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## Environmental Management Accounting in a Manufacturing Arm of a Financial Services Sector Organization: A Case of a Sri Lankan Organization

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### Abstract

**Purpose** - The purpose of this paper is to examine why and to what extent a manufacturing arm of a financial sector organization in Sri Lanka adopts and implements environmental Management Accounting practices.

**Design/methodology/approach** - The study followed a case study approach. The primary data were collected by conducting semi structured interviews and observing organizational processes. Secondary data were collected through analyzing documents such as internal records, online sources including the organization's web site and various other records. In the data collection process higher emphasis was placed on data triangulation. Data analysis was carried out following an explanation building approach.

**Findings** - The study identified that although the waste management initiatives are practiced to a great extent, they do not encompass a comprehensive and an integrated approach. The intention for cost savings and the significance of the output being generated are the main drivers for adopting environmental management accounting practices. Top management awareness remains poor and an integrated strategic approach for sustainability management is not well established within the organization.

**Research limitations/implications** - Due to the context specific characteristics, the findings of the study will be difficult to generalize. Also, the study mainly emphasized on the process of collecting and re-using gold dust, but other critical areas such as waste water and air pollution was not investigated.

**Originality/value** - The study attempts to fill the gap of environmental management accounting research in a manufacturing operation of financial sector of a developing country. The findings of the study will be expedient to the sector in developing and retaining environmental management accounting practices.

**Key words** – Developing country; environmental management accounting; financial service sector; waste management initiatives.

**Paper type** - Case Study

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## **1. Introduction**

Sustainability is a vital phenomenon in today's world since all human choices and actions will affect the future of the planet. Although, the earth provides for the needs of the living, if the environment is not taken proper care of, it will be damaged, and may even lead to extinction of all the living beings. Hence, it is vital to reduce the harmful impact of human activities on the environment and reduce the consumption of natural resources (Erdas, 2011). To this end, managing scarce resources and minimizing wastage is extremely important within the modern corporate world and businesses are continuously looking for measures and techniques to meet sustainability challenges.

There is an increasing pressure from stakeholders not only on managing scarce resources but also about the impact of corporate activities on the environment. The costs of environmental impacts have led to the emergence of various perceptions and practices of environmental accounting (Burritt *et al.*, 2002). Despite the importance of environmental accounting for any business organization, there is a dearth of research pertaining to the financial industry. Therefore, an organization operating in the financial industry of Sri Lanka has been selected to analyze how sustainable business practices are being applied. An efficient financial sector is essential to a well-functioning economy whereby it should serve in improving the efficiency of the economy as well as increasing its productivity (Pisano *et al.*, 2012). Even though sustainability is among the key words within the current context, the financial services sector hasn't been doing a very good job in these realms as they lurch from one major financial crisis to another (Eccles and Serafeim, 2013). We believe the findings of this study will contribute to fill the lacuna of research in this less researched industry of a developing country.

Stakeholders do not think environmental issues are irrelevant to financial institutions. They think that sustainability initiatives, especially environmentally responsible practices, can greatly benefit the institution itself more than the better public image generated (Eccles and Serafeim, 2013). Therefore, amidst the highly volatile business environment, the necessity for implementing environmental friendly initiatives and proper waste management strategies within the organizations operating in the services sector, especially the financial services sector is becoming vital.

The selected organisation is a leading finance company registered under the Monetary Board of the Central Bank of Sri Lanka. Its product range includes fixed deposits, pawning, gold sales, leasing, hire purchase and property development. Among them, pawning and gold sales are two important products of the company. Sale of gold is being focused and is under the spotlight in this research. The company provides pawning advances on gold articles with a total settlement period

of 13 months from advanced date. As a general practice, all customers do not redeem their jewelry and ownership of those articles ultimately transfers to the company. Since gold is a valuable material and every mili gram of gold has a significant value addition to the organisation, the company uses the unredeemed jewelry to prepare gold bars or sell in their show rooms. If a customer does not redeem the articles, the items are being transferred to the gold division through a stock transfer. Normally 90% of pawned articles are redeemed by customers and only 10% are transferred by pawning division to gold division as unredeemed articles.

The rest of the paper is organized as follows. Section Two presents the literature review of the study which is then followed by the research methodology in Section Three. Section Four provides the findings and discussion. The last section provides the conclusions.

