
Solid Waste and Waste Water Management in the Hotel Sector: Empirical Evidence from a Sri Lankan Case

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Abstract

Purpose – The purpose of this paper is to analyze the interplay between environmental management initiatives and environmental management accounting practices in the Sri Lankan hotel industry.

Design/methodology/approach – The study was based on the case study approach. The primary data were collected by conducting unstructured interviews and the facts gathered were fortified by direct observation. The secondary data were gathered through analyzing records such as *Green Directories*, technical diagrams on sustainability initiatives, records maintained on waste management and water consumption, online resources and various other articles. Several measures were undertaken to improve the reliability and validity. Explanation building approach was used to analyze the data gathered.

Findings – The hotel has emboldened itself to adopt and nurture environmental management initiatives through the sustainability philosophy permeated over the hotel chain. This philosophy has been stimulated by mutually interacting focal catalysts, such as cultivating a shared vision conflated with sustainability, training and awareness building, integrating stakeholders' interests and organizational learning. The initiatives have are further enhanced by the compatible environmental management accounting practices adopted by the Hotel.

Research limitations/implications –The findings of the study will be difficult to generalize due to the contextual factors associated with the research site, but will be more relevant to the hotel sector organizations with similar characteristics.

Originality/value - This report contributes to fieldwork research within the environmental accounting literature pertaining to the hotel industry in developing countries. The findings of the study can be constructively used as a guide to establish and sustain environmental management accounting practices in business organizations operating in the hospitality industry.

Keywords –Environmental management accounting (EMA); hotel industry; waste management; water management; Sri Lanka.

Paper type - Case Study.

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1. Introduction

Waste has become a growing concern in almost all industries around the world. Having realized the gravity of this issue, most companies worldwide are now concerned about taking necessary steps to minimize wastage. This is common to the hospitality industry as well. In the global context, the contribution of the travel and tourism sector represented 9% of GDP, 5% of investment and 5% of exports of the world economy (WTTC, 2012). Despite global impact of travel and tourism there is a scarcity of environmental management accounting (EMA) literature on the travel and tourism sector. Nevertheless, taking into account the impact on the environment, Environmental Management Systems (EMS) have recently been more recognized in the hotel industry (Chan, 2009). This is contrariwise to the finding by Wan (2007) that hoteliers generally did not value environmental management as an important tool (as cited in Waidyaseka and Nimanthi, 2007). Correspondingly, further according to Stipanuk (as cited in Chan, 2009) most of the hotels have implemented their in-house EMS in hotels with varying degrees of intensity in the past few decades.

In the Sri Lankan context, the hotel sector plays an important role. As a result of post war economic boom, the hotel sector in Sri Lanka developed rapidly (Central Bank, 2012). Identifying that tourism is one of the main industries that generate significant levels of waste in terms of waste water (also termed gray water) mainly arising from rooms, kitchen, pool area, laundry, restaurant and etc. and solid waste (mainly from restaurants and kitchen) and some hazardous waste (due the usage of certain chemicals along with air emission). Many large scale hotels in Sri Lanka have already implemented certain practices such as green teams, natural ventilation and LED bulbs that have helped to achieve significant savings related to waste treatment (Ratnayake and Miththapala, 2011). In this context, the purpose of this paper is to analyze the interplay between environmental management initiatives and environmental management accounting practices in the Sri Lankan hotel industry.

Although waste is clearly a noteworthy issue for hoteliers, examples of good waste management practices can be found across the hospitality industry. One such example became the base for this study. The hotel on which the study is based is situated in Negombo and is a Sri Lankan spa resort of distinctive elegance, designed by a renowned architect which adds to the value of being a proud member of luxury boutique hotels of the world.

The hotel follows waste treatment mechanisms, as encouraged by the increasing safety requirements of the industry, government regulations such as HACCP and ISO standards. Reflecting mimetic isomorphism as per DiMaggio and Powell (1983), the top management pressurizes the hotel to follow the competition

created by other luxury hotels which adopt these practices in order to ensure long term survival. The requirement has been compounded mainly due to the increasing awareness of the tourists who travel long distance to spend time without further increasing the carbon foot print. As per the Environment Protection Agency (EPA, 2010) hotels have numerous opportunities to prevent waste when purchasing supplies and food, serving customers and cleaning guest rooms. The hotel under study outshines its peers by exploiting all such opportunities.

The remainder of the paper is organized as follows. Section Two provides the literature review and Section Three focuses on the methodology employed. Section Four provides the findings of the study along with a discussion. Section Five, presents the conclusions.

2. Literature Review

Rikhardsson *et al.* (2005) pointed out in their study that literature on EMA is scarce. Despite prospects that EMA practices are varied, little has been done to explore that diversity. Thus, there is no single, universally accepted definition to the term (International Federation of Accountants (IFAC), 2005). However, as per IFAC (2005), EMA is broadly defined as the identification, collection, analysis and use of two types of information for internal decision making: 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. More broadly, EMA analyses financial costs and benefits associated with the environment (Dorweiler and Yakhou, 2003) and non-financial information, to fulfil requirements of managers regarding corporate activities that affect the environment as well as environment related influences resting on the corporation (Burrirt, 2004).

Both of the above definitions on EMA underline the concept of environment costs. One of the censures on conventional accounting is also that it largely pays no attention to the environment costs. Dorweiler and Yakhou (2003) remark in their studies that environment cost is cost on every environmental aspect, and cost of all types of related environmental actions. Burrirt (2004) broadly explains in his studies that there is a range of considerations which environment costs depend on such as the management function, specific decisions made, the role of the manager in the value chain, the responsibility level of the manager and the performance appraisal system.

