ADOPTION OF ENVIRONMENTAL MANAGEMENT AND ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) PRACTICES AMONGST THE SMALL AND MEDIUM SIZED ENTITIES (SMES) SECTOR IN SRI LANKA

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Abstract

The main objective of this study was toto find why and how the Small and Medium Sized Entities (SMEs) in Western province in manufacturing sector have adopted the environmental management and environmental management accounting (EMA) practices. Additionally this study investigates factors and barriers which influence the practice of environmental management accounting and management awareness on that. The study is significant on the grounds that this is the first time in Sri Lanka a study of this nature has been conducted.Moreover, the literature available in this area is scarce. Data is collected via questionnaireand descriptive statistic data is used to evaluate the gathered data.

The finding shows that the majority of the SMEs have already adopted various electricity savings methods within their premises. Further theywidely use EMA for making decisions in relation to Energy, WaterandWasteareas due to the importance of those in their manufacturing process. The results indicate that environmental laws, internal regulations, use of techniques and tools to reduce waste,develop and implement material, energy, water efficient processes and manage risk has provided higher motive on SME management decision making.

Finally research reveals that SME managers believe that EMA practices are difficult to implement in the existing costing systems, adoption practices is too costly and the company does not have staff with expertise in EMA. So these attitudinal, financial and informational factors are the most important barriers that prevent them from implementing EMA.

Keywords: SMEs, Environmental Management Accounting, Manufacturing firms, EMA practices & barriers

Introduction

SMEs that form the backbone of Sri Lanka economy are expected to play a greater role in the development process of the country. The SME sector has enormous potential in generating high level of socio-economic benefits to a developing country with a low level of investment.(Weerakkody 2015)

SME sector's contribution is paramount to support the government's efforts in promoting balanced regional development and developing the rural economy. SME sector is an ideal platform for the government to invest and support to reduce the gap between the haves and the have-nots (Weerakkody 2015).Therefore SMEs can be considered as one of the main balancing circles in the economic structures.These SMEs are very flexible in nature and response quickly to the changes in the markets.

SMEs play a major role within the economy. It helps to reduce poverty and increase the standard of living of the poor by providing job opportunities to poor as well as unskilled labours. As per government estimates, around 80 per cent of business in Sri Lanka that falls under SMEs contribute over 50 per cent to the gross domestic production of the country and represent the 35 percent of the total employment in the country (Weerakkody 2015).

SMEs play an important role in economic development through,

- Creating employment opportunities.
- Mobilizing domestic savings.
- Poverty alleviation.
- Income distribution.
- Regional development.
- Training of workers and entrepreneurs.
- Creating an environment in which large firms flourish.
- Contributing to export earnings.

(Jayasekara & Thilakarathna 2013)

Manufacturing sector in Sri Lanka

Manufacturing companies are made huge impact to the environment directly or indirectly compared to the other companies in Sri Lanka. (17.2 % manufacturing sector contribution to GDP, 18.2% represent of the Labour force) (Central Bank of Sri Lanka 2014). For their operations they obtained resources from the environment as a raw material and release the scrap to the environment. For the manufacturing in various industries especially chemicals, electronics, automotive, pulp and paper industry produce adverse environment impacts such as waste generation, energy consumption, and the release of hazardous substances (Xue et al. n.d.). If they release their unnecessary things to the environment continuously and it will be badly impacted to the environment. Because garages like chemicals, plastics, fuel, and any other harmful items, removes the environment equilibrium in loan term. Therefore by adopting better environmental management practices they can contribute to the sustainable environment while achieving the corporate goals.

By identifying the current position in Sri Lanka it can be identified how this industry impacts on environment and provide solutions to overcome from those matters. Also expect to select different type of manufacturing companies to evaluate applications of the sustainability management. (Food & Beverages, Tobacco products, Textiles, Paper and paper products, Pharmaceuticals, Construction, etc.)

In every country SME sector is perform a major part of their economy. Sustainability Management Accounting is a broad area it includes Planets, People and Profits. Environmental management represents major part of the sustainability management. Due to the importance of the environmental management in the present world there is an ISO standard call ISO 14001.

ISO 14001 Environmental Management provides benefits for Small and medium size businesses. It introduces the world-class management system to SME business and SME can reduce environmental impact. To regulate the companies, Central Environment Authority of Sri Lanka formulates the environment laws. (Ex-National Environment (Amendment) act No 53 of 2000)

Manufacturing sector companies use many natural resources as raw materials. Such as water, fuel, air, electricity, timber and etc. For continually using these natural resources will be affected to the future generation. Because huge consumption of natural recourses loosing availability of natural recourses for future generation.

Problem statement & Research question

Overview

There is a direct relationship in between the environment and the manufacturing entities. Entities obtain various resources as raw materials for their manufacturing activities which include water, petroleum and various energy sources. In turn there is a massive environmental impact in terms of waste generation, air pollution, water pollution, sound pollution and release of hazardous materials including E-waste to the environment. As a socially responsible entity which operates within the broad society, each and every organization has a greater responsibility toward the society.

Research Questions

The study addresses the issues relating to the following important questions.

- Why and how the Small and Medium Sized Entities (SMEs) in Western province in manufacturing sector have adopted the environmental management and environmental management accounting (EMA) practices?
- To what extent the management aware of environmental management and EMA of manufacturing companies?
- What are the Environmental Management & EMA practices followed by the organizations?
- What are the reasons for adopting and/or not-adopting environmental management and EMA practices by the SMEs?

