A STUDY ON SUSTAINABLE CONSUMPTION PRACTICES IN SRI LANKA HOTEL SECTOR

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Abstract: Tourism is becoming a very important sector in the Sri Lankan economic development, with the end of the 30 year conflict situation. It is reported that 7.9% of the GDP of Sri Lanka is contributed by the Travel and Tourism industry. At the same time, 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 to reduce the drain on the country's resources. In order to address the above issue, a project called "Greening Sri Lankan Hotels" has been launched by the Ceylon Chamber of Commerce, under the EU funded SWITCH-Asia program. While the "Greening Sri Lankan Hotels" project has a target of addressing the hotels in the whole country, for the current study, a few hotels where the data was available and the potential for saving could be estimated were selected. The study showed that even in the more sustainability- conscious hotels, there is room for improving the situation by better practices as well as better choice of equipment. It was found that on average about 30% of the water consumption and 17% of electricity consumption can be reduced in the three hotels studied. The suggested interventions to achieve such savings would have relatively short payback periods, thus making them worthwhile. They would also reduce the carbon foot print by an average of about 26%.

Keywords: Energy conservation, Green Hotels, Sustainable tourism, Waste reduction, Water conservation

1. Introduction

With increasing awareness on global energy crisis, scarcity of natural resources and growing attention on climate change and global warming, it has become a sustainability issue for the hotel sector to implement better practices in water consumption, energy usage and waste management. Pressure for greening the Tourism industry is coming from the clientele, particularly the European market. The challenge for tourist hotels is to save water and energy and reduce waste of natural resources without compromising the comfort level provided to the guests. As determined by many studies in other countries, the hotel sector has a saving potential of at least 20% in water consumption and energy consumption by improving their resource utilization by adopting best practices.

However, in Sri Lanka, except for the large scale multinational hotels, attempts for conservation among the small and medium scale hotels seems to be very limited, perhaps due to the lack of awareness about the importance of water conservation, energy conservation and waste management, and the potential for saving of money by reducing the above consumptions. Since the Sri Lanka Tourism industry is expected to develop rapidly in the next few years, it is very important that resource conservation is practiced by the hotels in order to make tourism in Sri Lanka sustainable. It is important to assess the current situation with respect to the resource consumption practices among the tourist hotels and the conservation measures that are being practiced, and the possible measures that can be introduced in order to reduce the consumption.

2. Objectives

To assess the current water consumption, energy consumption and waste management practices in a cross section of hotels in Sri Lanka, identify the conservation measures that are being practiced, and the possible measures that can be introduced in order to reduce the resource consumption by at least 20%.

3. Study Methodology

The study was based on analysis of data from hotels that were registered with the Greening Sri Lanka Hotels Project. Literature review on international best practices and visits to several hotels that are practising conservation measures helped to identify the priority interventions that need to be implemented to achieve sustainability. While there were more than 100 hotels registered with the Project at the commencement of this study, due to time constraints, the detailed studies in water, energy and waste aspects were restricted to three selected hotels, based on the availability of data and available potential for conservation measures. Walk through Audit Reports were studied to identify the potential areas for improvement, and calculation of saving potential under water and energy conservation and waste management were done based on data available. These results were used to make recommendations for more sustainable practices for the hotel sector.

4. Results and Discussion

An analysis of the situation with regard to water and energy conservation and waste management measures already in use in the tourist hotels in Sri Lanka (Table 1) showed that the use of CFL bulbs as an energy conservation measure was the only intervention that was used in the majority (81%) of hotels across all size categories. Other energy conservation measures like Power Factor Correction and of Key Switches are used by the large hotels, but very few medium hotels, and not relevant to most of the smaller hotels. Sewage Treatment Plants were available in 63% of the large hotels and 78% of the medium hotels, while waste segregation up to some extent was happening in about 50% of the large and medium hotels. Many medium (63%) hotels have invested on solar water heaters, while this is less common among the large and small hotels. All other interventions were used by very few hotels.

The hotels are concerned about energy management mainly because of the high cost of energy, and the cost savings they can make by the interventions. Those who are getting water from the City water supplies are somewhat concerned about water saving too, because they are being charged at the Commercial tariff, though the actual cost of water is not very significant compared to the turnover. However, those hotels that are pumping their water from their own wells do not seem to realize the importance of water saving at all, even though they are indirectly paying for the water by the use of electricity and chemicals/consumables for water treatment.