Considering the definition of EMA it is apparent that waste management is a part of EMA. As cited in Bates and Phillips (1998) in the UK waste is defined as (UK Environmental Protection Act 1990):

- Any substance which constitutes a scrap material or an effluent or other surplus substance arising from the application of any process; and
- Any substance or article which requires to be disposed of as being broken, worn out, contaminated or otherwise spoiled, but does not include a substance which is explosive.

Managing waste substances is important in the hotel sector as well. As stated by Ratnayake and Miththapala (2011), after the end of the 30 year conflict situation tourism is becoming a very important sector in the Sri Lankan economic development contributing 7.9% to the GDP of Sri Lanka. Further, the tourism industry is one of the highest consumers of energy and natural resources and could become a cause of much environmental and social concern if proper conservation measures are not implemented. Similarly, Weerawansa *et al.* (2010) explain in their study that since tourists travelling to Sri Lanka come for diverse reasons, the hotels are located all around the country to appeal to their differing needs and in most cases these are located adjacent to environmentally sensitive places such as virgin forests, beaches and archeologically significant locations. Due to this, some time ago a number of protests and demonstrations also took place in certain places opposing this industry, expecting that there would be environmental damages. Therefore, proper environmental management practices are of paramount importance for hotels. Hence, consistent with Ratnayake and Miththapala's (2011) studies, Sri Lankan tourist hotel sector has a significant potential for improvement with regard to sustainable practices. Furthermore, prior studies show that sustainability practices in the hotel sector in Sri Lanka implicitly and explicitly lead to reduction in cost and improvement in profits (Weerawansa *et al.*, 2010).

Ratnayake and Miththapala (2011), Gunarathne and Lee (2013) and many scholars mention tangible gains and rewards of EMS such as operational cost savings, sound business practices, conformance to regulations and customers' requirements, increase access to capital, reduction in insurance premiums and increases in competitiveness (Hughes; Haklik and Johnson as cited in Waidyaseka and Nimanthi, 2007). Ratnayake and Miththapala (2011) indicate that potential for waste management is very high, as the present waste management practices in the sector are at a very low level, except for a few special hotels. Their study show that sorting and selling the recyclable garbage would be beneficial to the hotel, even financially, as the cost of the small investment for purchasing of coloured bins is recovered within one or two years.

But as literature explains, the application of sustainability practices will also meet up with many challenges. Gunarathne and Lee (2013) imply in their study that the main challenge was to transform existing hotels into environment-friendly models and this is challenging in an already built-up place. Moreover, in order to reap the full benefits of environmental practices the support of various stakeholders is required and persuading these parties to provide such contribution on a regular basis is challenging. In addition, according to Gunarathne and Lee, successful implementation of EMA goes beyond the mere application or superiority of techniques. It requires the successful engagement of stakeholders on a regular basis to cover many environmental aspects comprehensively with a well-defined vision, that is, a *holistic* approach to its implementation. As indicated by Weerawansa *et al.* (2010) a main challenge in waste management for this industry is the difficulty to minimize waste generation or to educate the guests about it due to the nature of the industry and high competition in the sector. Therefore, best possible option remaining is to have proper waste management systems to run this industry in a sustainable manner.

3. Methodology

This section elaborates how the data was collected and analyzed in the study. The study was carried out using the case study approach (Yin, 2009) where the sustainability practices relating to solid waste and waste water management were studied in a real life context at a functioning tourist hotel in Sri Lanka. A main criticism regarding case studies is that the data collected cannot necessarily be generalized to the wider population and it is also very difficult to draw a definite cause and effect relationship from them. However, case studies allow a lot of detail to be collected that would not normally be easily obtained by other research designs.

Data gathering was done using direct observations and interviews as sources of primary data collection and archival studies as a source of secondary data collection. Usage of several methods as above when collecting data was instrumental to practice triangulation in this study which is one way of increasing the credibility in a study conducted (Cottrell and McKenzie, 2010).

Two visits were made to the hotel site which is situated approximately about 38 km from the Colombo city, in the suburbs of Negombo. The first visit was intended to give an initial understanding of the overall sustainability practices of the hotel in its day-to-day operations. Prior to the initial visit, a brief information search was carried out mainly by browsing the web site of the hotel and its hotel chain. The initial visit enabled the researchers to gather data for the study mainly through observing the hotel site and its operations. Visiting and observing the restaurants, lobbies, guest rooms, corridors, pathways, gardens, swimming pool, garbage

collection and compost generation facilities, water treatment facilities and biomass energy generation processes of the hotel enabled the researchers to get a clear picture of the waste and water management practices of the hotel. Since there were multiple observers (group members), the concern with the reliability of the observations made was minimized. The visit also provided the opportunity to obtain firsthand information from several persons involved in the sustainability initiatives of the hotel including the General Manager and the Environmentalist of the hotel.

Following the initial visit, further information search was carried out through the internet and other sources. This was done in preparation for the second visit to the hotel which was to be carried out with the intention of obtaining in-depth knowledge about the specific waste and water related sustainability initiatives along with their impact on management accounting aspects.

During the second visit, the data were mainly collected by conducting unstructured interviews with the hotel's Engineer and Environmentalist. These unstructured interviews with open ended questions facilitated to bring out authentic accounts of the interviewee's subjective experiences. Questions that emerged from the immediate context relating to the hotel's sustainability practices and accounting were raised to increase the salience and relevance of the questions (Klenke, 2008). These interviews also assisted to corroborate previously gathered data. Records relating to water usage and waste disposal were obtained from the hotel documentations for further analysis. Further, information and clarifications were requested and obtained through telephone and email conversations with the hotel's Engineer.

