahn & Schaltegger, 2002). Gunarathne and Lee (2019) state that EMA is a strategic business tool that focus on managing the company's environmental risks and opportunities while demonstrating to investors that their business models are sustainable. Further EMA facilitates the management decision making through some important EMA tools and techniques identified as accounting for energy, water, material and waste, carbon emission, sustainable balanced scorecard and eco – control.

According to the suggestions of Adams and Zutshi (2004) the application of EMA enables firms to experience the enhanced relationships with stakeholders and position themselves as a better corporate citizen. In the context, Le (2019) identified six factors which positively influence the application of EMA practices. These factors include government enforcement, the interest of different stakeholders, positive environmental strategies, community expectations, professional education network, and financial condition. Among these factors, government enforcement

emerged as the most significant factor which influences the adoption of EMA.

3.3. Sustainability Development and Environmental Management Accounting

The appropriate balance between social, economic and environmental aspects lead to a sustainable economy and its saturation is where the company achieves the eco performer positioning. The eco-performer monitors the entity's triple bottom line by giving an equal weightage to the three main areas: society, economy and environment (Marcinkowska, 2007). Gray (1992) revealed that the inclusion of concepts like Sustainability Development into reporting processes have made more challenging jobs for individuals who deal with accounting figures. Lange (2003) links the discussion on "sustainable development" to inter-generational altruism and follows the world commission on environment and development or popularly referred to as Bruntland Commission (1987) which in turn states that sustainable development is meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.

In the global context, there are several organizations, frameworks and guidance to assist corporates to deal with sustainability goals and they provide necessary guidelines on how to incorporate sustainability into reporting processes. Global Reporting Initiative (GRI) is such a network-based organization which developed one of the most widely adopted sustainability reporting framework. Burritt and Schaltegger (2015) argue the applicability of EMA as a sustainability tool where they state that the EMA can be applied in balancing both environmental and economic rewards, meaning that EMA incorporates both ethical and strategic business issues into decisions. According to Schaltegger, Bennett, and Burritt (2006), companies are increasingly occupying EMA systems as many of them have established business objectives directly linked with sustainability accounting. Zhang (2014) states that for the purpose of maintaining a sustainable global economic growth, every organization is required to be actively engaged in environmental activities such as reducing energy and resource costs, improving production efficiency and reducing compliance costs. Hence, at present, EMA information is widely applied by managers as an internal management initiative.

3.4. Management of Environmental Costs through EMA

Christine et al. (2019) analyze on how the earliest studies have examined the role of environmental accounting and based on earliest literature, they

argue that it was only limited to identifying the costs associated with firm's processes that can disrupt ecological conditions. However, with the recent developments in this emerging field, EMA has been progressively utilized and explored as an organization's interior management tool to deal with firm's ecological burden and orthodox practices (Qian et al., 2018). Jasch (2003) reveal show to identify the environmental costs and she further explains that a major drawback of EMA is, it does not provide sufficient explanations in defining the term 'environmental costs. Furthermore, she elaborates on the applicability of EMA as a management tool that enables companies to identify, assess and allocate costs associated with the external environment. The broader application areas of EMA includes the evaluation of investment projects and identification of cost saving opportunities.

The main cost saving example pays her attention is the replacement of toxic organic solvents with non-toxic substitutes where the replacement eliminates the cost of regulatory reporting, costs associated with handling hazardous waste and also other costs directly attributable to the usage of toxic materials. Accordingly, it is evident that EMA will enable an organization to experience cost savings through the better management of ecological costs. Broadly ecological costs comprise of both internal and external components. Internal ecological costs can generate direct financial implications where as business organization is accountable to the external ecological cost i.e. cost to society and the environment.