## **2. Literature Review**

The term “sustainability” is among the most important themes that emerged at the global level in the last few decades. According to World Commission on Environment and Development (1987), in a report accepted by many as one of the first global reports to address sustainability, sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Serious efforts are currently in place by growing number of companies worldwide to incorporate sustainability into their business practices. But most organizations face the problem of sustainability being alienated from the business strategies and performance evaluation which is frequently liberated by purely economic indicators (Petrini and Pozzebon, 2010). Since the interconnected world today is overwhelmed with environmental, social, economic and ethical issues, Avery (2010) states that organizational performances can be enhanced through a system of sustainable practices. Organizations are increasingly tending to integrate expectations of the society to their business practices to provide better response to the rising pressure from stakeholders while exploring prospects to build competitive advantage (Petrini and Pozzebon, 2010).

However, there is a notable absence of sustainable development literature on the services sector despite its global impact. It is little known how and to what extent service organizations adopt and/or implement sustainability practices especially in developing countries particularly in relation to waste management practices (Gunarathne and Lee, 2013). Managing waste is one of the most challenging for industrial, commercial and institutional sector since organizations are dealing with various types and large amounts of waste. So an integrated waste planning

approach is needed to define solid solutions and to create comprehensive strategy which is capable of supporting the organization in light of changing economic, social, material and environmental conditions (Davidson, 2011). Thus there is a need to demonstrate how environmental/sustainability management accounting practices are applied by organizations especially in the services sector. The next section provides the methodology applied in the study for this purpose.

### **3. Methodology**

Yin (2009), states that a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between the phenomenon and context are not clearly evident. Case studies have emerged as an increasingly important qualitative approach in many management disciplines (Gummesson, 2000; Scapens, 2004). It is advantageous to use case study methodology to analyze sustainable practices of the company as it studies the given context in detail. The case study method was identified as appropriate due to nature of research question, lack of control over events and focus on the contemporary real life phenomenon in the study (Yin, 2009). Marginson (2004), states that the ability to collect data from multiple sources is a major strength of a case study.

In order to collect data the company premises was visited and data were collected from primary and secondary sources. The primary data were collected by conducting semi structured interviews with the General Manager. The first interview was held in the first week of July 2013. Within the duration of four hours, entire polishing and refining processes were observed. Subsequent interviews were carried out in the third and final weeks of July 2013 to clarify further matters regarding process and environmental practices. These interviews lasted for about three hours. In addition to the interviews with the General Manager, several discussions were conducted with operational and executive employees involved in the process for the purpose of data triangulation. This helped to gain and verify information in relation to environmental and sustainability practices within the company.

As secondary sources of data, polishing reports, refining reports, waste summaries, daily energy records, and various documents were analyzed. Further, prior to and after the site visit, company web site, annual report and various relevant online resources were observed. Also, physical artifacts were observed and photographs of the polishing and refining process, equipment and documents were taken with prior approval of the company. Through telephone conversations with the General Manager, issues which arose in the course of analyzing the facts were clarified.

Marginson (2004) stated that in case study approach, when collecting data there should be a point of saturation and to ensure the accuracy of data collected, triangulation can be carried out. In this study, triangulation was ensured through collecting data from both primary and secondary sources. Data collected through interviews, observations, documentary review and physical artifacts were triangulated to improve the trustworthiness of the research work. As stated by Yin (2009), validity and reliability of data was ensured during the data collection process.

The researchers first prepared a process map to understand the production process of this organization (refer Appendix 01). This enabled them to get a better understanding on how the waste is generated and the treatments taken. The data were analyzed based on the different processes involved. During the data analysis process, explanatory case study building approach was undertaken to analyze the multiple data gathered from different sources (Yin, 2009). The next section presents the findings and discussion.

#### **4. Findings and Discussion**

The value of the raw materail, i.e., gold can be seen as the major driver towards implementation of sustainability initiatives in the organization under study. After an effective categorisation by gold experts, the unredeemed gold items are devided into two parts as explained in Appendix 01, i.e., salable items and unsalable items. Salable items are sent to showrooms after polishing, cleaning and plating processes. From that process jewelry is upgraded to a salable condition. Balance unsalable items are sent through a melting process and a gold bar is produced as an output, which will in turn provide an income to the organisation.