After collecting the required data from the above mentioned sources, the evidences were converged to assist in the analysis. In qualitative studies such as case studies, data analysis is conducted to transform raw data and obtain a meaning from it, without quantifying them (Monette, 2013). In this study, the case study data analysis technique of explanation building was used where cases are analyzed by building explanations of the case (Klenke, 2008; Yin, 2009). In analyzing and building the case, the existing sustainability practices relating especially to solid waste and water management activities and the physical and monetary recording and accounting activities were elaborated based on the understanding obtained from the data collected. The next section will provide the case study built revolving around the above aspects.

4. Findings and Discussion

This section provides the findings and discussion of the current practices and sustenance of solid waste and water management practices.

Current environmental and sustainability management practices

This section discusses the sustainability management practices already adopted by the Hotel and practices that are planned to be implemented in the near future. Most of these practices are in line with the sustainability practices implemented by other hotels of this group. Therefore it is evident 'Sustainability' is a common concept practiced across the entire chain of hotel. The discussion has been organized into two sections as solid waste management practices and waste water management practices.

Solid waste management practices

As per United Nations Environmental Programme (UNEP, 2003), in many destinations and regions dealing with solid wastes is becoming a pressing challenge as the amount of waste increases and the cost of dealing with this waste in a sustainable manner rise at an ever increasing rate. In most tourism facilities guest rooms, kitchens, restaurants, laundries, offices, gardens and conference rooms generate large volumes of solid waste which can result in negative ecological and aesthetic impacts. Therefore, it is essential for hotels to protect the environment by reducing the solid waste generation in order to satisfy the growing customer demand for environmental-friendly facilities. Numerous solid waste management practices being adopted by the hotel have been elaborated below according to the nature of solid waste described by UNEP (2003). These include hazardous waste, biodegradable and non-biodegradable waste and combustible and non-combustible waste.

Hazardous waste contains harmful chemicals and produces harmful by-products when burnt or placed in a landfill site (UNEP, 2003). One of the main areas that the hazardous waste could be generated at the hotel site is sludge produced from the waste water and sewage treatment plants. There is zero toxic waste from the waste water and sewage treatment sludge as the water used for the treatment plant contains no hazardous chemicals. Therefore, the hotel has the opportunity to dry out the sludge using drying beds. Then the dried out sludge is used as an organic fertilizer for coconut trees and gardens. In addition, LED bulbs are being used for lighting the entire hotel. LED lights contain absolutely no mercury or toxic chemicals, and conventional LEDs are made from a variety of inorganic semiconductor materials (Adams, 2007). The hotel does not use any externally purchased chemical fertilizers for gardening activities since only organic fertilizers produced within hotel premises are used. With the help of these practices the hotel maintains zero level hazardous waste-disposal throughout all operations.

According to Water and Waste Management Manual of UNEP (2003), biodegradable waste contains organic substances which can be broken down over time, treated and recycled into useful by-products such as biogas and compost while non-biodegradable waste consists textiles, chemicals, rubber and plastics which cannot be treated and recycled properly. The hotel has made a conscious decision not to use plastic water bottles within the restaurant and only glass water bottles provided by the water purification plant of the hotel group are offered for guests. Plastic water bottles carried by guests from outside are properly stored and given to the municipal council to dispose. The use of plastic has been reduced drastically by initiating several other practices such as dispensing shampoo in ceramic bottles, eliminating plastic cutlery, discouraging the use of plastic straws with cocktails or drinks, using wooden cocktail mixtures and reducing plastic in rooms. Also plastic and polythene shopping bags are not being used for hotel operations. A proper plastic crates handling system is used when delivering vegetables and other food items for kitchen by providing crates from hotel or using crates provided by suppliers to reduce the plastic waste. Also suppliers are informed continuously to reduce unnecessary packaging (e.g., milk powder packages) to strive for reduction of plastic and polythene consumption. More environmental-friendly materials such as wood curtains, cane baskets and clay tiles have been used for guest rooms. Also guests are encouraged to reuse linen and towels without daily removals through several ways such as displaying notices as only to put used towels near cloth bins if it is needed to change. Discarded towels and linens are used for cleaning purposes and if linens are in a reusable condition, those are donated for staff. The waste generated from the biomass boiler (ash of cinnamon wood) is mixed with fertilizer and used for plants.

The effective separation of solid waste has been initiated through separation of garbage and trash at their sources of origin in all departments of the hotel such as the kitchen, restaurant and bar, housekeeping and maintenance. The amount of waste generated at each source is measured at regular intervals to identify from where most of waste is being generated and whether it is beyond the accepted waste limit. Garbage is sorted properly and a color-coded garbage bin system is used to hold each type of garbage separately (wet garbage, polythene and plastics, glass, metal, paper and cardboard, etc.). Wet garbage collected during lunch (food waste) is sent to a nearby piggery that would support to reuse the wet garbage and as an initiative of a community development project. And all the other wet garbage collected during the daily operations and garden waste are being used to produce compost. A special compost machine is used by the hotel to produce compost using the collected food waste and that compost is used as an organic fertilizer for gardening and to maintain vegetable gardens of the hotel. The garden waste is also used to produce compost through traditional method as the daily input level of compost machine only process the food waste. The wet garbage which cannot be

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separated or recycled is collected by the municipal council. Garbage is sent to municipal council only it cannot be reused or recycled at the hotel premises. In order to reduce the wrong garbage being collected by municipal council trucks, garbage to be sent out is sorted again by another employee after the first separation. Employees are trained continuously to separate the garbage properly in order to reduce the waste disposal because if misidentified, waste that could have otherwise been recycled can be disposed. Also daily food waste generated at staff cafeteria is measured and the information is disseminated among staff to make them knowledgeable about the daily amount of food waste produced by them and to construct a sense to reduce the waste.

