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Devising a Strategy to Implement an Environmental Management System Based on ISO 14001:2004 in the Hotel Sector

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ABSTRACT

The aim of this study was to devise an environmental management strategy based on ISO 14001:2004 standard for a four star plus hotel in Mauritius. Results of the preliminary environmental audits at the case study hotel revealed that 22, 113, 374.2 MJ of energy was consumed per year whereas the water consumption amounted to 89089 m^3 during the same year. These figures are colossal considering that the hotel pays five per cent of its total turnover on environmental issues such as water consumption, energy consumption and solid waste disposal. The Environmental Management plan consisted identifying procedures to address each of the requirements of ISO 14001:2004 as well as building a list of environmental aspects and impacts, legal and other requirements and Environment Management programmes for water, energy and solid wastes reduction at the hotel. An environmental policy for the case study hotel was also written. The PLAN, DO, CHECK and ACT phases of Deming's PDCA cycle were taken into account while looking into these requirements and necessary measures were

suggested to reduce energy consumption by 30 %, water consumption by 40 % and solid waste generation by 30 %. These environmental targets were set for a specific time period whereby periodic internal audits would ensure that these objectives and targets have been met. However the successful implementation of ISO 14001 in the hotel lies in the full integration of the PDCA cycle within the management system.

Key words:

ISO 14001, Tourism Sector, environmental System, energy audits, PDCA Cycle, environmental aspects, environmental plan.

1.0 INTRODUCTION

Tourism is one of the world's largest industries and one of the fastest growing economic sectors. It has shown sustained growth in revenues and in number of travellers and has a broad economic, social and environmental footprint reaching almost every part of the Earth. If projections are right, the number of international tourists in just over ten years from now will be approximately 940 million, equivalent to one-sixth of today's world population. Already, travel and tourism contribute eight percent to the world's GDP (UNWTO Tourism Highlights, 2007). While being a boom to the economy of many smaller countries, tourism – like almost all industries – has its downside. The basic requirement for sustained success is a healthy physical and cultural environment. Yet most of the tourist infrastructure is located on/or adjacent to some of the most fragile ecosystems, leading to their degradation. By its success, the tourist industry may be slowly and unwittingly eroding its core asset, to the detriment of the industry itself. The plan and objective laid out by the Ministry of Tourism and other stakeholders in Mauritius is to build the tourism sector into a key engine of growth and to make Mauritius one of the best island destinations in the world and attract at least two million tourists annually by 2015. There is a great need to research the issue of tourism dynamics and its environmental impacts for obvious reasons, the island being so small, any severe environmental or social degradation caused by tourism could impact upon it rather quickly.

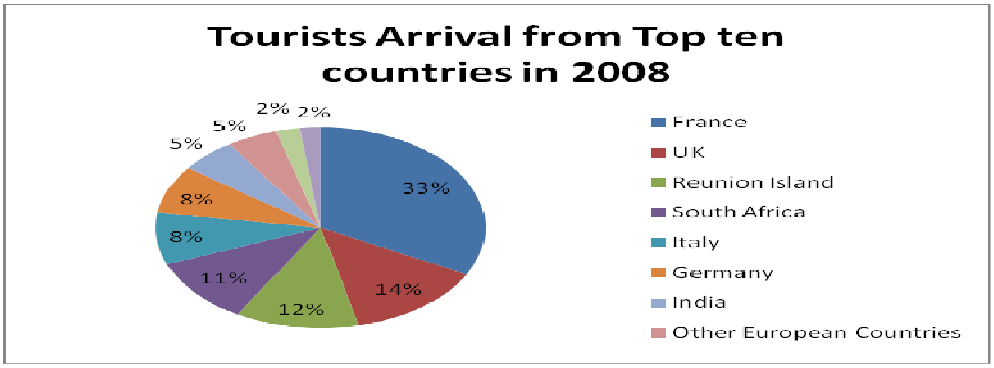

Figure 1: Showing top ten tourists market of Mauritius - *source CSO 2008*

In June 2008, there were about 94 registered luxurious hotels in Mauritius which provide an excellent service and some of which also rank among the best in the world. Eight hotels were not operational at that time due to renovation and the total room capacity of the registered hotels was 10,503 with 21,063 bed places [CSO, August 2008]. In 2008, 930436 tourists came to Mauritius from different parts of the world. Figure 1 gives an overview of the top ten tourists market of Mauritius for 2008 (CSO 2008).

1.1 Tourism and the Environment in Mauritius

The Government's vision of "Maurice Ile durable", aiming at making our island a showcase to the world, by exploring the green alternative has been gaining a lot of press coverage recently. The tourism sector must also take its share of responsibility and meet with the growing demands of protecting the environment in this sector. Environmental protection mainly aims at more efficient productive processes, waste reduction, promotion of eco-tourism as well as its handling and correct destination. However, the primordial question that one should ask oneself here is: Are hoteliers really environmental conscious to such an extent that they are willing to spend a massive amount of money simply to go 'green'? A quick glimpse at the

actual situation in Mauritius will describe the degree to which hotels are involved in 'going green'.