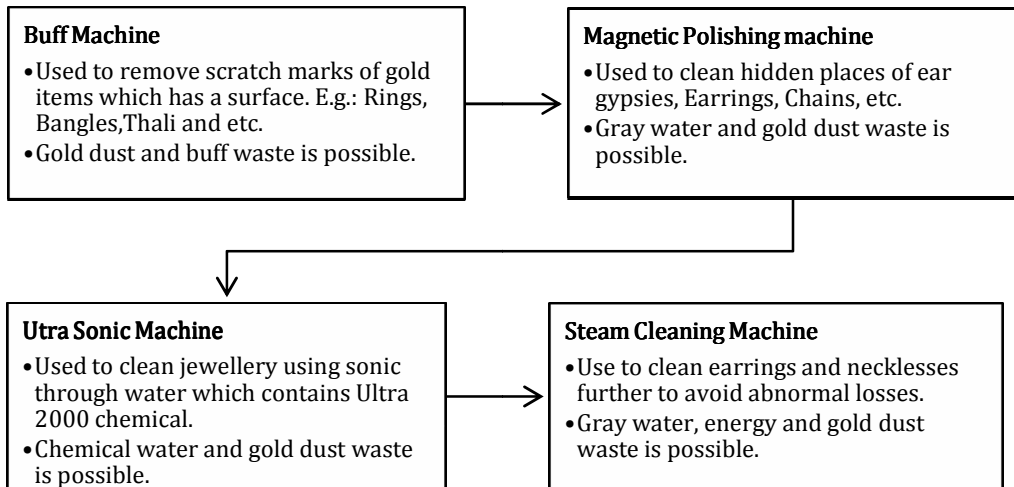
Throughout this process, waste is generated from five major instances. They are a) pollishing and cleaning b) plating c) stone and other material seperation d) cutting and e) melting. Sustainability aspects have been incorporated in each of these processes to ensure the maximum utilization of its most valuable output –gold. The next section describes the sustinability actions taken by this organisation in these five processes.

##### **Polishing and cleaning process**

The polishing and cleaning process is depicted by Figure 01 with possible waste that can occur at each stage. In this process, the Buff machine is being used to confiscate scratch marks and polish gold items. A separate tank has been built to collect the gold dust waste generated from this and at the end of a justifiable period, according to the judgement of the professionals involved, this waste is collected, measured and input to the system. A diversified team is involved to ensure the smooth flow and accuracy of measurement. At each year end, the

collected gold dust waste is sent to an outsourced company for cleaning and refining which ultimately leads to a salable by-product. The company is unable to handle the refining process due to lack of technological facilities and knowledge, which ultimately results in abnormal losses.

**Figure 01 - Polishing and cleaning process**



Source: Author Constructed

In the magnetic polishing machine, gray water and gold dust is recognized as waste. The gray water is pumped to a sediment tank which is being built in the premises. To collect the gold dust remains in the pins used in the polishing machine, a separate collection is done and the collected dust is sent to an outsourced company.

In both the Ultra Sonic machine and the Steam Cleaning machine, waste water is generated and it is being pumped to the sediment tank. Additionally the Steam Cleaning machine generates a high heat and the company has failed to use this heat successfully, for a value adding activity of the organization. All these waste management practices have been designed due to the value significance of the material with which the division is dealing. At the end of each process, gold weight variance analysis is done and variance reconciliations are prepared. As far as the polishing process is concerned, base materials (gold items which are having surfaces like rings, bangles), electricity and operating materials (such as equipments, chemical catalysts, equipment cleaning solvents and office and cleaning supplies) are being used. Physical measure of gold dust waste can be illustrated as, *“number of grams of gold lost during the cleaning and polishing*

*process of gold items in a batch*". Currently, the company measures the weight loss of polished gold items batch wise by preparing polishing reports.

It is clear that accounting and recording of waste is done purely to ensure cost savings. The General Manager stated during the discussion carried out;

*"These documents are done only for the protection and survival of the division. No one has told us to record anything."*

This confirms that the recording is done to ensure the compliance with internal standards as suggested by IFAC (2005).

The monetary value is assigned to this physical measure by transferring cost to cleaning and polishing activity from pawning. Using the polishing report the calculation can be performed for each batch and for each gold item in that batch considering the variance (the difference between new weight and previous weight) and per gold gram cost. If the entire batch is considered, the cost of lost gold during the cleaning and polishing process would be calculated as:

Cost of lost gold = Variance (in grams and milligrams) × Per gold gram cost

Where,

Per gold gram cost =  $\frac{\text{Transferred cost from pawning division}}{\text{Transferred weight of that gold item}}$

Since an extensive cleaning process is being carried out using the Buff machine, the Magnetic Polishing machine, the Ultra Sonic Cleaning machine and the Steam Cleaning machine, wastage is possible from any of these points. Therefore gold wastage, water and energy consumption at individual cleaning stage is measured in physical and monetary terms. This measurement would be more meaningful for effective decision making compared to the analysis of entire process only at the beginning and at the end.