Dascalu et al., (2010) state that internal costs include conventional costs, hidden costs, contingent costs and image and relationship costs. External costs consist of environmental degradation costs and human impact costs. They further argue that the allocation of ecological costs need be well justified, where it is encouraged to identify relevant cost drivers that drives each activity based on the Activity Based Costing principles. The mechanism of ABC allows the allocation of overhead costs to the polluting activities and products that are determined by quantitative life cycle assessment procedures. According to the United Nations (2010) the identification, assessment, and accurate allocation of above-mentioned ecological costs reveal hidden opportunities for expanding cost savings at the favor of management.

3.5. EMA in International Context

Chang (2013) conducted a study to address the issue of managing the major environmental costs from an accounting perspective in the context of Taiwanese higher education sector covering three universities. The focus was to find out what practices are employed within the universities in

managing the costs of electricity, water, paper and waste generation. It found that sample universities were not applying EMA for the purpose of ecological cost management and they are lacking the motivations for adopting EMA. Deegan (2003) states that majority of the EMA studies are centered around the organizations who engage with manufacturing activities and relatively a lesser number of studies are focused on service organizations. It was found that managers in the service sector have little or no concern about the environment and the environmental costs incurred by them. Deegan (2003) further argues that lack of EMA practices are a result of unfavorable consequences/ deficiencies arising from environmental cost accounting. Wilmhurst and Frost (2000) identify how companies actually disclose and account for environmental concerns and there they examined eleven reasons which motivate corporate entities to disclose and account environmental information. They found that most influential reason is to provide a true and fair view of operations. The second significant factor is to meet legal obligations with the satisfaction of due diligence concerns. All the reasons they examined were in line with their strategic objectives which ultimately supports corporate sustainability.

An entity can attain environmentally sustainable development by satisfying 3Ps; People – Profit and Planet at the same time (Nilsson et al., 1998). Similarly, Negash (2012) examines whether IFRS can be used for monitoring environmental degradation and he stated that the IFRS regime provides useful conceptual and practical frameworks for monitoring businesses that are engaging in ecologically sensitive operations. In 2015 Qian, Burritt and Chen identified the adoption of EMA in Chinese businesses for balancing the tensions between economic growth and environmental degradation. They found that they have achieved economic growth for over last few decades at the expense of environmental degradation which is unsustainable or against their environmental policies aimed at sustainability development.

4. METHODOLOGY

4.1. Research Site and Collection of Data

To achieve the aim of the study, we selected an organization which is operating in an environmental sensitive manner. It is referred to as DME PLC due to confidentiality and their core business involves providing automobiles and automobile solutions. This organization always focuses on their customers and is working for the social well-being. In their mission statement, they present themselves as a responsible corporate citizen who has clearly identified the underlying meaning of ‘sustainable development’

and they have aligned their functions accordingly to support their mission, "Create Value Responsibly". DME PLC's corporate strategy is geared towards sustainable entrepreneurship, or smart entrepreneurship, the kind which thrives on its surroundings and seeks to preserve those surroundings. Meeting/Exceeding customer expectations is what they always strive for and as a service provider they seek and cater each individual in a customized way based on their needs enabling DME PLC to wade through 79 years of success.

Based on applicable background information then we decided to carry-out a single case study with the support of qualitative methodology. The research undergoes and presents the organizational changes after the adoption of the Environmental Management Accounting by DME PLC and is discussing the organizational reformation and diverse areas of environmental reporting which is industry specific and somewhat complex. Therefore, it is vital to offer detailed explanations, provide sufficient evidences with available experiences on the research area for readers to obtain a rich and sound knowledge. The application of qualitative research in this study has enabled the researcher in exploring the research problem deeply as it is supported by the established two research questions of "how" and "what". Also among the previous literature, Yin (2009) in his research states the suitability of case study approach and he points out that conducting a case study is the most suitable way when researchers are analyzing holistic concepts or, "a contemporary phenomenon (e.g. a 'case'), set within its real-world context- especially when the boundaries between phenomenon and context are not clearly evident". Similarly, the application of case study method has several advantages such as interrogation of primary information and detailed examination of the problem statement. This method solves the issue of selecting samples in appropriate sizes and also the issue of hiding important concerns that arise when a large sample study is carried out, where as in quantitative methods these concerns become more challenging (Tinker & Gray, 2003).