Research objectives

Overall Objective

The purpose is to find why and how the Small and Medium Sized Entities (SMEs) in Western province in manufacturing sector have adopted the environmental management and environmental management accounting (EMA) practices.

Specific Aims

- To identify the management awareness of environmental management and EMA of manufacturing companies.
- To identify what Environmental Management & EMA practices are followed by the organizations.
- To identify reasons for adopting and/or not-adopting environmental management and EMA practices.

Significance of the study

The main objective of this study is to identify management awareness of environmental management and Environmental Management Accounting (EMA) practices in Western province manufacturing industry context.

EMA has a broad scope and different persons have interpreted it in different terms. Among them a definition given by the United Nations Division of Sustainable Development (UNDSD), provides a basis to understand it simply and clearly. According to that EMA is commonly defined as the identification, collection, analysis and use of physical information on the use, flows and destinies of energy, water and materials (including wastes) and monetary information on environment-related costs, earnings and savings for internal decision making. (UNDSD 2001)

As per the above definition an entity which follows EMA practices need to gather physical as well as monetary information regarding resources utilized in production flows. For this purpose dimensions such as kilograms, litre, cubic meters, joules etc. are used to measure & obtain physical information. (Gunarathne et al. 2014). Then the monetary value of the resources utilized is calculated by using an appropriate rate for physical information obtained.

The next objective of this study is to identify EMA practices available in Sri Lankan Small and Medium sized entities (SME) who engaged in manufacturing activities and to identify reasons for adopting and non-adopting of such practices within their organization. Further to identify difficulties and challenges face by those SMEs in gathering information.

Scope and Limitations of the study

- **Sample size** - The number of the units of analysis we use in study is dictated by the type of research problem we are investigating. If the sample size is too small, it will be difficult to find significant relationships from the data, as statistical tests normally require a larger sample size to ensure a representative distribution of the population and to be considered representative of groups of people to whom results will be generalized or transferred. However the sample size is less relevant in qualitative research than in quantitative research.

- **Lack of available of reliable data** – The most of SME lower level of source documents for their activities due to lack of knowledgeable person, lack of technology and lack of rules and regulations to regulate the SME. Also SME deliberately hide their information to avoid the rules and regulation such as tax law and environmental laws.

- **Lack of prior research studies on the topic** - Citing prior research studies forms the basis of our literature review and helps lay a foundation for understanding the research problem we are investigating. However lack of previous literature reviews available on our research question is limits our study. Therefore we required to develop an entirely new research typology.

- **Self-reported data** - Whether we are relying on pre-existing data or conducting a qualitative research study and gathering the data by our self, self-reported data is limited by the fact that it rarely can be independently verified. In other words, we have to take what people say, whether in interviews, and questionnaires, at face value. However, self-reported data can contain several potential sources of bias that we should be alert to and note as limitations

Literature review

Small and Medium Enterprises (SMEs)

Small and Medium Enterprises (SMEs) are regarded as one of the main driving forces of economic development of all economies because they generate new employments, introduce new business methods and products, reduce poverty, inflation and income inequality and solve the balance of payment problem. According to developed and developing country category, there may be numbers of definitions. As mentioned by Schumpeter (1934), an entrepreneur is the major agent of economic development, defined by the "carrying out of new combinations", which in turn means "the competitive elimination of the old". The concept of economic development covers the following five cases: They are

a) Introduction of a new good or of a new quality of a good;

b) Introduction of a new method of production;

c) Opening of a new market;

d) Conquest of a new source of supply of raw materials or half manufactured goods;

e) Carrying out of the new organization of any industry.

In Sri Lanka SMEs are defined by various organizations.Ministry of Industry and Commerce (2000) is said that SME is used to denote micro, small and medium enterprises and different countries use different definitions based on their level of development. The commonly used yardsticks are total number of employees, annual turnover and total investment in the Sri Lankan context. The SME policy framework defines SME based on the number of employees and annual turnover (Refer table 1).

Table 1 : Defining SMEs in Sri Lanka

Criteria	Medium	Small	Micro
Annual Turnover	Rs. Mn. 251 - 750	Rs. Mn. 16 - 250	Less than Rs. Mn. 15
No. of Employees	51-300	11 – 50	Less than 10

(Source: Ministry of Industry and Commerce, 2000)

SMEs are defined as an enterprise that have an annual turnover less than 600 Mn and its borrowing less than 200 Mn and total number of regular employees does not exceed 50 persons (Central Bank of Sri Lanka, 1998).

According to the definition given by various organizations we can construct an own definition,SMEs are the independent firms which have regular employee less than 50 persons, annual turnover less than 350 Mn and Capital investment less than 3.5mn.

Table 2 : Common criteria of SMEs

Criteria	Number of regular employees	Annual Turnover	Capital investment
Small and medium-sized enterprises	Not exceed 50 persons	Not exceed 350 Mn	Not exceed Rs.3.5 Mn

(Source: Author constructed)

The importance of the SMEs to the national economy

In "A review of SMEs in SL", performed by Gamage (2003), the following is concluded; SMEs play an important role in both developed and developing countries. Their importance is reflected by the absolute number of establishments, generations of employments, contribution to the GDP, embarking on innovations and stimulation of other economic activities. Further it is evidential by Dasanayaka (2009), the Small and Medium Scale Enterprises are functioning as a lifeline in the informal sector of Sri Lanka due to their significant contribution to overall economy in terms of employment, exports, tax income, innovation, equitable income distribution, social stability, domestic resources usage and regional development.