### **Buff Machine**

As Burritt *et al.* (2002) suggest physical EMA information tracks on the use, flows and destinies of energy, water and materials (including wastes). Thus, the amount of gold lost due to the Buff machine cleaning in a respective cleaning batch can be regarded as physical EMA information. The monetary aspect of this physical EMA measurement is derived as below, where the difference between initial weight and the weight after buff polishing is considered to be the gold variance.

The cost of gold variance = Gold variance × Per gold gram cost

### **Magnetic Polishing Machine**

Here, “the amount of gold dust thrown to the sink per each water renewal” can be considered the physically measured EMA information which is then used to calculate “the cost of gold variance” (Weight of gold after buff cleaning – Weight of gold item after magnetic polishing) by incorporating *per gold gram cost*.

In this case, the measurement would be possible as in a normal process the water used for magnetic polishing is renewed after every 4-5 kg of gold cleaned. When throwing water to the sink, through a proper filtering mechanism, gold dust which is mixed with water and magnetic pins is identified and measured. At the same time in this stage, there is an opportunity for accounting for water consumption as “liters of water consumed by magnetic polishing machine per cleaning batch” and monetary value is assigned through “cost of water consumption per batch of magnetic cleaning”. This once again reflects the physical and monetary aspects of EMA (Burritt *et al.*, 2002).

### **Steam Cleaning Machine**

When using the high pressure Steam Cleaning Machine in the cleaning process, gold dust as well as steam is spread to the air, and it is not practically possible to measure these wastages. Therefore when accounting for this activity, gold dust waste and water consumption is not effectively incorporated.

### **Ultra Sonic Cleaning Machine**

In the Ultra Sonic Cleaning Machine each batch cleans up to 4-5 kg of gold items and required level of water is measured and used. Therefore measurement of water consumption is easy to find. During the cleaning process of Ultra Sonic machine a chemical called Ultra 2000” mixed with water is released and that water can be measured in physical terms as “liters of chemical mixed water consumed per cleaning batch of gold items”. In this scenario, “cost of water consumed per Ultra Sonic Cleaning per batch” and “cost of chemical used (Ultra 2000) per batch of cleaning” can be measured and accounted.

### **Plating process**

Before the gold plating bath, jewelry should be cleaned using  $\text{HNO}_3$  and Electro acid. Acid water is pumped in to the sediment tank and finally this water is sent to a basic filtering process to condense the chemical effects before releasing in to the environment. Since gold dust is mixed up with the gray water of every bath tub, the water filtering practice has been introduced to collect the gold dust hidden in the sediments.



### **Stone and other material separation process**

Unsalable items include jewelry with stones, jewelry without stones and normal chains. Before sending these bulks into the melting process, stones, other materials such as threads, metals, elephant hair, etc. should be removed from the items to avoid abnormal losses and to reduce different unpleasant odors harmful to the environment. In this separation process gold dust is created as a waste and it is being collected and entered in-to the system through a systematic measurement process. And the removed stones and materials are packed, which either being used in jewelry manufacturing process or sold.

In removing stones attached to gold items, gold dust is weighed in milligram terms. Since the stone removal is carried out in a covered table, after stone removal of a batch, gold dust remained on the table will be brushed and collected. This can be measured in physical terms as “amount of gold milligrams collected from the stone removal table per batch of melting”. And this is multiplied by per gold gram cost which leads to account for the “cost of gold dust collected from stone removal”. The accounting for “gold dust collected from stone removal” too reflects the physical and monetary aspects of EMA (Burritt *et al*, 2002).

After stone removal, the entire cleaning process is required to be carried out before melting gold items, thus all physical and monetary measurements can be applied depending on cleaning machines and activities carried out.

### **Cutting process**

In this process jewelry is cut into small pieces to facilitate gold melting. Since the size of the Inductive Machine is small, cutting into small parts is necessary for a smooth melting process. Here too, gold dust is generated and it is collected in a flat tray during the cutting process. The collected dust is measured, input into the system which ultimately leads to a valuable by-product in the course of the refining procedure.

This cutting process is another possible area of gold loss. At this instance also, gold loss can be measured as “amount of gold lost due to cutting gold items in preparing a batch for melting” and accounted as “cost of gold dust collected from cutting” using the standard measure of per gold gram cost.