After the preliminary discussions we had about the organization, the sample of interviewees was selected. The sample consisted of Director Finance, The Chief Accountant, The Executive – Stakeholder Interactions and Sustainability Team. The researcher has applied interviews, observations and document analysis as data collection instruments. The idea of the prior scholars was that the combinations of multiple instruments in a single study strengthen the validity of the data that are obtained (Crescentini & Mainardi, 2009). Much of the data were gathered through interviews. Both a pilot study and a main study were conducted. All the data collected were separately examined and similar areas were identified

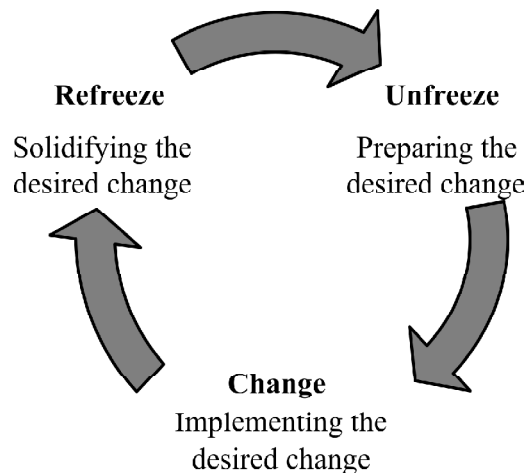
as common subject matters. The raw data gathered were organized based on the research requirement and categorized according to the two main research questions.

4.2. Theoretical Framework

Kurt Lewin's Change Management Model (1940) is employed as the theoretical framework in this study. This model explains the organizational change using the analogy of changing the shape of a block of ice. Lewin proposed the Change Management Model in the 1940s and his model became the mostly adopted model by businesses worldwide in managing the organizational change. Similarly, time to time scholars have added some more features to the model according to the studies they undertook and have commented on the validity of the Lewin's Model (Schaltegger & Burrit, 2000; Epstein & Roy 2003). In this study the Lewin's Change Management Model is employed to explain the way in which organizational change towards improved accountability occurs and can lead to changes in activities, routines, employee morale and practices and management processes of DME PLC.

The management of change is frequently linked with most of the corporates and organizations which are vulnerable to change. But the way the organization manages the change could vary depending on the level of readiness and willingness to accept the change. Accordingly, the change process of DME PLC is respectively explained under the three stages suggested by Lewin model (figure 1) as unfreezing, changing, and refreezing.

Figure 1: Mulder, P. (2018, June 18). Kurt Lewin's Change Management Model.



5. DATA PRESENTATION AND DISCUSSION

In analyzing the raw data 'coding' was carried out and data has been segmented in to several areas based on the major titles identified through coding. Thus information will be presented under coded themes in upcoming chapters.

5.1. DME PLC and the Organizational Change through EMA

The change process is backed by the change management model and based on the three main phases of change; findings of the study are separately elaborated. The first stage, unfreeze is about creating the motivation to change. According to the explanation provided by the chief accountant; DME PLC was not into any kind of environmental related reporting prior to 2001. The reason they introduced environmental reporting in 2001 was backed by the implementation of Environmental Management System (EMS) which was accredited by ISO 14001 (2015) as environmental reporting is a part of the triple bottom line reporting. According to the findings of Gunarathne and Lee (2015) an entity could apply EMA as an internal management accounting tool and they clearly explain how an organization moves gradually from a constancy stage to an assimilation stage. Similarly, as an initial step towards change, firstly a change-oriented culture has to be developed within the organization.