The best know common framework for an Environmental Management System (EMS) is the ISO 14000 series, prepared through the International Organization for Standardisation (ISO) based in Geneva, The standard requires that there is an environmental policy which 'includes a commitment to continual improvement and pollution prevention" and "a commitment to comply with relevant environmental legislation and regulations". End of February 2007, there was only one ISO 14000 certified hotel namely Labourdonnais Waterfront Hotel and three Green Globe certified hotels: Coco Beach Hotel, Labourdonnais Hotel and Le Prince Maurice respectively (MSB 2009). Recently the Sugar Beach hotel has also gone green by implementing ISO 14000. Out of the existing 94 hotels that exist, only four of them are certified which represents approximates 5% of certified hotels. In 2002, the Association des Hoteliers et Restaurateurs de L'Ile Maurice (AHRIM) (Chetty 2002) also produced an Environment Charter, which is a voluntary certification scheme so as to promote high standards in tourist facilities. The project was funded by the National Environment Fund. The AHRIM consists of 14 hotel members, out of which only 6 hotel establishments signed the charter. Even 50% benchmark was not reached by AHRIM as its own members were not willing to abide by the rules of saving the environment. The negligible percentages showing the reluctance of hotels to commit themselves obliges oneself to ponder on "why such a lack of interest?"

There are various reasons which can explain the very dim percentages showing certified hotels in Mauritius. Attempts made so as to promote sustainable tourism and eco-tourism as quality products suffer from lack of

methods so as to ensure hoteliers the benefits that they carry. Lack of proper knowledge on this respective topic, like for example huge savings that can be made, also plays against certification of hotels. However, the major drawback of certification remains the cost associated with it. ISO 14000 certification is not inexpensive as for a small hotel, it can cost easily US $5,000 or more (Saxe 2007) together of course with further expenditures for periodic auditing. However, those who are spending such huge amount of money so as to obtain the certification must be having a valid reason to do so. If properly marketed, certification obtained can be of great use as it will enhance the status of the hotel on an international level and attract more tourists as nowadays tourists are showing preferences for destinations that protect and preserve the environment. Certification has not only led in to market advantage over competitors, but also saving in spheres such as energy, water wastage reduction.etc, thus it can be concluded that certification for sustainable tourism is a mechanism that has a very big potential to help development of the tourism business. Travellers are already looking for low environmental impacts and high social and economic benefits. In order to play the game on an international footing, hotels of Mauritius must seriously think about the 'go green' option and help Mauritius to live up to its name of being a Paradise Island.

2.0 METHODOLOGY

The aim of this study was to devise an environmental management strategy based on the ISO 14001:2004 Environmental Management standards for a hotel facility.

2.1 Selection of a Case Study Company- A four-star plus hotel

A four-star plus hotel was selected as the case study hotel to carry out preliminary environmental audits. The hotel's name was not included anywhere in this report for confidentiality. For reference purposes this case

study hotel is referred to as Hotel M throughout the text. Hotel M lies on a 25 hectare private estate and contains 221 rooms and 2 restaurants for catering purposes. The hotel is mostly used for business conferences and as a honeymoon destination apart from being a lodging facility for middle and high-class tourists.

2.2 Phases of the Study

The study was divided into two main phases:

Phase 1: Carrying out preliminary environmental audits in the case study hotel.

Phase 2: Evaluation and devising an environmental management plan for the hotel using PLAN and DO aspect of the PDCA cycle and based on the ISO 14000 management systems.

2.3 Gap Analysis

The gap analysis was a very short and straightforward process. The goal of the gap analysis was to obtain an overall assessment of the company's current environmental management activities in comparison to the ISO 14000 standard requirements. This was accomplished through review and comparison to each requirement of the standard and completion of a questionnaire based on the standards. Specifically, the work under this task included briefly reviewing and comparing the results to a certified ISO 14001 hotel, which for the purpose of the study will be called the **Benchmark hotel**.

Questions were asked on the following:-

- The company's environmental policy.
- Current management system procedures and structure and whether the procedures were documented and implemented.

- Current environmental management records related to the site.

To conduct the gap analysis, each requirement of the standard was converted into a question. Rather than a yes or no answer, the responses were rated on the scale of one to five viz:- Scale 5 - conformance to ISO 14000, scale 4 - procedure implemented but not documented, scale 3 - procedure documented but not implemented, scale 2- no procedure and scale 1 - no answer/not known. This scoring system provided a better understanding of the existing gaps, which in turn led to more accurate implementation planning. Answers to these questions were graphed to provide a detailed method to assess any sub-element and visually compare all sub- elements within each major element. Finally results of the Hotel were benchmarked against results of the certified ISO 14000 Hotel.