### **Melting process**

Items which are being cut in the process and other types of jewelry such as chains, rings and earrings are categorized accordingly. Then they are put into the Inductive Melting Machine following a sequential order. Normally, gold melts at the temperature of 1064<sup>0</sup>C which generates a massive heat to the atmosphere which can even be harmful to human beings. This is being addressed by the company via

providing masks to the employees engaged in this process. This represents the company's concern on social sustainability where it tries to protect its work force.

A separate electricity line for this whole process has been activated with effect from February 11, 2013. Therefore electricity consumption can be separately identified from the general electricity cost of the premises. Induction Melting Machine operates using electricity and the company maintains a separate three phase electricity line for melting process. Thus the electricity consumption is easily and accurately measured and accounted by obtaining "the amount of electricity units consumed and monthly electricity cost incurred for melting machine" by looking at the monthly electricity bill.

As described above all gray water is being put into the sink, which is located in the operational premises, and all chemical water and normal water is being pumped into a machine which contains three tanks to filter gray water step by step and at the end filtered water is being sent to a sediment tank which is situated outside the premises. At each month end, gold sediments accumulated in the filtering tanks and outside tank is being sent to an outsourced company for refining. The proper treatment of sediments in this way generates financial benefit to the organization, as there is a considerable value in the gold included in the sediments. Waste water of the sediment tank after a proper purification process is pumped to the national drainage system.

Getting the gold bar washed and cleaned will cause further gold dust loss. This reduction of gold weight can also be measured as "grams/milligrams of gold dust collected in wash basin from gold bars per batch of melting". This would be possible by identifying the washing process separately. Water consumption for the head office and cleaning, polishing and melting process is not segregated since a common water connection line is used for all activities in the premises. However, water cost has not been a burden since the cost is insignificant and the key focus of top management is towards staggering electricity cost. The normal loss of the melting process is decided as 1% by the company management and hence it is just ignored without allocating a monetary value. This practice can be further improved by incorporating a monetary value for the loss as suggested in Material Flow Cost Accounting- MFCA (Strobe and Redmann, 2002; Annett, and Uwe, 2012), accordingly the normal loss value using the positive product output can be as below:

$$\begin{array}{l} \text{(Weight of gold items in a batch before entering to the} \\ \text{melting process * 1\% normal loss)} \end{array} \times \begin{array}{l} \text{Per gold gram} \\ \text{cost} \end{array}$$

In the evaluation of current sustainability practices of the company, it is noted that the company is having a status which is close to a cradle to cradle approach (El-Haggar, 2007). Almost all the wastage that is generated in the polishing and refining of pawning articles is well managed where the company has achieved Economic and Environment pillars of sustainability to a considerable extent. But social sustainability is still at an infant stage. Since the company is refining the pawning articles in the absence of customers to release those, they are producing gold bars and biscuits to the economy which ensures the economic sustainability of the firm. Moreover, all the gold waste generated in this refining process is collected and sent to an outsourced company, which indirectly generates an income to the organization and a value addition to the Gross Domestic Product (GDP).

Environmental sustainability is addressed where the organization ensures that waste water is not directly released to the environment, but a basic refining process is done to make sure the damage is lessened. But as a loophole, it is identified that no practice is undertaken to prevent the release of toxic air to the outer space as highlighted in a full mass balance (IFAC, 2005). Social sustainability also can be seen at a minimal stage where the organization provides safety masks and caps to its employees who engage in this gold refining process. But the company has managed to guarantee a mass balance for the materials used where they account the inputs that are being entered in to the process and the product and non-product outputs come out through the refining of gold.

When evaluating these practices it was observed that the adherence/adoption of sustainable practices within the company is isolated from their current decision making process where the top management is hardly aware of what is going on within this pawning and gold division. This is a mere attempt of the General Manager of the pawning and gold division to ensure that divisional performance is being maintained at maximum level. As per the General Manager,

*“Four years ago there were nothing like this. Nobody knew what is happening to the wastage.”*