Before implementing an eco-based corporate strategy and an eco-friendly organizational culture, the company set the goals and formulated the policies for the implementation of the environment related management accounting techniques. The need for adopting environmental management techniques were backed by increasing pressure from global and regulatory bodies and one such influential factor was development of world SD goals by United Nations. On the other side DME PLC being a successful company required to obtain a distinctive competency over others that distinguish themselves as a responsible eco-friendly corporate citizen compared to other businesses. Further they wanted to maximize shareholder's wealth and cutting off costs as a way of reducing costs. The company identified environmental concerns as a means of reducing costs. As an initial step environmental related policies were established for the purpose of integrating environmental concerns into daily business processes. The company specifically aimed to achieve the following environmental objectives: save energy, fuel, and water, avoid using polythene, maximize practices to reduce, reuse and recycle, reduce consumption of materials, spread the message, work together, be informed, get involved in environmental protection and promote proper waste segregation.

The chief accountant responsibly explained that they conducted number of workshops to make the employees aware of level of waste generation and has focused the attention of employees on rapid environmental degradation and its effect on sustainable development. Further in creating awareness within the society special programs were arranged targeting the school and university children. One such example is the series of seminars conducted in 2010 on Mercedes-Benz's Blue Efficiency Technology. Through the environmental activities of the organization they try to communicate the importance of environmental preservation and encourage others to carry the green theme within and outside the organization.

In explaining the individual's willingness to change the chief accountant stated that:

"...Motivation is intrinsic to an individual and no one can motivate others to change. But can create the conditions, messages, and environment that may influence people to want to change. Hence by highlighting the need for adopting EMA within the organization it is possible to create a sense that a change is needed, we have a highly talented workforce and they are always ready to try new areas, where we stand today is due to change appreciating culture that we have developed throughout our journey..."

The second stage of Lewin's Change Management Model is "change" which aims at moving to a desired behavior. According to the Schein (2002) Lewin's "changing" phase involves learning new concepts, new meanings and new standards, imitation of and identification with role models and scanning for solutions and trial and error learning. Under this stage all the areas relating to the environment where company's attention needs to be given were identified and necessary actions were decided in managing water, waste, noise, atmospheric emissions, materials and energy and fuel. In managing these identified areas and overall environmental impact DME PLC had formed four specific teams under "Go-Green" theme. It was simply an initial step that the company has taken and respective tasks had been assigned to each team. Team 01 was specifically for flood prevention, team 02 for electricity conservation, team 03 for waste management and team 04 for water conservation. DME PLC's main concerns on saving the energy sources have made the company to pay much attention in seeking for cost controlling opportunities by keeping an eye on electricity consumption and other substitutable sources of energy. Some of the management initiatives include use of natural light when planning new constructions and Green Buildings (DME 800) which have been certified into gold category by Leadership in Energy and Environmental Design. The reporting process of DME PLC was totally manual prior to introducing EMS and

managing automated systems was a huge challenge for the workforce as they were used to manually process data.

The challenge they faced while dealing with the new system and EMA techniques was described by the chief accountant as follows:

“...Changing is not much easy. We have put massive efforts in overcoming the failures we faced during first two years after the implementation of EMS and EMA techniques. Those concepts were relatively new to us when we were working on the change process. However, we have created no of changes when implementing the EMS and failures and costs of change management are a common phenomenon for any organization, somehow we have managed it by interpreting the importance of the EMS and EMA techniques...”

Under change phase it is required to empower action and as a way of empowering workforce to put efforts into action line managers of DME PLC always provide day-to-day direction to operational employees. It is a kind of their management practice and provides lots of opportunities for employee involvement. The importance of trending management accounting techniques which are followed simultaneously with the EMS are continuously communicated to employees. The Director Finance summarized his opinion regarding the correct decision that they have taken in implementing new management accounting techniques:

“...Our company has an ISO 14001 certified EMS. It enables us to measure and monitor the impact of our operations on the environment which in turn leads to have suitable measures being put in place. Our EMS is guided by triple R concept; Reduce, Reuse and Recycle. We are guided by our EMS to generate lots of environmental accounting information which will be incorporated by us in making decisions and developing action plans as a part of our EMA techniques. Most of the times, EMS emphasizes environmental information to ensure the ISO requirements...”