Among the SME sector Manufacturing companies are made huge impact to the environment compared to the other industries in Sri Lanka. Manufacturing sector contribution 17.2 % to GDP and 18.2% represent of the Labourforce. (Central Bank of Sri Lanka 2014)

As mentioned by Schumpeter (1934), an entrepreneur is the major agent of economic development, defined as the carrying out of new combinations and competitive elimination.

Environment Management Accounting

ACCA (2015) has defined EMA as the generation and analysis of both financial andnon-financial information in order to support internal environmental management processes.

As well as Bouma and Correlje (2003) suggested that 'Environmental management accounting (EMA) is a subset of environmental accounting which is the accounting systems and techniques that provide decision-makers and management with financial and non-financial information about the firm or organization and its environment'. Further Birkin (1996) indicated that EMA is a straightforward development of management accountancy.

Environmental accounting covered national income accounting, financial accounting and management accounting (USEPA 1995). EMA is as wide-ranging in its scope, techniques and focus as normal management accounting. Burritt et al (2001) stated that there is still no precision in the terminology associated with EMA. They viewed EMA as being an application of conventional accounting that is concerned with the environmentally-induced impacts of companies, measured in monetary units, and company-related impacts on environmental systems.

Environmental accounting provided environmental-related information to internal and external stakeholders of a company which could discharge the accountability of the firm. It explicitly considered environmental impacts caused by organizational activities (Burritt et al. 2002).

Managers and accountants need to manage the firm's environmental performance. The first step is usually concentrating on managing the environmental costs. Ideally, environmental costs include all costs in relation to organizational activities which have an environment impact. Administration costs, legal fees, employee education, cost for awareness programs, and the loss of goodwill if environmental disasters occur can be identified as some of the environmental costs.

There is a tight linkage between EMA and environmental management. With environmental management, stakeholders can assess the performance of the companies in reducing or minimizing their environmental impacts. International standards are developed for environmental management like ISO14000 series of

certification from the International Organization for Standardization (ISO), BS7750 from the British Standards Institute. These international standards provide a framework on how to manage an organizations' environmental performance and created the need of EMA in key management decision making processes. (Gray & Bebbington 2001).

EMA includes both monetary and physical aspects of environmental accounting. It provides data mainly for internal decision making on both environmental and financial performance which belongs to the scope of traditional management accounting. Physical EMA data includes the flow of energy, water, materials and wastes which is essential to the identification of different environmental aspects, and allows the company to assess and report the physical aspects of its environmental performance.

Benefits of EMA practices

There are many benefits associated with EMA applications. These include cost reductions, improved product pricing, attraction of human resources, and reputational improvements. (Perez et al. 2007) found that management accounting practice facilitates for continuous improvement of environmental performance, compliance with environmental legislation, communication with interested parties and employee involvement.

Decision-makers of both private and government organizations can use the physical information and cost (Monetary) information provided by EMA to make decisions that impact both the environmental and financial performance of the organization. Implementation of EMA will strengthen the effectiveness of existing government policies and regulations by forcing to companies the true environmental costs and benefits resulting from those policies and regulations.

Methodology

This research study investigates Environmental Management and Environmental Management accounting in the Small and Medium Sized entities in Western Province**.** For that purpose we selected 272 companies in the small and medium size entities in the manufacturing sector in the western province.

Research Approach

It is observed that this research study falls in to empirical study category as a result hypothesis cannot be formulated with regards to this study.

Population and sample

The population of the research study represented all the small and medium size entities in manufacturing sector in western province in Sri Lanka. The sample is selected from 50 small and medium manufacturing companies operated in various manufacturing activities such as Apparel related, Rubber related, Food & Beverages, Plastic Product, Chemical & Mineral, Packaging and others miscellaneous activities. Firms are derived from the directory of the SME.lk website which is maintained by the Ministry of Industry and Commerce and National Enterprise Development Authority.

The sampling method was convenience sampling procedure. This method makes data more available and quickly to collect, enabling the researcher organizes data within shortest possible time and it is cost effective as well as making the sampling procedure very simple. Using this approach, information was elicited from respondents who had visited the companies to transact business and who were prepared and volunteered to provide the relevant information by willingly completing questionnaires within the limited period of time of their visit and the time duration allocated for the data collection is two months.

Data-collection

Qualitative method was used as the main data collection method and mainly the primary data was collected.The data gathering procedure employed was the survey techniques. This method was used since it is most appropriate given the nature of the topic and the most popular tool in data gathering in the social sciences. Generally, surveys refer to techniques of data collection whereby information is obtained through

the use of questions. In this study, face to face interview and questionnaire administrationwere used in collecting the data.

The kind of interview carried out for the study was a face-to-face type which was one-on-one and which was done concurrently with the questionnaire administration and 10 entities was directly interviewedthrough face to face type interviews. Also collected data through the mails and Out of 272 samples of questionnaires sent to SME entities, only 30 (11%) were returned and found to be usable. The low response rate of 11% was expected since EMA is a new accounting tool in Sri Lankan SMEs.

Strategy for Analysis

This research analysis has three stages; in first stage categorized the information collected through the questionnaires, into the main five sections based on the research objectives. In second stage, data converted into the descriptive statistic data to perform descriptive analysis such as frequencies, mean, mode, highest, lowest values and calculated percentages. In the third stage findings were analyzed using above descriptive statistic tools.

Analysis and Discussion

General Information

Small & Medium manufacturing companies operating in Western province in Sri Lanka were selected as the population due to higher level of contribution to the national economy despite the small land area. A questionnaire was prepared and data was collected from selected SME entities. According to the data collected following analysis can be done.