Combustible waste such as paper, used oils, rubber and leather, has a high heat value, burns easily and releases heat energy when combusted. Non-combustible waste such as glass, aluminum and most organic waste (e.g., food scraps and garden trimmings) has a lower heat value and cannot be easily burned (UNEP, 2003). As elaborated in the previous section, as a practice, all recyclable organic waste is used for production of compost waste by the hotel. A separate store is used to collect all glass bottles and those will be sold later to generate an income. Paper usage is reduced by using software for management activities such as store maintenance. Stationery is reused and electronic mails are sent for inter-departmental activities to minimize the paper consumption.

Water conservation and waste water management

The hotel's corporate environmental policy, affiliated with the Green Directory Programme and JEEP (The hotel's Eternal Earth Programme), is focusing on encompassing improvements in the areas of water conservation and waste water management. Waste water is defined as, waste streams whose primary component is water but which also contain contaminants of some kind, such as high Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), nutrients (such as phosphates), excess heat and toxic materials (IFAC, 2005).

In order to obtain the ultimate benefit of water, consumers should have to be savvy with efficient water use which is considered as a way to reduce the need for costly infrastructure with the assistance of efficiency enhancement options like metering, water reuse, water-saving appliances, landscaping, and public education (EPA, 2005). The major forms of waste water generated by a tourism facility are kitchen and restaurants, toilets and washrooms, housekeeping and maintenance, laundry and gardening (UNEP, 2003). In the Green Directory Programme of the hotel chain, it is identified that generally tourist hotels over use water resources for swimming pools, golf courses and personal use by tourists. Therefore, conservation of water has been identified as a vital area to be addressed in the corporate environmental policy.

With regards to the above mentioned understanding about efficient water use, the hotel has taken a number of initiatives to conserve water preceded by a systematic study conducted by an expert ecologist and those initiatives are addressed in this area of the case study report. The environmental and economic performance is evaluated through management accounting systems and practices that focus on both physical and monetary information (Bennett, *et al.*, 2008). As water saving appliances, the hotel is using cisterns with dual flushing facility which saves approximately 3 liters of water per one flush. Rain water shower heads are saving almost 20 liters of water per minute. Further the staff cafeterias are equipped with sensor faucets, which save a considerable amount of water compared to conventional manual taps. The hotel is focusing on obtaining contribution from guests in implementing water conservation initiatives by providing an option to reuse towels and linen without washing daily, which conserves water while cutting down the laundry cost. Currently, the hotel is not operating a laundry at the hotel premises and laundry tasks are accomplished using the laundry of another hotel of the same group located nearby. The operational staff is provided training regarding water conservation practices such as, reducing water consumption in washing dishes during the orientation program and monthly training programs. The house keeping staff and technicians are responsible for preventive maintenance of interior water drainage system. Water consumption in different departments like kitchen, guest rooms, restaurants and public area are monitored by installing separate meters, which helps to identify the departmental patterns of water consumption and make decisions accordingly. Guests are provided in-house purified drinking water, which is refined at the self-sustaining mobile water purification and bottling plant (Reverse Osmosis (RO) plant) of the hotel group. This initiative has been identified as a cost effective and quality alternative compared to external purchasing. Moreover the prodigious swimming pool of the hotel is recognized as a unique feature of the hotel. The swimming pool pump room, which purifies pool water using sodium chloride provides an extra comfort to the guests along with eco-friendly cost savings approximately LKR 30 per 1kg of sodium chloride. In addition, the recycled water in the water treatment plant is used for cooling towers, toilet flushing and gardening purposes. As a continuous monitoring initiative, the hotel is carrying out monthly green audits where water consumption is a vigilant criterion (EU-Switch Asia, 2013).

When considering about the management of waste water in the hotel, the Water Treatment Plant (WTP) located in the facility purifies sludge and consumes grey water through a technical process (Appendix 01). The plant purifies around 7000 liters of waste water per month. Technicians are appointed for the continuous monitoring of the process and once every six months, a third party checks the quality of water to ensure it meets the required standards of the Central

Environmental Authority. The precipitation of the process is sent to Sludge drying beds, which produce fertilizer for gardening purposes. Even though, the same RO purification process can be applied to refine water obtained from the nearby lagoon, the hotel does not adopt the option due to less cost benefit advantages; i.e. this process incurs additional LKR 75 for each 1000 liters of water comparing to the water obtained from water board which costs LKR 75 per 1000 liters. The next section explains how these practices are sustained.

Sustenance/continuous improvement of EMA practices

Effectiveness and the continuous improvement of the EMA practices in the hotel are stimulated by mutually interacting focal catalysts, such as cultivating a shared vision conflated with sustainability, covering an extensive array of sustainability aspects, training and awareness building, integrating stakeholders' interests, and organizational learning. The sustainable vision inspired by the top management's clear advertence on sustainability plays a main role in continuously improving EMA practices. JEEP and the green directory to be implemented are managing numerous sustainability aspects such as energy, water and waste management, pollution prevention and corporate social responsibility. Training and awareness building has allowed the hotel to provide employees the appropriate initial and ongoing training, which enhances their active participation and involvement in the tasks related to EMA practices.