The final stage of change management model is “refreezing” which is about anchoring the changes into culture and it provides confidence that is necessary for moving to the next stage of change. The company has developed several environmental policies and all the policies were published all around the organization to make it familiar with every single individual and to make it a part of their culture. What they believe is each and every single individual will contribute towards managing environment by making it a part of their work life. Similarly, DME PLC has developed ‘I Pledge’ program to encourage the workforce to carry the ‘live green’ theme and practice the ecological ethics outside the workplace by linking them to their ordinary social lives. Through these initiatives it is expected to keep everyone informed, supported while developing ways to sustain the

change. Additionally, for easy measurement and comparison of level of eco goal achievements company has established some organizational specific key performance indicators by incorporating balance scorecard approach into their daily decision-making process: climate change - carbon foot print tCO₂e (tons of Carbon Dioxide Emissions) per Rs. 1 Mn. of group net turnover, energy - total energy consumption (1000 GJ), energy consumption (Giga joules) per employee (on average), water - total water consumption (m³), water recycle-ground water recycled and reused as a percentage of ground water consumption, waste - total hazardous waste sent for recycling/reusing (Kg), total hazardous waste sent for recycling/reusing (Litres) and environmental non-compliance - action taken by the central environmental authority for non-compliance.

5.2. The Specific Areas of EMA

The primary categorizations related to the areas of EMA are based on the materiality of environmental impacts generated via the entity's value creation processes. Under the EMS of the company, six main pillars are identified as areas that have to be managed and accounted for: management of atmospheric emissions and balancing climate change, management of noise, management of energy and fuel, management of water, management of material and waste. Additionally, Bennet and James (1997) also commented that the scope of EMA extends over diverse reporting areas including accounting for energy, material, carbon emissions and eco – control. Consequently, Frost and Toh (1998) selected 76 Australian public sector entities as the sample and analyzed the Environmental Management Systems (EMS) implemented by the respective bodies. It was observed that many of them have developed systems and procedures that capture purely the waste handling and energy usage costs and thus have missed other important areas. The environmental strategy of the company is designed with two key principles and those two principles are center to their six areas. The fundamental precept is to lessen the unfavorable impact on the physical environment and the succeeding policy is to encourage the workforce and the community to manifest the values of preservation and to minimize the impact over the eco system which is a more participative approach.

5.2.1. Management of Atmospheric Emissions and Climate Change

Climate change is concerned with changing atmosphere temperature or a change in global or regional climate patterns, simply referred to as global warming. A more specific attempt by the company in this regard is; they continuously update their policies towards managing Greenhouse Gases

and monitor carbon footprint. In measuring the performance coupled with carbon foot print they have developed a ratio between the carbon consumption and the revenue [Carbon Dioxide Emissions per Rs. 01Mn]. of turn over where the intention is to identify the linear relationship between turn over and the carbon foot print. Improper management of waste causes Greenhouse gas emissions and hence waste need to be managed in a responsible manner. In DME PLC a streamlined waste disposal system is established which saves GHG emissions and reduces the amount of carbon footprint for the coming years. The idea of the chief executive who is in charge of stakeholder interactions, regarding the company's efforts on minimizing emissions was:

"...All the DME Group's own vehicles and rented vehicles subject to emission tests for compliance with national standards. But, our vehicles are also required to comply with our own standards which are more stringent than national standards..."

The company uses WBCSD/WRI Greenhouse Gas Protocol's Corporate Standard (revised edition) to compare its carbon foot print and GHG emissions. The targets established by DME PLC in reducing the amount of GHG emissions are relatively small operational goals where every individual can contribute to it through their day today activities. The chief accountant commented that:

"...We are given individual targets to reduce the consumption of A4. Per day we have a target and at the end of the day we check the amount of paper we used with the target we were given. If there are variances, following day we consume only the balance remaining per day after setting off extra consumption made previously, consumption of A4 sheets result in increased amounts of GHG emissions..."