The main operation

Small and medium size entities in manufacturing industry perform various kinds of operational activities in order to contribute to the national economy. During the data collection stage data was gathered from SME entities and those data can be analyzed as follows (Refer table 3).

Table 3 : Profile of Respondents

Main Operation	Percentages %
Apparel Related	30
Miscellaneous.	23
Rubber Related	17
Food & Beverages	17
Plastic Product	7
Chemical & Mineral	3
Packaging	3

(Source: Author constructed)

This table illustrates the results of the survey where in what kind of operations have mainly done by the responded SMEs. Accordingly majority of the sample represents the Apparels related SME entities (30%). The second largest is miscellaneous manufacturing category (23%). This category includes label and sticker printing, water bottles and IT related manufacturing. Food and beverage and Rubber product manufacturing SMEs represents similar percentage (17%) and ranked in the third place. The lowest percentage is given for both Chemical & Mineral and Packaging SMEs (3%).

Respondent's Designation

During the research we get the perception that the research topic from respondent's who entities are in various kinds of designations in the SME. Accountants & Assistant Accountants are some of that etc. Those respondent's designations can be analysis as follows, (Refer table 4).

The table shows the results of the survey where respondents who are in which kind of designations in the Small and medium size entities. Accordingly it is clearly visible majority of sample represent respondents who are in the Assistant accountant designation. That is 33% when compared to the other designations. Respondents who are categorized under Accountant and Finance Executive designation represent same percentage in the sample. Those represent 24% when compared with the others as second majority in the sample.

Table 4: Respondent's Designation

Designation	Percentages %
Assistant Accountant	33
Finance Executive	24
Accountant	24
Financial Controller	14
Engineer Executive	5
Other	0

(Source: Author constructed)

Respondents who are in Financial Controller designation represent 14% of the sample when compared to the other designation. Generally knowledge from several areas is required to successful implementation, maintenance and communication results of an EMA system. Environmental Careers Organization of Canada (ECO) has cited in their official website (2016), Environmental Professionals includes environmental scientists, technicians, engineers, biologists, managers, consultants, and executives. However as per the above chart, designations of such environmental professionals cannot be seen. Except engineer executives other all are general designations in a finance department. As per the SMEs defined in above chapter, it has a lower number of employees compared to large manufacturing entities. Hence it is difficult to see designations of environmental professionals in a SME.

Annual Turnover

Small and medium size entities in manufacturing industry can be categorized in to different categories based on the annual turnover.During the research data was collected from SME entities about their annual turnover and those can be analysed as fallows, (Refer table 5)

Table 5 : Annual Turnover of SMEs

Description	Percentages (%)
Less than Rs. Mn. 15	10
Rs. Mn. 16 – 250	27
Rs. Mn. 251 - 750	17
Rs Mn .750 – 1000	20
More than Rs Mn 1000	27

(Source: Author constructed)

According to the table majority of sample is represented by the SMEs which has anannual turnover more than Rs.1000Mn and annual turnover between Rs.16Mn – Rs.250Mnranges (27 %). SMEs which earn annual turnover between Rs 750 Mn– Rs 1000 Mn range represent second majority (20%). Annual turnover Rs. 251Mn to Rs.750Mn range represent 17% the range less than Rs Mn 15 are represent 7% of the sample. In the literature review it is identified that entities which has its' annual turnover less the Rs. 750 Mn is categorised in the SME category. However as per research findings there are SMEs who earn more than the defined threshold and monitoring and regulatory institutes need to revise their definitions accordingly.

Number of Employees

The below table shows the number of employees employed in the SMEs sampled for this study.

Table 6 : Number of Employees

Description	**Percentages %**
Less than 50	13
50 -100	20
100 - 400	23
400- 700	17
More than 700	27

(Source: Author constructed)

According to the above table majority of sample is represented by the SMEs who have no of employees more than 700 range (27%). SME entities which maintain employee base between 100 – 400 ranges represent the second majority (23%). The employee range 50-100 holds the third place with 20 % of the sample. Range 400 – 700 and working less than 50 employee range represent 17% and 13% of the sample respectively.

Main Energy Sources

Manufacturing companies use various energy sources for their production process. According to the data gathered all of the companies use electricity as their main source of energy. Further 11 (28%) companies use Petroleum and 8 (20%) companies use LP gas as an alternative to the electricity. This situation is very general within the Sri Lankan context because most of the SMEs depend on national electricity supply. As well as they use electricity generators as a backup plan for electricity failures.

As per the 2015 Economic and Social statistics report of Central bank, Small and medium industrial units have consumed 2,001 GWh, which represents 18% of the total electricity production. So these statistics also reveal that considerable portion of national electricity production is used by SMEs. (Refer table 7)

Table 7 : Main energy sources

Energy Source	Frequency	Percentage %
Electricity	40	100
Petroleum	11	28
LP gas	8	20
Bio mass	4	10
Other	3	8
Furnace Oil	3	8
Coal	0	0

(Source: Author constructed)

As well as it is less likely that these entities move towards other energy sources such as wind power, solar power. The research results also imply that only 3 companies have adopted such other sources and it is only 8% from the total sample. Higher initial

investment cost and lack of technological knowledge are some reasons behind this situation. No companies have used coal for their production since it is widely used by manufactures such as electricity, steel and cement whose productions are larger than SMEs. The annual coal report in 2015 of the U.S. Energy Information Administration highlighted that the electric power sector has consumed about 92.5% of the total U.S. coal consumption in 2014.