2.4 Aspect Analysis

The aspect analysis study, is a general data gathering to establish the site's environmental interactions as opposed to a comprehensive audit or assessment. An *environmental aspect* is any element of the organization's activities, products, and services that can interact with the environment and which can be controlled or influenced. The impact is the change caused by the aspect on its environment, which can be either positive or negative. For the initial assessment, environmental aspects were identified that applied to the company's activities, products, and services. These aspects were then sorted into various aspect categories such as air emissions, water releases, solid and hazardous waste, energy, and natural resources. Related impacts on the environment were then identified for each aspect. The aspect analysis was carried out in a three-step procedure. First of all, a list of all procedures was reviewed including chemical storage, wastewater treatment, and product transportation, among others. Secondly appropriate personnel were interviewed to identify the facility of various operational units that interact

with the environment and finally the facility's aspects and associated impacts were sorted by activity, product, or service and results were tabled. The significance of the environmental aspects depended on a variety of considerations related to the business and its environmental norms. These significant aspects were then used to build objectives, targets, and the ISO 14000 program flowcharts as a whole.

2.5 Developing the Environmental Policy of Hotel M.

Based on information collected in the initial assessment, the organization's personnel developed a policy that met ISO 14000 requirements. The company is committed to being environmentally responsible. Employees were proactive in efforts to improve production processes to eliminate waste, to meet legal and other requirements, to set environmental objectives and targets and to be up to date with new technologies especially waste water and solid waste handling and disposal.

2.6 Objectives, Targets, and Development of Environmental Management Programs

With the baseline information obtained and policy in hand, specific objectives and targets were established based on its environmental policy and significant aspects. The related targets included performance goals and milestones for measurement such as review options to reduce water consumption and to reduce effluent/waste.

The environmental management programme was devised for three main aspects namely energy reduction, water and solid waste reduction. Responsibilities were identified and targets were set for each environmental management programme along with a reasonable time frame following a detailed energy, water and solid waste audits.

2.7 Preliminary Energy Audit

The energy audit was a periodic examination of an energy system to ensure that the most appropriate sources of energy are employed and that energy is used as efficiently as possible. Once information was obtained, data were analysed and were used to promote energy efficient practices in areas of the system where they will prove to be most effective. Progress of any initiatives that are put in place can then be accurately monitored. The energy audit was carried out in three steps. First an audit of historical data was made, followed by a walkthrough audit and analysis of results. During the first phase of the audit, data was collected to establish the general trend or pattern over a time period. Associated costs and consumptions levels were also investigated. During the walk-through audit, areas of energy waste and inefficiencies were identified. It was also the aim of the investigator to seek opportunities to reduce energy wastage and to establish programmes of cost savings in major areas of energy consumption. This last phase of the audit was based on the areas that were identified in phase two as requiring further investigation. With results from this phase and those obtained in the walk through survey, an energy management program for the business was developed.

2.8 Preliminary Water Audit

In order to establish the quantity and cost of water used in a hotel building over a given period, water audits were carried out. Again there are four steps in a preliminary water audit: data collection, data analysis, data presentation and establishing priorities. After thorough analysis of existing water records, data were analysed. A walk-through survey was further carried out and direct observations and measurements were used to identify any leaks or inefficiencies in the system leading to water wastage. Potential

areas for water conservation were identified and potential cost savings in major water consumption areas were established.

2.9 Solid Waste Audit and Chemical Audit

Source reductions where possible, coupled with recovery, re-use and recycle of wastes collectively results in pollution prevention. Before this prevention can take place there must be a thorough understanding of what a solid waste is, where it comes from, what process practices create it, and what technologies are available to eliminate it. A solid waste audit provides the basis for collection and evaluation of technical and economical data necessary to select appropriate waste reduction techniques. A solid waste audit can result in cost savings through reduced loss of raw ingredients or products, reduced treatment costs and reduced environmental fines and surcharges. In order to decide on whether to proceed and to accurately plan for implementation, it was necessary to assess and evaluate existing conditions at the facility. Once the gap analysis and aspect analysis and audits were completed, significant aspects were prioritized and an implementation plan was developed. This included flowcharts of how to establish procedures for each of the requirements of ISO 14001 as well as developing programmes to improve on environmental targets to be achieved.

3.0 RESULTS & DISCUSSION

3.1 Results of Gap Analysis

Results of the gap analysis reveal that the organization does not have a written environmental policy. However the hotel does show commitment to meet the obligations of all relevant laws, guidelines and best practice. It is also committed to continual improvement and prevention of pollution.

Results of comparison of the Hotel against those of the benchmark hotel are shown in Figure 2 below.