The vehicles and air conditioning machines of the company are totally free from Chlorofluorocarbon (CFC) gases and it is guaranteed that the company's operations are designed in a way that they do not deplete the ozone layer. All these concerns are captured in the reporting process and the company accounts for these activities with the support of EMS.

5.2.2. Management of Noise

Accounting for noise management deals with identifying costs associated with noise generation and taking controls to mitigate or reduce the impact of noise. Within DME PLC noise levels are measured with the help of an independent third party who is accredited by the Central Environmental Authority. The measured figures are properly accounted and compared overtime to identify how efficiently the company is managing noise. The level of impact created on the environment by interrupting noise need to

be categorized and compared to check whether noise emissions are well below the legal and statutory allowances provided by regulatory bodies. If any variations are found quick actions are taken. Hence management accounting plays a major role in identifying and accounting noise emissions.

5.2.3. Management of Energy and Fuel Consumption

As the company is into motor engineering the key sources of power includes diesel, petrol, liquefied petroleum gas and electricity. Meanwhile alternative energy sources are used in some of the business units with the intention of reducing over dependence on scarce energy sources. The usage of diesel for vehicles, diesel for generators, petrol for vehicles, LP gas and electricity are measured and accounted and finally arrive at total energy consumption during a year. The comparative figures are presented in management reports to be compared against previous years and there they identify the % of change in energy consumption from the immediate previous year. Further to support management decision making 'energy intensity ratio' is calculated.

The annual report provides strong evidences on the efficient management of energy and fuel within DME PLC:

"...Our premises and service workshops meet with the standards stipulated by local authorities and the Central Environment Authority (CEA). Our endeavor is to move beyond these minimum standards and further improve our ecological foot print. Bosch Diesel Centre and DME 800 are two Green Buildings which have been certified into gold category by Leadership in Energy and Environmental Design (LEED). DME 800 with more than 16,000 square meters of built area gives an energy saving of 25% compared to a traditional building..."

In explaining the value generated by EMA information the chief accountant stated that:

"... Previously we were not into those energy measures, but the implementation of EMA has enabled us in saving our energy sources and planning our business to extend over future in ways that secure of energy sources. The most specific thing here is that we have identified some organization specific energy saving initiatives like usage of CFL and LED bulbs, air conditioning rate specifications, computers to revert to standby within five minutes idling period and maximum use of natural light..."

Similarly, the company conducts energy diagnosis and audits where they are accredited to carry those audits by Sri Lanka Sustainable Energy Authority.

5.2.4. Management of Water

Water is a key input in their operational process and when water is used to wash and repair motor vehicles it gets mixed with engine oil, chemicals and mud. There is a separate process to recycle the polluted water and the company's attentiveness on water recycling is visible through the achievement of established sustainability objectives related with management of reused water. They have been achieving this reusable water target for a number of consecutive years across their business calendar. The National Water Supply and ground water are used for the company's operations and have water recycling and purification plants in Siyambalape and Kurunegala. The company has designed a waste management process to eliminate the risk of discharging untreated water into any public area or sewage system which could create negative externalities. The process followed is clearly explained in the annual report of DME PLC as follows:

"...Waste water from all our workshops passes through oil separators and is monitored to ascertain pH levels on a daily basis, thus ensuring compliance with legal limits. Random samples of recycled water are also collected by a Central Environmental Authority approved third party, to monitor pH Value and Chemical Oxygen Demand (COD). DME's biochemical oxygen demand, total suspended solids and oil/grease content were all found to be well below the tolerance levels demanded by the Central Environmental Authority..."

The company divides aggregate of water utilization and reuse into four major areas namely municipal water, ground water and rain water harvesting. Finally, they calculate and compare water usage, reused water and reused percentage annually. Based on information necessary actions are taken and relevant management plans are developed for upcoming years. In discharging water three main methods are followed including recycle and reuse, recycle and discharge to municipal drainage, treat and discharge.