Practices already adopted for preserving energy

The finding shows that the majority of the respondents adopted various electricity savings methods within their premises. Practices such as using CFL, LED bulbs, purchase of energy efficient machines can be easily implemented without undue cost and effort. (Refer table 8)

Table 8 : EMA Practices already adopted

Practice	Frequency
Adopting various electricity saving methods	26
Conducting awareness programs	17
Use of alternative energy sources	10
Having an energy saving policy	7

(Source: Author constructed)

Research findings indicate thatconducting awareness programs are also practiced in a moderate level. These practices includes switch-off bulbs, fans, A/C machines during the lunch time and after the office hours, use staircases instead of lifts and sending e-mails and pasting stickers regarding energy saving methods. So these practices suggest that awareness regarding environmental activities is increased.

The result also reveals that alternative energy sources are also adopted by majority of respondents. Though it is not the main energy source, companies have followed such practices in order to reduce their energy cost by some extent as well as several companies have adopted an energy saving policy with the purpose of saving energy.

Areas where environmental accounting is used

According to Burritt et al. (2002), EMA practices involve the tracking, tracing and treatment of costs, earnings and savings incurred in relation to the company's environmental-related activities. Respondents were asked to select areas where environmental accounting is used and following table summarizes the data gathered accordingly.

The below table shows environmental accounting information are widely used for making decisions in relation to Energy, Water and Waste areas. (Refer table 9). It could be due to SMEs viewing EMA as an important accounting tool in their internal management control system.

Table 9 : Areas where EMA is used

Area	Frequency
Energy	15
Water	16
Waste	11
Material	6
Carbon	3
Other	0

(Source: Author constructed)

Environmental Management Accounting (EMA) tools

According to the data gathered, most of SME manufacturing companies follow Water accounting and Energy cost accounting practices. It represents 40% (16) and 37.5% (15) respectively. This is mainly due to they use Water and energy for their manufacturing activities. (Refer table 10). Hence those costs represents majority oftheir overhead cost and need to be controlled.

As well as 11 and 8 companies have used Waste management tools and Environmental KPIs respectively. Further 9 companies were found that they not practicing any EMA tool in their business process. It shows that some manufacturing SMEs do not focus on the monetary aspect of EMA since they may likely be more involved in physical related environmental activities, without concentrating on the costing process. Additionally there might be lack of internal and external influences to

follow EMA practices as well as barriers to implement EMA. Reasons for those influences and barriers are discussed in next chapters.

Table 10 : EMA tools used

EMA Tool	Frequency	Percentage %
Water Accounting	16	40
Energy Accounting	15	37.5
Waste Accounting	11	27.5
Use of Environmental KPIs	8	20
Accounting for materials	5	12.5
Sustainability Balanced Scorecard	2	5
Life-Cycle Analysis	1	2.5
Material Flow Analysis	1	2.5
Not following any tool	9	22.5

(Source: Author constructed)

Relevance of Environmental factors on Management decision making

In this section it is expected to analyse the factors which are affected to the management decision making and magnitude of the factors in decision making (Refer Table 11 for survey analysis)

Table 11: Relevance of environmental factors on decision making

External	Very high	High	Moderate	Low
Comply with environmental laws	5%	80%	5%	
Comply with trade associations/trade unions	7.5%	7.5%	55%	30%
Comply with internal regulations/standards	2.5%	70%	27.5%	
Satisfy various stakeholders		35%	65%	
Publish sustainability related reports		35%	65%	
Maintain public relations	7.5%	22.5%	70%	
Improve turnover or innovation	2.5%	10%	87.5%	
Attract investors, employees or customers	17.5%	52.5%	30%	
Generate a better public image	25%	70%	5%	

Find new markets or introduce new environmentally friendly products/services	10%	72.5%	17.5%	
Internal	**Very high**	**High**	**Moderate**	**Low**
Reduce packaging	2.5%	17.5%	80%	
Use of recycled materials or reuse of materials		17.5%	62.5%	20%
Use of techniques and tools to reduce waste	10%	87.5	2.5%	
Control of emissions or carbon footprint			10%	90%
Reduce costs			65%	35%
Include environmental aspects in internal decisions			65%	35%
Encourage growth of new technologies using EMA practices		10%	87.5%	2.5%
Manage risk	10%	82.5%	7.5%	
Develop and implement material efficient/ energy efficient/water efficient processes	12.5	87.5		

(Source: Author constructed)

- **Compliance with the Environmental Laws**

  According to the collected data through the survey it is observed that 80% of the responses are supported that there is a high relevance for the management decision making process from compliance with environmental laws prevailing in the current environment.

- **Comply with trade associations/trade unions**

  In the case of Compliance with the trade associations, responses are indicated that it is moderately relevant to the management decision making process. Because in the SME sector trade associations are not that much strong when compared to the large-scale organizations.

- **Comply with internal regulations/standards**

  As observed in the survey there is a high relevance for management decision making from internal regulations and standards. Most of the time internal regulations and standards are designed and imposed by the management for their own necessities. Due to that it is highly impacted on relevance of

management decision making process. As per the survey 70% of the companies in the sample believe that it is highly relevant to the decision-making process.

- **Satisfy various stakeholders**

  When it comes to the SME's Stakeholders most powerful stake holders are the management if management believes that EMA practices are not relevant to their decision-making process they tend to not to adopt EMA practices for their entities. That is the reason behind the observations. As per the observations entities moderately believes that satisfying all the stakeholders is not that much relevant to the management decision making process.