By integrating stakeholders' interests, the hotel has established trust-based collaborative relationships with a wide variety of stakeholders, which facilitates an open dialogue to share information, identify and prioritize stakeholders' environmental concerns and share gains obtained from environmental initiatives. Also organizational learning promotes changes to internal values, routines, and rules that represent collective learning. Currently the Hotel is in the process of obtaining HACCP, ISO 14001 and ISO 50001 standards. 68% of the tasks of Green Directory are completed and 15% of the remainder is already scheduled. In the process of continuous improvement, the hotel has earned justifiable recognition from the world over namely, Pacific Asia Travel Association (PATA) Grand Award 2013, Trip Advisor Travelers' Choice Award. Further, initial audits have been conducted to award the Travel Life Gold Award.

Physical and monetary accounting practices

This section discusses benefits obtained by the hotel through waste management practices in terms of environmental accounting aspects. Environmental Management Accounting (EMA) is broadly defined to be the identification, collection, analysis and use of two types of information for internal decision making; physical information on the use, flows and destinies of energy, water and materials and monetary information on environment-related costs, earnings and

savings (IFAC, 2005). In this respect, the hotel has a well-structured EMA process which includes planning, data collection, accounting for environmental information, analyzing and strategy development with an ongoing monitoring strengthened by continuous staff training and customer awareness. If the waste reduction plans are not feasible and advantageous business wise, penetration towards sustainability practices will get diminished. Therefore, the benefit of solid waste and waste water management practices of the hotel has been translated into physical and monetary units as follows.

Solid waste management

Through the several solid waste treatment and management projects, currently more than 80% of the waste generated by all departments of the hotel is being recycled. As explained in the previous section, since the solid waste is sorted into several types such as cardboard, used papers, glass bottles, polythene, and burnt oil, measurement of physical units of waste has become a clear and transparent task. Even though the hotel has started its operation very recently (from April 2012), incorporation of environmental accounting has also been initiated after few months of inception. The sorted waste sold for recycling has been calculated since July 2012. From July 2012 to August 2013, the largest portion of (nearly 43%) this sold waste consists of glass bottles and 3643 bottles has been sold during this period. As Appendix 02 depicts, in each month on average, 115 kg of cardboard, 260 glass bottles, 45 liters of burnt oil, and 64 kg of tins have been sold for recycling during the past 14 months. By selling this waste for recycle, the hotel has earned a total of Rs.105,560 during those 14 months and averagely it's Rs.7,540 per month and this income is used as a contribution for employee welfare society to motivate the staff towards sustainability practices.

Table 01-Annual compost production

Year	Month	Weight of Waste (kg)	Weight of produced compost (kg)	Compost amount as a % of waste
2012	July	786	121	15
	August	1,220	180	15
	September	820	70	9
	October	0	0	0
	November	835	180	22
	December	1,130	200	18
	Total		4,791	751
2013	January	1,230	280	23
	February	843	95	11
	March	887	110	12
	April	450	105	23
	May	1,010	255	25
	June	975	105	11
	July	940	120	13
	Total		6,335	1,070
TOTAL (2012+2013)		11,126*	1,821	16

*11,126 kg of wet garbage was re-cycled and transformed into 1821kg of compost fertilizer.

Source: Engineer's data

Each day 50 kg of wet garbage is used as the input for the compost machine used by the hotel. Even though the normal duration needed for compost generation is 40 days, this machine has reduced the compost process cycle up to 14 days. During 2012, 4791 kg of wet garbage was recycled and transformed into 751 kg of compost fertilizer. And 6335 kg of wet garbage was transformed into 1070 kg of compost fertilizer in 2013 (from January to July). On average 16% -17% of wet garbage is converted into compost using this machine annually (Table 01).

Seasonal effects on solid waste generation can also be tracked through the physical measurement of solid waste. If monthly sorted waste sold for recycling and wet garbage used for compost production is referred, it is evident that the amount of waste has increased in peak months like August, December, and January. But it is clearly visible that the hotel has been able to reduce some of the waste even in peak demand times, as 73 kg of waste cardboard sent for recycling has been

reduced in August 2013 when compared with August 2012. Also roughly 30% of the annual linen used is discarded during one year. And by considering these physical and monetary measurements, green audits are carried out by the hotel during each month.

Waste water management

A commitment to water reduction begins at the top, ensuring that the management team fully supports this project (Kuoni, 2012). The hotel’s top management, housekeeping, maintenance, grounds keeping, kitchen, engineering and accounting departments are collectively involved in all the planning stages of EMA practices in the hotel preceded by a prior analysis conducted by an expert ecologist. Certain individuals have been identified for key roles as detailed in Table 02.

Data regarding water conservation and waste water management in the hotel is collected and analyzed in terms of both physical and monetary terms, where physical data is given much dexterous focus comparing to the monetary data. The tracking of physical information on the flow of energy, water, materials and wastes is important under EMA, because such information allows an organization to assess and report the important materials-related aspects of its environmental performance (IFAC, 2005).