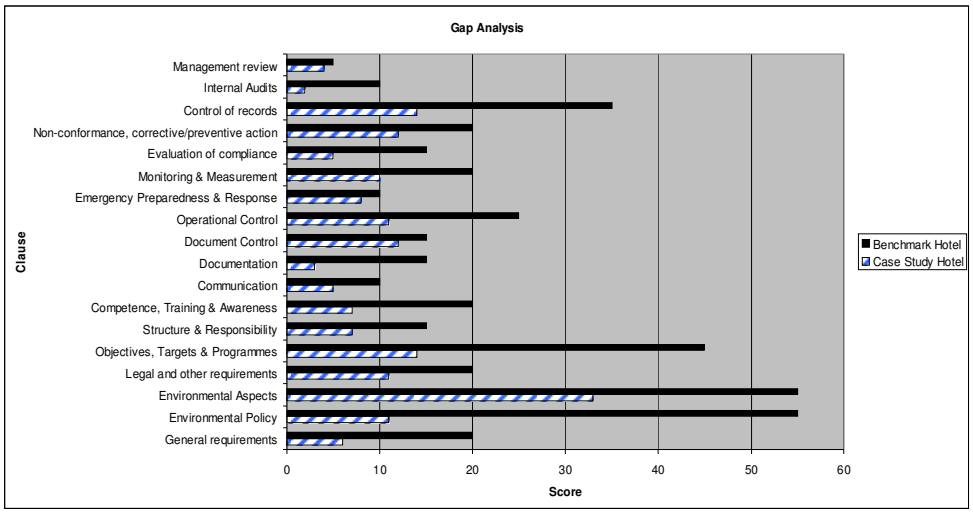

Figure 2: Gap Analysis between benchmark ISO 14001 hotel and case study hotel

Although monitoring of the main waste streams is being done, there are no existing procedures to identify the aspects and impacts. Hence there is no available register of the relevant environmental aspects and impacts related to the organization's activities. The legal and other requirements of the organization are not fully documented. Moreover there is no procedure to show how the register of these requirements is updated. Finally there **were** no procedure to clearly list the objectives and targets of the organization.

There are sufficient resources available to implement and maintain an EMS. Presently the organization spends a considerable amount of money to treat the wastewater generated prior to discharge. Since there is no existing Environmental Management System, there is no appointed environmental management representative. The existing environmental practices are taken in charge by the maintenance and engineering department and the wastewater treatment department. There is a lack of awareness concerning

the environment among the employees. Only head of departments have acquired training in their field of work but not necessarily with respect to the environment. There was no procedure to identify any training needs associated with the organization's environmental aspects.

As far as monitoring and measurement is concerned, there is no documented procedure to monitor and measure the key characteristics of its operations that can have a significant environmental impact. Effluent characterization is being done on a monthly basis and daily tests are done by the operators in the Waste water treatment plant (WWTP) on the pH, COD and temperature for the wastewater to be used for irrigation. Management audits are being done twice a year but no environmental audits are performed by the organization. Management reviews are carried out on a daily basis but they do not include environmental management reviews.

3.2 Results of Preliminary Energy Audit

Hotel M uses considerable amount of energy in the form of heat and power. By reducing energy use, the hotel can achieve environmental and cost benefits. The hotel uses energy mainly in the form of electricity, LPG (butane gas) and diesel fuel for the generator and vehicles. The main uses of energy are given as follows:

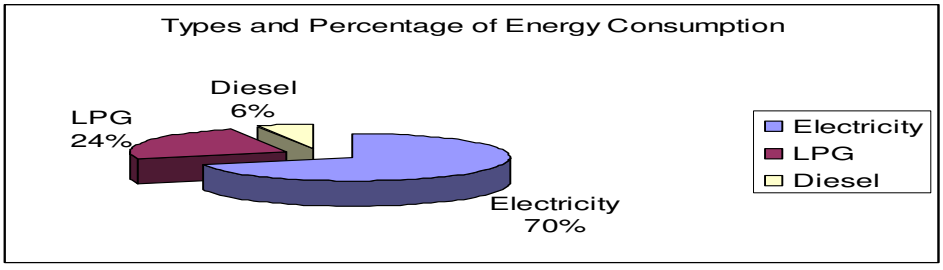

Figure 3: Types and Percentage of Energy Consumption

Table 1 show that electricity contributed to seventy percent of the total hotel energy consumption which amounted to Rs. 17,377,224 per year for electricity costs.

Energy Forms	**Total Costs per year/Rs.**	**Percentage of Total Costs (%)**
Electricity	17,377,224	83
LPG (Butane)	2,664,775	12
Diesel	964,072	5
Total	**21,006, 071**	100

Table 1 Energy Forms and their costs/year

LPG gas consumption was 24% of the total energy consumption mainly due to the high fuel requirements of the six gas-fired boilers and in the kitchens for cooking purposes. Diesel oil was the least used form of energy as it contributed only 6 % to the total energy usage. However, a relatively high expenditure of Rs. 964, 072 was observed for diesel owing to increased price of fuel during the recent years. The total energy costs amounted to Rs. 21, 006, 071 which is a high price paid on energy usage and representing of 3 % of money paid of total turnover on energy only.

3.2.1 Monthly pattern of Total Energy Consumption

Figure 4 below shows the energy consumption pattern on a monthly basis for the year 2007 at the case study hotel. The average total energy consumption for that year amounted to 188,000 MJ. This depended on the room occupancy rate at the hotel which corresponded to an average of 80 % occupancy as well as the seasonal patterns over the year.