- **Publish sustainability related reports**

  In most of the large-scale Sri Lankan companies tend to Publish sustainability related reports in their reporting practices because they believe their operations are highly impacted on the sustainability of the environment. As far as scale concerns SMEs are not that much impacted to the environment individually but collectively there is a huge impact on environment from the SMEs. As per the above concern SMEs do not tend to prepare sustainability reports which have resulted in moderate relevance to management decision making process.

- **Maintain public relations**

  Same as the sustainability reporting, when compared to the large-scale companies' public relations are minimal in SME sector due to that decision relevance is at lower level. As per the observation in survey 70% of entities believe that maintaining public relations are moderately relevant for the decision-making process.

- **Attract investors, employees or customers**

  Companies seen as leaders and innovators can be in a stronger bargaining position when it comes to attracting investment, initiating new activities, entering new markets, and negotiating contracts. Measuring sustainability performance can help companies to meet regulatory requirements effectively, avoid costly breaches, and gather necessary data in a more efficient and cost-

effective way.Transparency about non-financial performance can help to reduce reputational risks, open dialogue with stakeholders such as customers, communities and investors, and demonstrate leadership, openness and accountability. That is the reason why 53% of the entities believe that it is highly relevance in management decision making process.

- **Reduce packaging**

  Adopting EMA for manufacturing process does not necessarily reduce packaging cost because green product generate benefits in long run that is the reason why 80 % of entities believes it is moderately impacted on management decision relevance.

- **Use of recycled materials or reuse of materials**

  Recycled materials are not effective in manufacturing process as original raw materials therefore entities are less likely to use recycled materials in manufacturing process. As per the observations found in survey 63% of entities believe that it is moderately relevant to the management decisions and less impact on decisions.

- **Use of techniques and tools to reduce waste**

  As per the observations found in survey most of the SME sector companies use techniques and tools for reduction of waste. Because reduction of waste always results in profit increment and cost reduction of the entity. 87% of the entities believe that use of techniques and tools to reduce waste is highly important and decision relevance.

- **Control of emissions or carbon footprint**

  As per the observations 90% of the companies believes it is low relevant to management decision making because adopting, measuring and reporting carbon foot print is high costly process which will negatively affect to the profits and performance of a company .That is over burden for SME as well.

- **Reduce costs**

  According to the survey results 65 % of the companies believe that EMA does not contribute to the reduction of the cost of the entity. As per the observations small scales companies are not benefited from the economies of scale but larger companies benefited from the economies of scale. EMA directly related to the economies of scale therefore adopting EMA most of the time benefits to large scale companies rather than small scale companies. Due to that reason, most of the SMEs believe adopting EMA does not necessarily reduce cost.

- **Include environmental aspects in internal decisions**

  Survey result indicates that 65 % companies believe it is moderately affects to internal decision making and less relevance of management decisions. Those who use fewer amounts of EMA practices contribute less to the decision making and their intension is the information generated through environmental reporting is less value relevant and lower likelihood for internal decision making.

- **Encourage growth of new technologies using EMA practices**

  Growth of new technology contributes to the measuring, analysing and reporting EMA practices of entities, Technology has contributed to reduce EMA adoption, implementation and maintenance cost which is very helpful to relevant information. Some companies have developed integrated systems for measuring reporting and analysing EMA information for decision making.

- **Manage risk**

  Frameworks for environmental management accounting refer to a number of tools that assist managers to address the environmental effects of their businesses. One area that has not received systematic attention is the link between environmental management accounting information and risk (and environmental risk) management. As per the survey data 82% of the entities adopts to manage risk because in SME sector entities future potentials decides by the risk and always try to minimise the risk as much as the can.

- **Develop and implement material efficient/ energy efficient/water efficient processes**

  Energy plays vital role in SME in most of the companies that we selected for our research is basically manufacturing companies and their energy cost is major part compare to the other costs that they incurred. Therefore, these companies always try to adopt practices to minimise the energy, water and material cost. By adopting EMA it is easier to manage energy, water and material efficiently. As per the observations found in survey data 88% of the companies internally use energy efficient, material efficient and water efficient techniques for their day to day operations therefore it is Positive Avenue for EMA and decision relevance is high for this factor.

The extent EMA practices have enabled make an impact on organization

According to the data gathered, EMA practices have enabled make an impact on organization in relation to the company's environmental-related activities. The data was collected and measured them on a scale of 1 (not at all) to 6 (to a great extent) the extent of EMA practices. Following table shows what extent EMA practices have enabled make an impact on organization.

Table 12 : The extents EMA practices have enabled make an impact on organization

	What extent EMA practices have enabled make an impact on organization	**Mean**
1	EMA practices was helped in developing/designing energy/water efficient processes [or to reduce waste in these areas]	5.28
2	Adoption of EMA practices created additional work for the staff	5.20
3	EMA practices facilitates to better report on the GRI Guidelines (sustainability or integrated reports)	5.20
4	EMA practices encouraged the growth of new technologies	5.20
5	EMA practices required extra investment that was not justified by the benefits.	5.15
6	EMA enables to comply well with the regulations.	5.13

7	EMA assists to obtain/maintain certification standards such as ISO.	5.13
8	Following EMA resulted in added complexity for the tasks/operations.	4.68
9	EMA practices were useful in making effective internal decisions by incorporating environmental aspects.	4.45
10	EMA practices helped in controlling of emissions or carbon footprint.	4.23
11	EMA practices helped in managing risk of the business.	4.23
12	EMA practices enabled to reduce packaging/cost of materials.	3.90

(Source: Author constructed)

According to the above table, managers of the manufacturing companies believe that EMA practices highly impact to developing/designing energy/water efficient processes (5.28), created additional work for the staff (5.20), EMA practices facilitates to better report on the GRI Guidelines (5.20), encouraged the growth of new technologies (5.20), practices required extra investment that was not justified by the benefits (5.15), comply well with the regulations (5.13), obtain/maintain certification standards such as ISO (5.13).