Table 02 -Key roles of senior officers in the hotel

Designation	Role	Experience required
Managing Director	Understand program objectives, Define timings and expected results	Motivate staff and approve changes/spending
Hotel Manager	Co-ordinate collection of data, Plan necessary training	Attention to detail with data received, analytical thinking to formulate action plan
Technical / Maintenance Manager or Engineer	Data collection, Placement of meters, Physical measurements, etc.	Good numeracy, ability to complete worksheets and cost-benefit calculations
Accountants	Budget spending on water saving devices, Reporting, data analyzing, monitoring, investment appraisal	Budget planning, Cost benefit analyzing, Investment decision making, Controlling
Head of housekeeping	Data collection, target setting, monitoring	Keen supervision
Head of kitchen	Data collection, target setting, monitoring	Keen supervision
Head of grounds	Keeping data collection, target setting, monitoring	Keen supervision

Source: Author Constructed

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In the hotel, physical data is collected in both absolute and relative terms. In relation to the absolute indicators, overall average water consumption is measured on daily and monthly basis. Water consumption per day is averaged to 60 cubic meters which leads to 1800 cubic meters consumption per month. Further, the hotel is measuring the departmental water consumption by installing separate water meters for Guest rooms, Kitchen, Boiler, Chiller, Staff accommodation and GM quarters, Cistern, Garden and Waste water treatment plant.

Moreover, the relationship between water consumption and room occupancy is calculated on monthly basis as a relative indicator which depicts the positive relationship between the two variables. Another revelation of this analysis is, after the operations of the Waste water treatment plant has actively commenced in June 2013, water consumption per occupied room has been decreased to 1.76 cubic meters (Table 03).

Table 03-Water Consumption per occupied room (First two quarters, 2013)

Month	Total water consumption (m ³)	Occupied rooms	Water consumption per OR(m ³)
January	1648.4	663	2.49
February	1968.7	1049	1.88
March	1817.5	909	2.00
April	1555	663	2.35
May	1480.8	707	2.09
June	1262.27	717	1.76

Source: Engineer's data

In addition to that, Table 04 explicates the savings generated from the newly installed waste water treatment plant in the hotel. The departmental consumption readings reveal that the new plant has been able to cut down 81 percent and 27 percent of water consumption of the Chiller and Guest rooms respectively. The waste water treatment plant recycled 355.4 cubic meters of water for the month of June 2013.

Table 04 - Savings from the waste water treatment plant

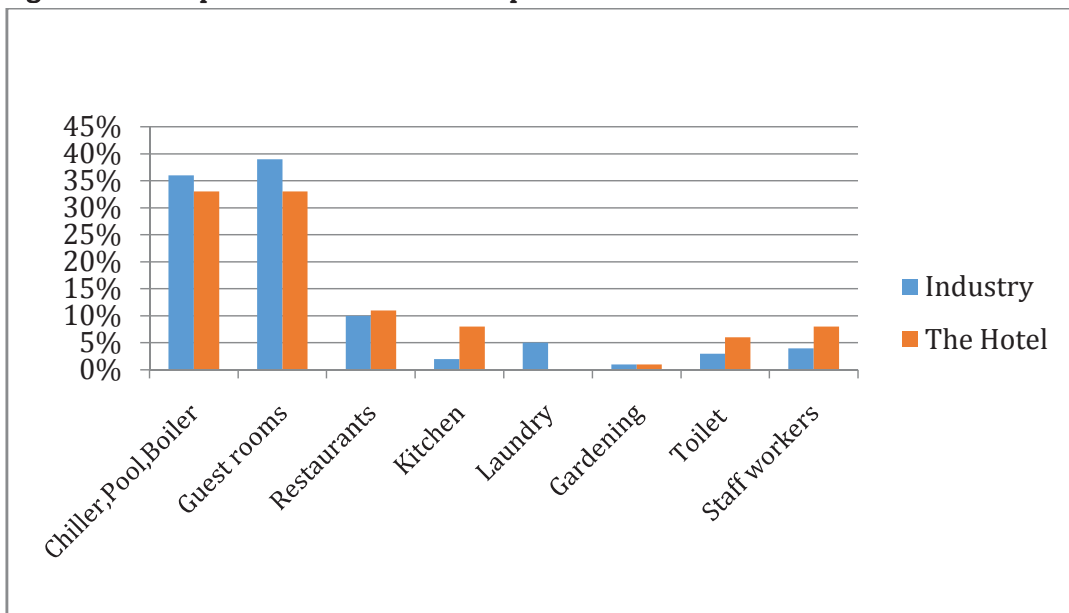
Department	January (m3)	June (m3)	Saving (m3)	Saving (%)
Guest rooms	582.4	422.9	159.5	27%
Kitchen	137.3	100.2	37.1	27%
Boiler & HW	356.3	367.7	-11.4	-3%
Chiller	273.5	50.9	222.6	81%
Staff acc., GM quarters	211.9	237.2	-25.3	-12%
Cistern	87	76.4	10.6	12%
Garden	N/A	6.97	-	-
Total	1648.4	1262.27	393.1	

Note: Savings are computed comparing the January 2013 (before installation of the plant) and June 2013 (after active operations of the plant has begun) months.

Source: Engineer’s data

As an advanced phase of EMA practices, the hotel compares its own departmental water consumption with departmental water consumption of the hotel industry (Figure 01). This benchmarking divulges that the hotel’s water consumption is well below the industry average consumption in Guest rooms and the Chiller categories.

Figure 01 –Comparison of water consumption



Source: Authors Constructed based on Engineer’s data

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When considering the monetary aspect of EMA practices, similar to the physical information collected under EMA, monetary data can be collected for an organization as a whole, or for particular sites, input materials, waste streams, process or equipment lines, product or service lines, depending on the intended use of the information (IFAC, 2005). In the Hotel monetary terms of water related EMA information is used for calculation of costs, savings generated from water management initiatives as well as to perform Cost benefit Analysis (CBA). The average cost of water consumption per month of the hotel is Rs.250,000, where cost per one cubic meter of water derives as Rs.138.88. After installation of separate meters for departments, the hotel can compute the cost of water consumed by each individual department, where Boiler, Chiller, Guest rooms, and Restaurants can be recognized as highest cost consuming departments pertaining to water consumption.