5.2.5. Management of Waste and Materials

DME PLC's waste management strategies are based on 3R concept of Reduce, Reuse and Recycle where they have developed a waste management hierarchy in identifying the order of managing waste based on the relative significance given to each waste item. The first layer of the hierarchy deals with waste items which are reusable and usage of those items could be controlled or minimized. Items such as A4 papers, cotton waste, waste oil and food waste are identified under this category. In explaining the process chief accountant stated that:

"...We are given daily targets to reduce our usage of A4 sheets. Also for food items we have taken some steps for proper disposing. What we follow is very easy, simply you have to put food items into relevant bins, food separately and wrapping papers separately..."

The second layer consists of recyclable waste items such as cardboard, polythene, plastic, oil filters, metal scrap, glass and tires. The third layer includes contaminated paper, polythene, cotton waste, paint tins and sludge. All the items which come under third layer are destroyed by burning which is called 'incineration'. The process was well explained by the executive-stakeholder interaction as follows:

"We are very much careful when it comes to incineration and we have outsourced the process into a third-party cement manufacturer, Holcim. Holcim is the largest third-party organization in incinerating waste. We spent a huge amount for this; sometimes the cost exceeds all the benefits we obtained through the utilization of these items. Our intention is not always our benefit, but to benefit the entire society. If the items such as cotton waste and sludge are not properly disposed it creates huge negative environmental impacts than any item, so the only option is to incinerate. Even the burning emission is so harmful to be breathed. Holcim has an underground pipe in minimizing the effect on the environment..."

The items of the layer upon last layer can be composed and composting is the option followed by DME PLC in managing the items like garden waste. The last layer consists of waste items including windscreen, paint booth filters and food contaminated polythene. The company highlights two major waste categories and two separate treatments for the items. Two categories include non-hazardous solid waste management and hazardous waste management. The management of non-hazardous solid waste is controlled through various initiatives launched within the organization. One simple method followed is, company has a colour coded bin system to manage the food waste and the collected food waste is given to an external party for animal feeding. The method of disposing hazardous waste is decided based on the type of material and level of impact on the environment generated by waste outputs.

5.3. EMA and Strategic Business Leadership of DME PLC

This study reveals how an organization can implement eco management approaches from the very beginning and how environmental aspect can be integrated into business process overtime. It is proven that the integration of EMA into the organizational strategy enables a company to achieve corporate sustainability.

5.3.1. DME PLC and Sustainable Development

DME PLC being a green initiator contributes to sustainable development mainly through its efforts towards preserving the environment. In attaining superior future prospects they always align their corporate goals with the United Nation's sustainable development goals. With small improvements every year DME PLC adds multiple goals in aligning their company's plans with the global commitments. How they monitor their progress is, using company indicators, national and international indicators. In explaining company's commitment, the executive stakeholder interactions stated that:

"...Being responsible is a part of our business philosophy, our aim is to establish a company framework for achieving the 17 sustainable development goals and under environmental aspect we cover, clean water and sanitation, affordable and clean energy, responsible production and consumption, climate action, life below water and life on land. We are a signatory participant of UN Global Compact since 2001 and from Sri Lanka there are 35 participating institutions. Communication On Progress (COP) by our company is due on coming January 2019, where we annually detail our compliance with ten principles..."

The degree of company's compliance with the SD goals is identified separately for each area by different mechanisms especially through EMS which is accredited by the latest version of ISO 14001:2015 through ensuring responsible consumption of resources, minimizing impacts and complying with regulations across the entire life cycle of entity's value creation process. The application of EMA as a discipline has enabled the company in improving the environmental performance and has become an influential factor in integrating best management accounting thinking philosophies which is vital in complying with global goals for sustainable development.

5.3.2. Competitive Triangle and Sustainable Competitive Advantage

The implementation of EMA practices has enabled DME PLC to earn sustainable competitive advantages over other rivals in the market. The term, 'sustainable competitive advantage' is a part of their corporate strategy and being a responsible corporate citizen has paved the way towards the attainment of competitive position in the market. In DME PLC they have 'Differentiation, Collaboration and Diversification' among which 'differentiation' is achieved mainly through the concerns placed on environment and sustainable development. There it is possible to arrive at a competitive triangle that connects the aspiration and purposes into the corporate strategy.