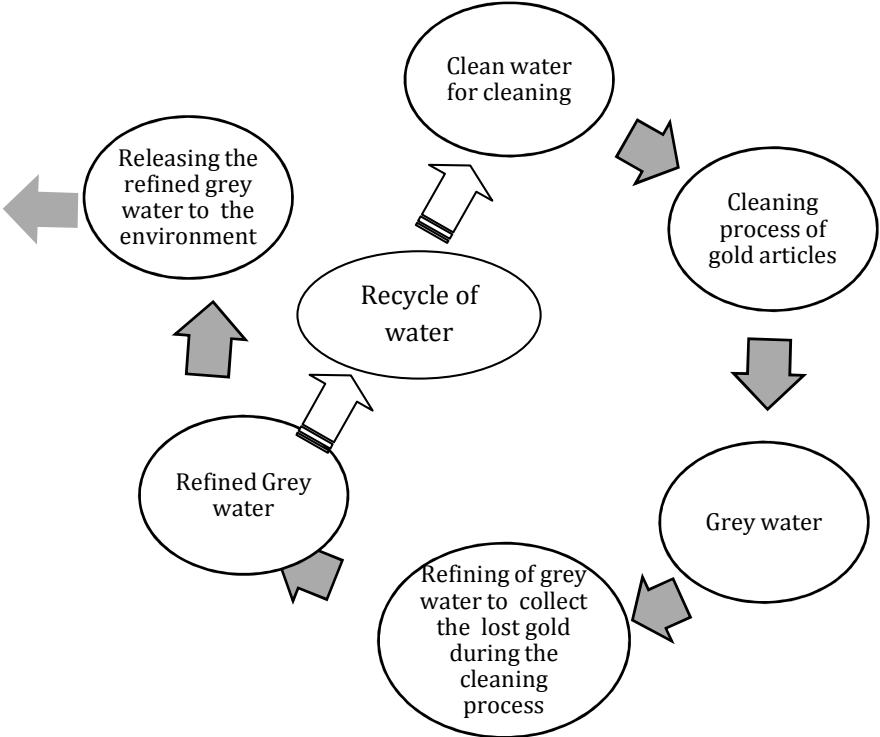
Therefore, the lack of top management support and direction can be seen as a challenge to the sustenance of these waste management practices. According to Subasinghe and Fonseka (2010) there is a strong positive correlation between top managers' awareness of relevance and usefulness of management accounting and the adoption of management accounting practices. Hence, there is a greater possibility where General Manager can make the top level enthusiastic about these sustainable practices currently being adopted and ensure it is embedded to the culture of the organization which ultimately will benefit the organization as a good corporate citizen to serve the economy of Sri Lanka.

## **5. Conclusions**

The case demonstrates how the company thrives to minimize the wastages of the major raw material used in its operations - gold, due to its high scarcity and the high designated value. Further it was noted that the top management is not aware of the practices and there is a lack of integrated strategic approach towards the sustainable practices. Hence it is obvious that the company can further improve the process and adhere to more efficient sustainable practices by referring to the similar organizations internationally as benchmarks. So to improve the sustainability initiatives adopted by the company to a higher level, the following key recommendations have been identified.

The top management lacks awareness, due to the current practices being initiated by the General Manager only very recently . Hence it is apparent that those practices are not embedded into the organizational culture and a part of daily decision making as recommended by Gunarathne and Lee (2013). Top management attention and implementation of complete health and safety measures are the need of the hour for this organization. Moreover, it was observed that the water used for the production process is released to the environment with minimal safety measures, which eventually hinders the social and environmental well-being. So it is suggested to build an improved emphasis on cradle to cradle approach avoiding cradle to grave approach. This can be achieved by using the refined grey water for cleaning purposes again rather than releasing them to the environment as illustrated in Figure 02. In Sri Lanka, the particular process of gold refining and melting is not common. Most related organizations are used to importing the gold necessary for production. Hence, it is a new concept practised among very few companies, making the task of identifying a local company to benchmark and compare practices a difficult task. Due to this limitation and the specialized nature of the process, the recommendations and suggestions for further improvements may not be complete and comprehensive and may require further specialized research for greater improvements.

Figure 02– Cradle to cradle approach of water used in the process



Source: Author Constructed

The research paper identifies only the sustainable accounting practices adhered to achieve economic effectiveness of a particular process. But future research can be done on the organizations engaged to achieve economic, ecological and social aspects of sustainability, both in local industry and internationally. In addition, the accounting aspects of various international organizations in similar scope can be observed in order to make recommendations for the local companies. Studying and drawing conclusions for a single organization without considering the industry or competitors’ practices were experienced as drawbacks of case study methodology. Further, restrictions to access the information of the company due to uncontrollable events created detrimental impact to continuation and success of the research work.

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Appendix 01: Production process of this organization