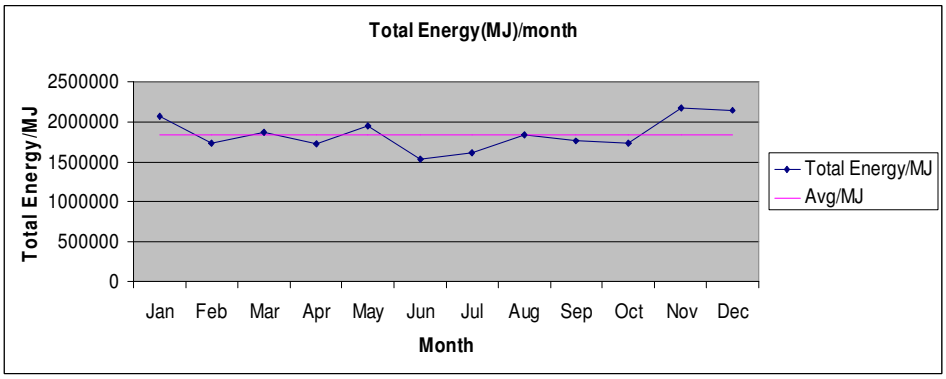

Figure 4: Monthly pattern of Total Energy Consumption 2007

Summer season usually starts in October to end in April. The winter season is from May to September. It can be observed that during the first five months of the year, energy consumption varied around the average total energy consumption figure while being high owing to the summer. The energy figure is relatively high compared to figures during the months of May to August because during summer, large quantity of energy was required for ventilation and air conditioning, while in winter energy was consumed for heating purposes only. Furthermore, the occupancy rate of tourists in the hotel was high in summer compared to winter.

3.3 Results of Preliminary Water Audit

The hotel consumed large quantities of water of maximum amount 9000 m^3 per month and the water consumption varied according to the number of tourists residing at the hotel or the room occupancy rates.

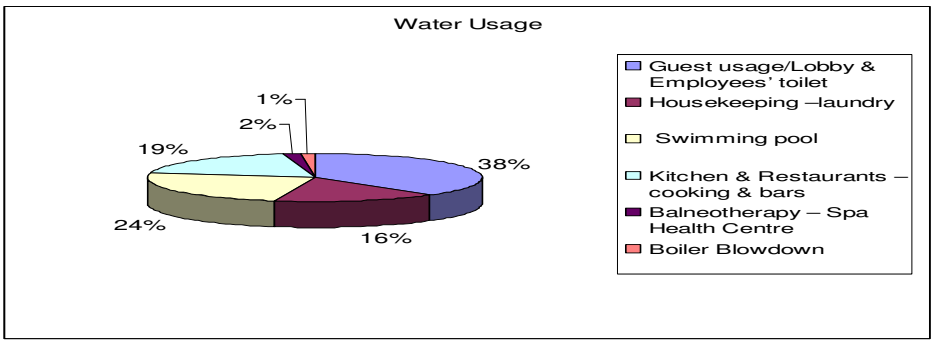

Figure 5: Water Usage by areas at Hotel M

Kitchen and bars use 19 % of water whereas the housekeeping activities contributed to 16 %. However, the boiler blow down and spa centre use relatively low amount of water with percentages of 2 % and 1 % respectively. The total water costs for the year 2007 amounts to Rs. 2,648,589. However, treated wastewater from the rotating biological contactor plant is used to irrigate the lawns and golf courses amounting to 74,691 m^3 of wastewater per year used for irrigation purposes. Had potable water been used for irrigation purposes, an additional expense of Rs. 2, 218,322/ year would have been incurred.

3.3.1 Monthly Water Consumption Pattern

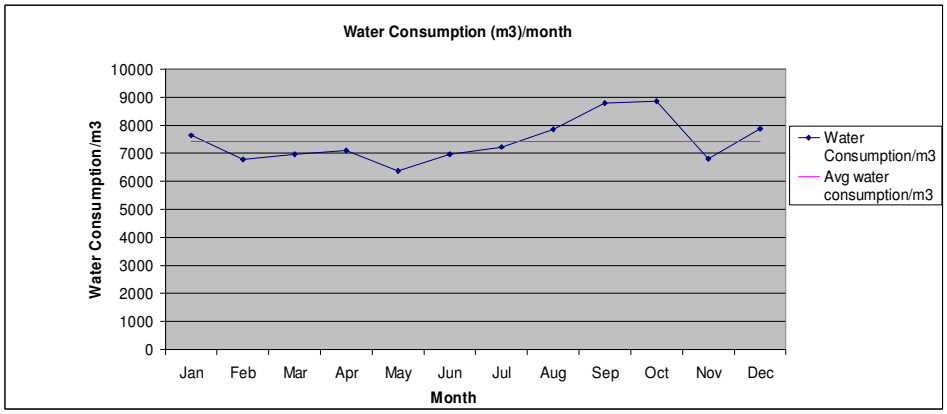

Figure 6: Monthly Water Consumption Pattern

Figure 6 indicates the water consumption patterns at the hotel for the year 2007. It can be seen that the water consumption patterns were slightly below the average figure of 7225 m^3 during the first seven months and a nearly constant pattern was observed. This average figure of 7225 m^3 is quite high owing to the summer season whereby tourists consume more water for bathing, in swimming pools and for drinking purposes. In August, water consumption begins to increase above the average figure and continues to escalate till November. Upon investigation and questioning with the maintenance and engineering staff, it was found that this increase was due to inefficiencies in water equipment and leaks in the piping system. However remedial actions were taken and the water consumption dropped to the average figure during the month of November. However, the slight increase in water usage during the month of December can be accounted by the high occupancy rate of tourists in the hotel at that time of the year and the high consumption of water by tourists in the summer season.