The orientation towards sustainability has made their company to gain a competitive position at the market place. Their belief is that people are

more into 'go green' concept and as a result, were able to distinct themselves in the minds of customers as a brand that carries green concept and sustainability as the core strategic imperative. Further as a group, they have realized the blooming results of having management accounting tools like EMA and while discussing on the company's future plans, they explained their targets and objectives for improving the existing corporate practices. A separate sustainability team for implementing such developments has been created. The interrelation between the management of impacts and its contribution to the strategic business objectives is clear cut. The aspects of the value creation process that generate material impacts to the environment include discharges, emissions, product stewardship, subcontractors work and compliance with statutory and regulatory requirements. The value created through the impact management is further strengthen via voluntary initiatives on environmental conservation which in turn generates favorable consequences. It is like a continuous cycle and there is no any visible end point in the value creation process. As a consequence, the relationships are much complicated and sustainability is identified to be no longer a concept but a business initiative.

6. CONCLUSION

In this study, DME PLC was able to manage its usage of natural resources and was able to implement precautionary environmental initiatives as a result of introducing measures in identifying resource usage, degradation and waste generation through the information derived from EMA techniques. It is observable that each six environmental management areas of DME PLC have positively impacted on the business process and overtime they were able to achieve number of accolades for being a green enterprise.

Overall findings indicate, the execution of EMA is not an overnight procedure, it is mandatory to have sufficient time and resources. For a corporation to be a sustainable enterprise, it has to be economically stable, socially responsible and environmentally friendly. DME PLC has their organization specific impact management areas including economic impact, environmental impact and social impact capturing the triple bottom line. All the three areas need to be balanced in order to contribute towards sustainability. Environmental aspect being a major part of sustainability needs to be better managed and EMA plays a vital role in assisting the entity in measuring the level of environmental impact created from their operations. The overall use and the effectiveness of the EMA adoption is directly linked with the environmental goals aspired to be reached by the management. According to Schaltegger and Burritt (2001) such goals include:

“...Identifying environmental improvement opportunities, prioritizing environmental actions and measures, environmental differentiation in product pricing, mix and development decisions, transparency about environmentally relevant corporate activities, meeting the claims and information demands of critical environmental stakeholders to ensure resource provision and access and finally justifying environmental management division and environmental protection measures...”

The study may suffer from a few limitations during the research period which sometimes might have an impact on the research. One main concern was that the study was conducted in 2018 and at the time study is being conducted EMA and sustainability reporting has become a usual business practice of DME PLC. Hence the situation during past and now could vary and although people are capable of recalling past some facts may be subject to variations. In this study, data triangulation is employed to avoid such mismatches in data, but still significant inherent facts that are out of control do exist such as ‘selective memory’, ‘telescoping’ (recalling events that occurred at one time as if they occurred at another time) and ‘attribution’ which attributes positive outcomes to one’s agency and pass negative events to other parties. Other than above basic drawbacks, limitations associated with qualitative research due to its nature such as generalizability of findings and subjective, bias views of people, this study provides detailed description of validity and capability of EMA application in private sector business enterprises. As further improvements to this study, future researchers can investigate the level of application of EMA in public sector entities. Although private sector companies are dynamic and quickly capture the changes, in public sector it is rare to see change implementation. It is mainly due to very much centralized decision making in public sector and tall hierarchies with not precisely defined goals.

Additionally, researchers can carry out multiple case studies by contrasting among entities who adopt EMA and entities that do not follow EMA along different business sectors of different sizes and locations. There researchers may arrive at exact merits associated with EMA implementation. Such further research opportunities would overcome the lack of comparability of the single case study method as is in the current scenario. Last but not the least, given the multitude of EMA methodologies additional comparative studies might shed some light for practitioners and regulators on this emerging area.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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