In relation to the monetary savings generated from water management initiatives, the hotel has identified there is a substantial saving of water cost from the installation of Waste water treatment plant in June 2013, which amounts to Rs. 54,594. The value of waste water treated during the month of June is Rs.49,358. Further, by substituting Sodium Chloride for swimming pool water purification process instead of Chlorine a saving of Rs.73,920 has been identified.

The hotel is considering the related costs and potential benefits, which are raised by implementing environmental friendly initiatives at all possible events where the implementation of the initiative is not mandatory. After conducting such a Cost benefit Analysis (CBA) for purifying water fetched from the nearby lagoon it has been noticed, that the hotel can purchase similar purified water from the Water Board at Rs.75 (per 1000 liters), where the purification process costs Rs.150 (per 1000 liters). Therefore, the hotel has abandoned the proposal.

Monitoring is an essential component of any plan, be it managing water, solid waste or energy (Kuoni, 2012). In the hotel the ongoing monitoring process for water consumption is enabling the engineers and technicians to identify fluctuations in consumption occurred due to seasonal (for example, increased irrigation demand in the dry season) and occupancy factors, as well as savings from water management initiatives. In addition to that, breakdowns and leakages can be figured out by tracking abnormal patterns in water consumption. The EMA practices of the hotel are reinforced by the monthly management briefings and employee training sessions. Further, the awareness of guests regarding EMA practices, which are carried out by the hotel is enhancing the smooth flow of the process.

5. Conclusions

As demonstrated by previous chapters, the hotel has used numerous solid waste and waste water management practices. Environmental accounting information (physical and monetary units) depicts how the effectiveness of those projects is gradually enhancing with time, several advanced technological implementation and well-planned training programs. The proper attention paid by the hotel on continuous improvement of waste reduction projects has also contributed significantly for effective execution of waste management practices. Certain improvements can be recognized even in the middle of the adoption of comprehensive waste reduction and recycle programs.

The hotel can incorporate cost savings derived from organic fertilizer. Since the hotel uses only organic fertilizer for gardening there is an economic advantage in physical and monetary terms as a result of non-consumption of outside fertilizers. If the saving obtained by eliminating purchased fertilizer is calculated monthly and annually, it can also be considered as a contribution to improve the current accounting figures associated with waste management projects. Even though some of the hotels in this group have already started the production of bio gas, this hotel has not yet planned to initiate the production of bio gas by improving their Sewage Treatment Plant (STP). Bio gas provides a non-polluting and renewable source of energy and produces enriched organic manure, which can supplement or even replace chemical fertilizers. Also it leads to improvement in the environment, sanitation and hygiene. Therefore, the financial benefit that will flow to the hotel with the use of bio gas would facilitate to enhance the economic advantage of being an environmental-friendly tourist destination.

Also the hotel should focus more on separating trash at source. Currently, cloth bags with several pockets to store different types of garbage are being used in guest rooms to encourage visitors to identify each type of garbage and properly separate them for efficient disposal. This system can further be improved by displaying notices in each room requesting guests to use separate waste paper baskets provided in order to separate trash into degradable and non-degradable trash. And the installation of advanced equipment to enhance the performance can be considered. The existing water saving appliances can be further strengthened by installing equipment with enhanced performance such as water-saving faucet devices with infrared and ultrasonic sensors, pressure-reducing valves in Guest rooms, liquid pool covers which retain heat and prevents evaporation of swimming pools, pre-rinse spray valves, combination ovens, steam kettles, clean up equipment and steam cookers in the kitchen. Rainwater harvesting techniques can be used to consume rainwater, which is currently captured from roofs and gutters. Water can be diverted into underground storage tanks or into water butts and used for gardening purposes later on.

A laundry can be established in the hotel premises with energy efficient machinery, commercial water softeners along with a proper laundry wastewater recovery and recycling system. The guests can be awarded for the changes made in their behavior like reusing linen and reducing water consumption by donating the savings to charity or offering vouchers to spend at the hotel. Guest's feedback on other potential water saving measures can be obtained by conducting standard guest satisfaction surveys. Also the hotel can extend the existing system boundaries beyond their own operations to include physical information from suppliers such as the Ceylon Water Board, guests and other elements of the supply chain, with Supply Chain Environmental Management in mind. Since currently the hotel is not calculating separate water foot print, initiatives can be taken to calculate it and as a subsequent phase the dining menu can be revised by providing low water foot print food alternatives. Furthermore, the hotel can adopt the EMA reporting formats with a global recognition such as Global Reporting Initiatives (GRI), Carbon Disclosure Project and Carbon Trust Water standard which will promote the name of the hotel to the worldwide tourism community.

A main limitation of the study would be the difficulty in generalizing its findings of. The study has been done on a qualitative approach in which case the findings are generally not possible to apply to the overall scenarios due to the differences in the contexts. Additionally, even though steps were taken to improve the quality of the data collected by using several methods, there is still the possibility that some biasness occurred in the study. This is because there was a high level of reliance on the data obtained from the hotel and its staff, who are generally inclined towards promoting the hotel and its activities.

Further, researches can be carried out related to whether there are similarities in the EMA practices in the hotel industry in Sri Lanka and if there are differences what the reasons are for that; does the hotel size impact on the sustainability initiatives followed; are the efforts towards sustainability recognized in the Sri Lankan context; and are accountants playing a relatively lesser role in the organizational efforts towards reporting on sustainability. Increasing the research conducted on sustainability and sustainability accounting would help to increase the awareness on these aspects and would ultimately lead to a positive impact on the general wellbeing of the society at large.