With respect to waste management, the hotel sector is driven almost entirely by the regulatory requirements, except for a few environment conscious hotels that are motivated to practice reduction, reuse and recycling of solid waste and wastewater. This is because it is not easy for the management to see any financial benefit from the investments, unlike in the energy conservation measures.

4.1 Water Conservation

Figure 1 shows the typical distribution of water usage in the different departments of a hotel in a warm, humid climate, such as Sri Lanka (AIHE, 1996). As such, it can be seen that in order to achieve substantial water savings, efforts should be directed towards conservation measures in the guest rooms, kitchen, public wash rooms and laundry. In addition, gardening and landscaping consumes substantial amounts of water, particularly in the dry periods, depending on the size of garden and type of vegetation.

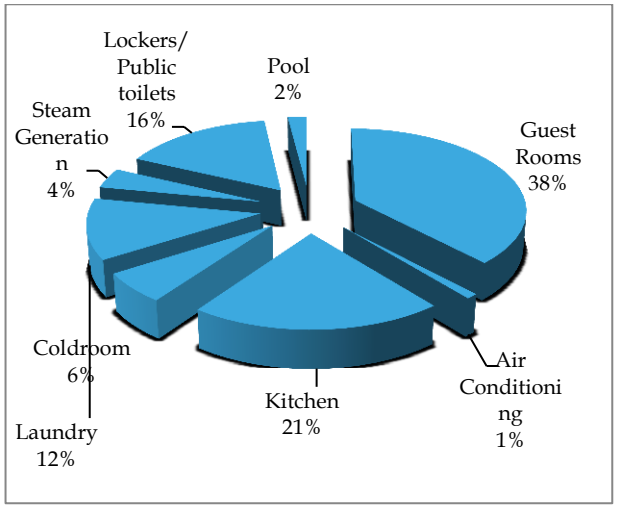

Figure 1: Typical Water Usage in Hotels for warm humid climates (AIHE, 1996)

The water faucets (taps) may have flow rates from 15 – 25 litres per minute (lpm), while a good quality low flow tap with an aerator would produce the same guest satisfaction with a flow rate of 6 – 10 lpm. Similarly, a good quality aerated shower head with a flow rate of

7- 15 lpm will provide the same guest satisfaction as a shower with a flow rate of 25 – 35 litres per minute, over the same time period. This is because, for shower and washing purposes where the water is not used to fill a container, the feeling of the water on the body and not the actual quantity of water provides the satisfaction. Similarly, for toilet flushing, well designed systems can perform perfectly with as little as 3.5 litres, whereas the older systems use up to 11 litres per flush. Dual flush cisterns that use 6 litres for full flush and 3 litres for half flush are commonly available. Leakage is another major area where water consumption increases. A dripping tap could lose about 110 – 125 litres per day, and heavier leaks would lose up to 250 litres in a day. In hotels with Swimming Pools, sometimes the filters are backwashed for a fixed period of 20-30 minutes daily, whereas the good practice is to start backwashing when the pressure drop exceeds the predetermined value, and backwash only until the wash water runs clear. This would normally require running the wash water for about 3 -5 minutes, and may not require daily backwashing, particularly during off peak periods. Table 2 shows the calculated water saving potential in three hotels in Sri Lanka

Table 2: Potential for water saving in Hotels A, B and C

Area	Saving as a Percentage of Total Water Consumption		
	Hotel A	Hotel B	Hotel C
Taps in guest Rooms	23.98%	10.1%	20.7%
Showers in guest rooms	-	4.8%	7.7%
Taps and showers in Staff quarters	-	-	1.8%
WC's	1.6%	8.4%	-
Swimming Pool	4.1%	-	0.4%
Leakages	5.4%	-	-
Laundry - towel and linen reuse	-	-	1.3%
Total	35.08%	23.3%	31.9%

If all the above interventions are implemented, the average water consumption per guest night in these three hotels can be reduced to o.48 m^3, from the current rate of 0.68 m^3. These values compare well with the corresponding values given by Goodwin (2007) in a Survey carried out for the WTM, where the Green Globe baseline water consumption is 0.7 m^3 per bed night, and the Green Globe Best Practice value is 0.5 m^3 per bed night.