In addition, EMA practices are moderately impacted to added complexity for the tasks/operations (4.68), useful in making effective internal decisions by incorporating environmental aspects (4.45), helped in controlling of emissions of carbon footprint (4.23), helped in managing risk of the business (4.23), reduce packaging/cost of materials (3.98).

- **EMA practices helped in developing/designing energy/water efficient processes [or to reduce waste in these areas].**

According to the collected data sets, managers always are looking to implement EMA practices to developing and designing energy (5.28) by planning and development aspects of EMA's in energy sectors.Therefore corporate strategies of the companies link with the environmentally sustainable and secure energy supply like solar energy that ensuring sufficient power generation capacity in the long term.

- **Adoption of EMA practices created additional work for the staff.**

To implementing EMA practices in the companies, managers need to do additional tasks. Therefore most of the selected companies' employees are doing EMA practices in addition to their day to day activities. Because of that managers highly believe (5.20) task lists of the employees in the selected companies has been increased due to EMA practices.

- **EMA practices facilitates to better report on the GRI Guidelines**

When going through with selected manufacturing companies, it was found that the EMA practices are more helpful to sustainability reporting (5.20). Reports published by companies about the economic, environmental and social impacts caused by its everyday EMA activities.

Sustainability reporting can help organizations to measure, understand and communicate their economic, environmental, and social and governance performance, and then set goals, and manage change more effectively. Therefore managers are more concentrate about the EMA practices in selected companies.

Therefore managers are using, triple bottom line reporting, corporate social responsibility (CSR) reporting, and more.

- **EMA practices encouraged the growth of new technologies.**

Generally EMA practices have been developed than before, therefore new technologies are required to develop EMA practices further. According to the selected manufacturing companies, who are implementing EMA practices encouraging with new technologies (5.20) like solar panel system, new water management system, waste management and water management system.

- **EMA enables us to comply well with the regulations.**

In Sri Lanka currently executing bellow mentioned rules and regulations.

Acts

- National Environmental act (Act No. 47 of 1980)

Regulations

- Environmental Protection License Prescribed Activities.
- National Environmental Protection & Quality Regulations.
- Air emission, fuel & vehicle importation standards.
- Prohibition of Ozone depleting substances.
- PermissibleAmbient Air Quality Standards in relation to class of Air Pollutants.
- Prohibition of Polythene or any polythene product of 20 micron or below in thickness.
- License for discharge, emission or disposal of waste/scheduled waste management.
- Appointing Forest Department as a Project Approving Agency.

AccordinglySME manufacturing organizations, whichhave currently implemented EMA practices, automatically comply with rules and regulations mentioned above.

- **EMA assists to obtain/maintain certification standards such as ISO.**

To obtained ISO certification relating to environmental practices, companies must follow the basic requirements. Mainly bellow types of ISO certificates can be obtained by companies.

- ISO14001- Certification and Environmental Protection Activities.
- ISO 14000 - Environmental management.

Base on the comments of respondents (5.13), EMA practices have supported them in obtaining, maintaining local and international certifications such as ISO and SLS certifications.

Barriers to implement EMA practice

Being a developing country, Sri Lankan manufacturing SMEs face numerous challenges in adopting Environmental Management Accounting (EMA) practices. The authors identified many such challenges and barriers using questionnaires and interviews. The following table summarizes research findings for barriers that are faced by the SMEs.

Table 13: Barriers to EMA implementation

	Barriers to implement EMA	Mean
	Attitudinal Barriers	
1	EMA practices are difficult to implement in the existing costing systems	5.250
2	The company is not interested in the collection of environmental data as they are not considered to be important for our business	4.425
	Financial Barriers	
1	Adoption of EMA practices is too costly	5.225
2	The company is too small to adopt EMA we do not have enough resources	4.900
	Informational Barriers	
1	Our company does not have staff with expertise in EMA	5.100
2	We have limited or little knowledge on the suitable EMA practices	5.050
3	Capturing of environmental costs is not possible (or too difficult) due to lack of flexibility (or no room) in my accounting information system	4.775
4	We are not clear which costs are environmental and how to account for them	4.075
	Institutional Barriers	
1	We do not have any external stakeholder pressures to adopt EMA practices	5.050
2	The top management is not interested in implementing EMA practices	4.250
	Management Barriers	
1	There is lack of support from accounting/other departments when we implement EMA practices	4.875
2	Present organizational structure does not support adoption of new EMA practices	4.400

(Source: Author constructed)

Respondents were asked to measure on a scale of 1 (Not sure) to 6 (Very high) on factors hindering EMA practices. The mean is calculated using the measures on a scale and identified significant factors that are affected to implement to the EMA practice.

When consider attitudinal barriers the most of the company management believes that the EMA practices are difficult to implement within their existing costing system (5.250). Also they think that company is not interested in the collection of environmental data as they are not considered to be important for their business (4.425).

The result shows that financial barriers are one of the most important factors that prevent the organization from practicing EMA. Managers believe that adoption of EMA practices is too costly (5.225) and the company is too small to adopt EMA & they do not have enough resources (4.900), are the two main barriers to the implementation of EMA practices in Sri Lankan manufacturing SMEs.