3.4 Results of Solid Waste Audit

A solid waste audit was carried out in the hotel for three days and waste segregation was carried out for the waste components in the main departments of the hotel. The aim of the waste segregation activity was to quantify the solid waste composition in the hotel and to identify opportunities for reducing, reusing and recycling programmes. It should be noted that since the setting up of the hotel, waste segregation forms part of the hotel's company policy locally and governed by the main mother company in Germany. The following figures show results of the waste segregation in two main departments namely, restaurants and kitchens, housekeeping (guest rooms and lobby) yard golf courses and office.

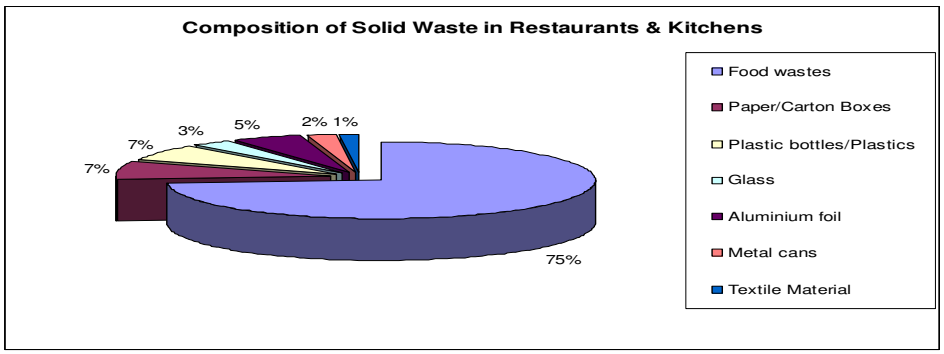

Figure 7: Composition of Solid Waste in Restaurants & Kitchens

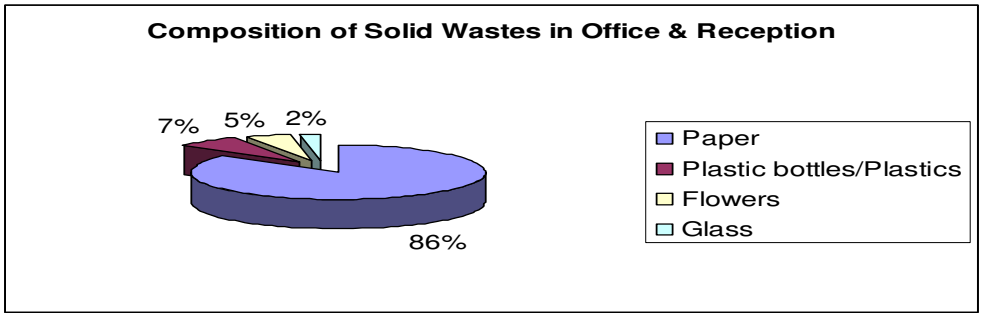

Figure 8: Composition of Solid Waste in Office & Reception

3.5 Results of Chemical Audit

An analysis of hazardous chemicals used at the hotel was carried out in the laundry and the maintenance section which caters for the well keeping of yards and golf courses through the application of fertilizers and pesticides. A list of main chemicals and pesticides used in the laundry and maintenance section is given below. It should be noted that for confidentiality reasons, the names and codes of the chemicals were not used in this list.

Table 2 Results of Chemical Audit

	Chemicals	Composition & Hazardous Properties	Use	Quantity Used /month
1.	Laundry Detergent/Soap	Contains potassium hydroxide and is corrosive in nature	Used as a washing agent for linens/clothes	1790 L
2.	Softener	Contains sodium hydroxide and is corrosive in nature	Used to provide softness to linens and clothes	895 L
3.	Bleach/Destainer	Contains sodium hypochlorite which is irritant in nature	Used to remove stains in white linens/clothes	609 L
4.	Neutralizer	Contains organic and inorganic acids	Used to prevent yellowing of white linen/clothes	286 L
5.	Herbicides	Contains mainly dinitroaniline and acetophenone which are very toxic in nature	Used in yards for killing weeds	200 kg
6.	Fertilizers	Contains nitrogen, phosphorus and potassium and can be poisonous.	Used as aiding agent to grow plants, shrubs and flowers in the yard as well as growing grass on golf courses.	300 kg

3.6 Wastewater analysis results for some months of the year 2007

Table 3 indicates that wastewater analysis tests done by the SGS Company for Hotel M show that the wastewater parameters were within the permissible limits Table 4 except for the COD during the month of October where it was 237 mg/L.