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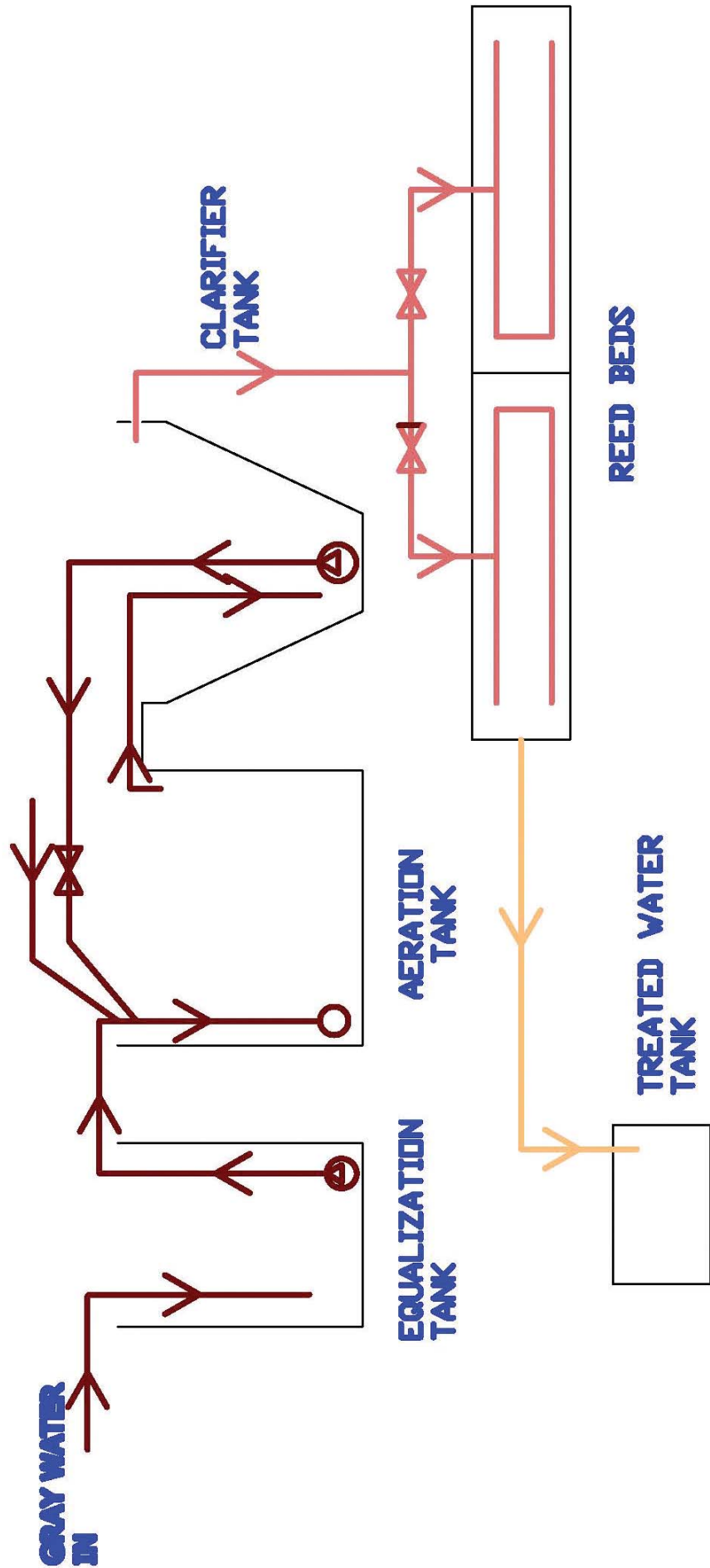
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Appendix 01: Waste Water Treatment Plant



Appendix 02: Sorted waste sold for recycling

Item	Unit	12-Jul	12-Aug	12-Sep	12-Oct	12-Nov	12 Dec & 13 Jan	13-Feb	13-Mar	13-Apr & May	13-Jun	13-Jul	13-Aug	Total	Average
Cardboard	Kg	110	227	132	146	118	240	59	100	120	135	75	154	1,615	115
Used Papers	Kg	59	38	30	13	47	56	25	45	57	93	43	74	579	41
Glass Bottle	nos	128	211	190	240	201	600	210	330	373	240	330	590	3,643	260
Burnt Oil	Liter	-	45	50	45	35	100	60	60	60	80	60	40	635	45
PET bottle	Kg	27	57	37	49	29	56	6	24	47	17	33	41	422	30
Polythene	Kg	3	-	-	-	-	21	-	-	-	-	7	-	31	2
Aluminum cans	Kg	2	9	1	-	-	15	-	-	-	-	3	-	30	2
Tin	Kg	28	11	5	5	6	98	65	120	129	143	100	180	889	64
Scrap metal	Kg	36	-	-	-	-	-	-	-	-	-	-	-	36	3
4lt Plastic cans	nos	3	13	11	15	8	31	17	16	27	36	41	72	290	21
5lt Plastic cans	nos	7	23	4	7	5	17	25	14	28	35	24	52	241	17
10lt Plastic cans	nos	-	-	-	-	-	3	8	-	-	-	-	-	11	1
20lt Plastic cans	nos	4	9	1	6	4	10	10	5	6	7	9	9	80	6
Income		10,485	7,818	7,514	9,084	5,033	13,309	6,288	7,006	9,468	11,015	8,571	9,969	105,560	7,540