With regard to informational barriers the study shows that the company does not have staff with expertise in EMA (5.100) and have limited or little knowledge on the suitable EMA practices also lead to the decision not to implement EMA practices. Also managers believe that capturing of environmental costs is not possible or too difficult due to lack of flexibility in their accounting information system (4.775) and they are not clear which costs are environmental and how to account for them (4.075) are also act as barriers to not to not to implement EMA practices.

When consider the institutional barriers SME managers have responded that they do not have any external stakeholder pressures to adopt EMA practices with a mean value of 5.050 and the top management is not interested in implementing EMA practices (4.250). In the process of implementation of an EMA practices within the organization top management involvement and stakeholder pressures play a major role. Their decision might be lead to consider EMA as an activity which brings competitive advantages, comply with legal requirements as well as a core business activity of the entity which generates a value to their product as same as other value creating activities.

With regard to management barriers, the study shows that lack of support from accounting & other departments to implement EMA practices lead highly to the decision not to implement EMA practices with a mean value of 4.875 as well as present organizational structure does not support adoption of new EMA practices (4.400). Implementation and continuation of successful EMA practices is not only a responsibility of accounting department but also the support of all employees in all departments are required. It is a collective approach at the inception of the idea to collect, analyse and communicate results in order to make decisions.

When consider the overall results following factors are the main barriers to the implementation of EMA practices within Sri Lankan manufacturing SMEs. EMA practices are difficult to implement in the existing costing systems (5.250), Adoption of EMA practices is too costly (5.225) and the company does not have staff with expertise in EMA (5.100). It is obvious that SME managers believe adaptation of EMA practices would be a reason for increase their cost and be an extra burden to pricing their products. As well as in order to measure EMA performances knowledge from several areas is required. These areas include not only accounting but also areas such as engineering & mechanical, architecture and physical sciences. So it is clear that such a mix of knowledge is not available at SMEs.

Summary and Conclusion

This study was considered to review the adoption of EMA practices by the SMEs in manufacturing sector in Western Province of Sri Lanka. In the analysis part, it is explained that the SME's are playing a major role to the development of national economy. Regarding the research objectives, the conclusion is discussed as follows.

In the first part of the research analysis data related to main operation of the respondents was analyzed. Accordingly more data was gathered from the apparel sector. Then designation of the respondent was analyzed and majority of respondents held assistant accountant and finance executive post in their respective entity. Further it was noted that there is no professionals who has sound knowledge regarding environment such as environmental scientists, technicians, engineers, biologists. EMA practices have designed, maintained, measured by the staff in the finance department. As per research findings there are some SMEs who earn annual turnover more than the threshold defined by monitoring and regulatory institutes. Hence such thresholds need to be revised. Further there were SMEs who have number of employees more 400, which is also greater than the threshold defined by monitoring and regulatory institutes.

In the next chapter data related to energy sources was analyzed and it was noted that all of the respondents use electricity as their main energy source. In addition to that, petroleum and LP gas also usedas an alternative to the electricity. Few companies use alternative energy sources in addition to electricity such as solar panels, wind power. No companies have used coal for their production since it is widely used by manufactures such as electricity, steel and cement whose productions are larger than SMEs.

The finding shows that the majority of the respondents adopted various electricity savings methods within their premises such as using CFL, LED bulbs, purchase of energy efficient machines because such can be easily implemented without undue cost and effort. Beside that conducting awareness programs, energy saving policies are also practiced in a moderate level. This shows that SMEs are also stepping towards better EMA practices. It is also revealed that SMEs widely use EMA for making decisions in relation to Energy, WaterandWasteareas.

According to the data gathered, most of SME manufacturing companies follow Water accounting and Energy cost accounting tools.This is mainly due to they use Water and

energy for their manufacturing activities.Hence those costs represents majority of their overhead cost and need to be controlled. Therefore they pay more focus towards this area.

In the third chapter internal and external factors caused to managers' EMA decisions were analyzed. When consider the external environmental factors, environmental laws, internal regulations/standards and to find new markets or introduce new environmentally friendly products/services has higher relevance to the decision making. As well as internalenvironmental factors such as use of techniques and tools to reduce waste,develop and implement material, energy, water efficient processes and manage risk has higher relevance on management decision making. Further there is a moderate relevance on encourage growth of new technologies using EMA practices and Reduce packaging cost.

Respondents believe that EMA practices were helped in developing, designing energy, water efficient processes and to reduce waste in these areas with the highest mean value compared to other factors. Further it was revealed that adoption of EMA practices created additional work for the staff andEMA practices encouraged the growth of new technologies in the organization.

In the final chapter barriers to implement EMA practices were analyzed. Following barriers shows that respondents believe that, EMA practices are difficult to implement in the existing costing systems, adoption of EMA practices is too costly and the company does not have staff with expertise in EMA.

This study has a number of implications. The government, especially the departments involved in manufacturing SMEs, can play a significant role in promoting EMA practices through the issuance of proper guidelines and training. Because the finding shows that attitudes of the management is the most important barrier that prevents them from implementing EMA. Further insufficient staff, little or limited knowledge on suitable practices also restrict the integration of environmental issues in to the current accounting systems and practices.Accounting professional bodies should also be involved in promoting EMA by providing a better framework for EMA practices. In conclusion, the pursuit of integrating environmental issues into existing accounting systems and practices requires organizational learning mechanisms, greater corporate responsibility and proper guidance on EMA.

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