Month	**BOD (mg/L)**	**COD (mg/L)**	**TSS (mg/L)**	**Colour (hazen)**	**pH**	**Nitrate (mg/L)**	**Oil & grease (mg/L)**	**Faecal Coliforms (MPN/100 mL)**
Jan	1.0	36	6.4	30	7.38	1.36	8.6	< 1
Aug	3.0	83	34	20	7.34	1.54	3.0	< 1
Oct	12.0	237	44.0	20	7.50	2.07	1.0	< 1
Dec	3.0	92	36.4	20	7.23	1.45	9.0	< 1

Table 3: Wastewater tested parameters for Hotel M

Parameter	BOD/ mgL^{-1}	COD/ mgL^{-1}	TSS/ mgL^{-1}	Colour (hazen)	pH	Nitrate / mgL^{-1}	Oil & grease/ mgL^{-1}	Coliforms/ MPN/100 mL)
Permissible Limits	40	120	45	-	5-9	20	10	200

Table 4: Permissible Limits for Wastewater Characteristics in Hotels

Upon research, it was found that the high organic matter content was due to a major conference held in that month whereby significant amounts of food were prepared and hence increasing the organic matter content of the wastewater stream during discharge. Immediate remedial actions were taken to reduce the COD content of the wastewater as a result. Oil and grease are stored separately and are not discharged into the wastewater streams.

3.7 Benchmarking exercises and cost benefit analysis.

A summary of main findings or Operational Performance Indicators (OPIs) concerning electricity consumption in KWh per year, total energy consumption in MJ per year, total water consumption in m^3 per year, and

total solid wastes generated in kg per year are given in the table below for (Hotel M) and an ISO 14001 certified hotel.

Operational Performance Indicator	**Quantity/year**
Total amount of electricity consumed	4, 311, 352 kWh
Total amount of energy consumed	22,113,374.2 MJ
Total amount of water consumed	89, 089 m^3
Total amount of solid waste generated	664, 443 kg

Table 5: Operational Performance Indicators at Case Study Hotel (Hotel M)

Operational Performance Indicator	**Quantity/year**
Total amount of electricity consumed	3,017, 947 kWh
Total amount of energy consumed	21,303,151.1 MJ
Total amount of water consumed	21, 111 m^3
Total amount of solid waste generated	371,477 kg

Table 6: Operational Performance Indicators at Benchmark Hotel

(Source: AHRIM 2002)

From the Tables 5 and 6, it can be seen that the ISO 14001 hotel is environmental friendly since it generates and consumes relatively less solid wastes, water and energy per year. A deeper analysis shows that the Benchmark hotel consumes 30 % less electricity per year than Hotel M. Furthermore, its water consumption is significantly lower than Hotel M by 76%. The solid waste generation rate of Hotel M is 44 % higher than that of the environmental friendly hotel. These significant cuts in energy, water and solid wastes can be explained by the implementation of a well-structured environmental management programme at the ISO 14001 hotel whereby energy and water savings programmes were successfully implemented. Composting of the organic fraction of the solid wastes was done, thus

avoiding further expenditure in buying fertilizers for the gardens and lawns. The total energy costs for Hotel M amounted to Rs 21,006, 071 for the year 2007 whereas the total water consumption costs amounted to Rs 2,648,589 for the year 2007. On overall, hotel M paid 4.8 % of its total turnover on water, electricity and wastewater tax in 2007. If the Benchmark implementation techniques and guides are used by the hotel, total savings of about Rs 8 million rupees can be achieved by the hotel per year (Source: AHRIM 2002).

Identifying Aspect and Setting improvement Targets

A list of aspects identified for the study was established for the EMS implementation of Hotel M and is as shown in Table 7. Once aspects were identified, their degree of impact on the environment was established and **significant** aspects were established.

Section	Activities	Environmental Aspects	Environmental Impacts	Frequency of Occurrence	Degree of Impact
Generator	Operation of generator	• Generation of suspended PM, CO_2, CO, HC, SO_2, NO_x • Generation of heat and noise • Consumption of diesel	• Air pollution • Safety and health hazard	2	**2**
Effluent Treatment Plant	Flow of effluent to treatment plant	• Generation of oil and grease (for kitchen effluent) and phosphate in effluent for treatment • Generation of odour • Generation of sludge	• Use of treated water for irrigation • Air pollution • Land pollution	4	**3**

Pumps	Operation of pumps	• Generation of noise • Consumption of energy	• Noise pollution • Global warming	4	**2**
Boiler	Operation of boiler	• Generation of gas combustion exhaust • Consumption of water • Consumption of salts for softening water	• Air pollution	4	**3**

Table 7: Identifying Environmental Aspects and Impacts

Frequency of occurrence: 1: improbable, 2: infrequent, 3: frequent, 4: continuous

Degree of impact: 1: no impact, 2: minor, 3: moderate, 4: serious

Environment Management Programmes at Maintenance department.

Targets were set for those aspects having a high impact on the environment. Appropriate Environment Management Programmes for Energy and Water Conservation/Reduction as well as solid wastes management are given for the maintenance department in Table 8.-10 below.

Department	Target	Responsibility	Means	Time Frame
1. Maintenance	**Reduce electricity consumption by 30%**	**Maintenance Manager** **Mechanical Engineer** **Mechanical Engineer**	**1. Ensure boilers & chillers are regularly serviced to maximize efficiency.** **2. Ensure that proper insulations are made for hot water pipes, boilers.**	**Each week** **3 months** **1 month**

			3. Regulate room thermostats such that when rooms are heated to a set temperature, heating/cooling systems are switched off automatically.	

Table 8: Environment Management Programme for Energy Conservation

Department	Target	Responsibility	Means	Time Frame
1. Maintenance	Reduce water use by 40%	Mechanical engineer Mechanical engineer Plumbers	Using drip irrigation instead of overheads when watering gardens. Retrofit taps and showerheads with aerators especially in guests' rooms.	1 month 3 months 3 months

Table 9: Environment Management Programme for Water Conservation

2. Maintenance	Reduce solid wastes by 30%	Maintenance Manager	1. Separate, compact and store all wastes generated by the resort before contracting out. 2. Send glass, plastic, paper, cardboard and metal cans for recycling. 3. Use organic fertilizers with no herbicides in gardens. 4. Mulch and compost garden and kitchen food wastes(vegetable peels) 5. Use drought-resistant native plant species to minimize irrigation.	Every day Every month 3 months 8 months 9 months Every month

Table 10: Environment Management Programme for reducing solid wastes

The direct benefits of the hotel in implementing an EMS will be to achieve savings through energy, water and waste minimisation approaches. Good housekeeping should be maintained supported by up to date cleaner production technologies and appropriate pollution control equipment. Increasing discharge fees and waste disposal charges will provide ongoing incentives for cost-effective pollution reduction. There must be an appropriate framework of regulations and incentives to drive the performance improvements. Procedures should be in place and implemented to ensure that significant aspects are compliant to their related environmental norms. Where non-conformances are recorded appropriate corrective actions should be taken to sustain improvement.

4.0 RECOMMENDATIONS

The PLAN and DO aspects of the PDCA cycle were taken into account in this project and flowcharts representing procedures to implement each of the requirements in ISO 14001:2004 were devised. However, the other two major aspects of Deming's PDCA cycle are the CHECK and ACT phases. The successful and complete implementation of ISO 14001 at Hotel M lies in putting the environmental management programmes into action. This is the actual deployment of the ISO 14000 program into the organization. It is important during implementation to synchronize processes and personnel with procedures in place. Having the business units and all employees work together to develop the system led to consistency throughout the company and a more effective ISO 14000 programmes. The following elements in the CHECK and ACT phases are equally important.

Internal Auditing and Corrective Action

ISO 14000 requires that the program be periodically internally audited, independent of any third-party certification program. Although outside consultants could be used, the organization can assemble its own internal audit team to conduct the audits supplemented with oversight and support as needed. Internal audits are being conducted in conjunction with the auditor training to provide a hands-on way to use the techniques learned. The training and the initial audits should be coordinated for efficiency. Non-conformances identified during the auditing process should be corrected. Corrective action in this context refers to improvements in the ISO 14000 program. Non-conformance sheets should be devised and corrective and preventive actions should be applied throughout the company and documented.

Develop an Emergency Preparedness and Response Plan

The Emergency Preparedness and Response Plan should include a description and map of the hotel, including location of emergency response equipment such as fire extinguishers, hydrants or absorbent materials. It should also include emergency services available on site and in local area such as fire departments. The plans should also highlight specific actions to be taken for different types of emergencies and information on hazardous materials, including environmental impacts.

Continuous Improvement

This is the company's ongoing task and involves researching other systems, benchmarking, developing strategies to achieve goals, establishing future corporate requirements, and linking them to environmental issues. The ongoing maintenance of the program, including periodic internal audits and third-party surveillance audits, has yet to be addressed. However, as it is implemented, the program should become the standard operating procedure

and resources because these functions would be incorporated into the environmental business function, which would eventually be beneficial for the company.

5.0 CONCLUSIONS

To conclude the study was successfully completed. Preliminary environmental audits were carried out for this purpose and it was deducted that the hotel consumes huge quantities of energy and water on a yearly basis. More specifically the hotel consumes 22, 113, 374.2 MJ of energy per year whereas the water consumption amounts to 89089 m^3 during the same year. The total expenditure relating to water and energy consumption costs is Rs. 23, 654, 660 per year which is colossal, considering that it represents 4.8 % of the hotel's total turnover. Environmental Management programme for energy, water and solid waste reduction were proposed. Environmental Management tools such as benchmarking exercises and cost-benefit analysis were used in formulating the environment management plan for the hotel. It is to be highlighted that a complete success of this ISO 14001 Implementation strategy lies in fully integrating the PLAN, DO, CHECK and ACT concepts into the company's business operations.

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