4.2 Energy Conservation

Figure 2 shows the breakdown of energy usage in a typical hotel in the warm humid climate, like the Sri Lankan coastal areas.

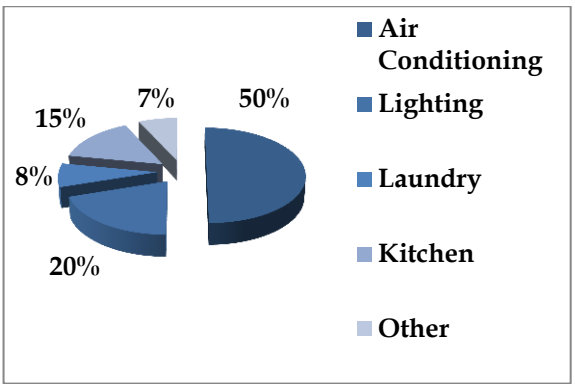

Figure 2: Typical Energy Balance for a Hotel in warm humid climatic conditions

This shows that the Air Conditioning (A/C) load is the highest in hotels with central A/C, followed by lighting. In smaller hotels with no central A/C, the lighting load becomes the most significant. The kitchen is the next highest load, with refrigerators, chillers and electric ovens and cookers. Therefore, these are the areas that need to be addressed, in order to reduce the energy consumption.

Furthermore, the sources of energy range from electricity, diesel and LP gas to solar energy, biomass from cultivated forestry and biogas from waste. Use of the former sources should be reduced by improving efficiency and reducing waste and also replaced by the latter forms as much as possible, in order to achieve sustainable development.

The energy saving potential for hotels A, B and C calculated based on their current practices and establishment details are shown in Table 3. Table 4 shows the estimated Carbon foot print before and after implementation of the interventions mentioned in Table 3.

Table 3: Calculated Potential savings if energy saving interventions were implemented

Energy Conservation Method	Potential Saving as a % of Total Consumption		
	Hotel A	Hotel B	Hotel C
Electricity Saving Potential			
implementing Energy saving Bulbs	8.7%	4.5%	4%
implementing new water saving practices and appliances	6.8%	2.3%	2.5%
increasing the efficiency of solar panel	5.3%	3.8%	13%
Total Electricity	20.8%	10.6%	19.5%
Kerosene saving potential			
Adopting line drying (Laundry)	23%	N/A	N/A
Total Kerosene	23%	N/A	N/A
LP gas saving potential			
Increasing the kitchen efficiency (Gas Cookers)	27%	27%	Well maintained
Generating bio gas	35.2%	41%	30%
Total LP Gas	62.2%	68 %	30%

Table 4: Estimated Carbon Dioxide Emissions before and after implementation of Interventions (International Energy Agency, 2011)

Hotel	Calculated CO_2 emission kg per guest night	
	Before	After
A	40.99	31.23
B	15.14	13.52
C	15.43	12.44

The energy consumption could be further reduced by many other interventions such as ensuring the proper sealing of air-conditioned spaces, providing key switches for the rooms, so that the electrical appliances get switched off when the occupant leaves the room, engaging the guests in the conservation efforts by displaying notices with switching off times for lights in common areas, establishing a schedule for opening of upright freezers and chillers by kitchen staff etc.

4.3 Waste Management

Table 5 gives the methods of wastewater and solid waste management practices currently implemented in the three selected hotels. It should be noted that two of the hotels selected for waste management is different from the ones selected for water and energy studies. The main reason for this difference is the lack of data for waste in two previous hotels, B and C.

Table 5: Methods of Wastewater and Solid Waste management at the three selected hotels

Type of waste	Hotel A	Hotel D	Hotel E
Grey water	Septic Tank	Activated Sludge treatment	Activated Sludge treatment
Black water	Soakage Pit	Activated Sludge treatment	Activated Sludge treatment
Reduction at source	No	No	poor
Separation at the source	No	Poor	Poor
Reuse	No	No	No
recycle	No	Poor	No
Bio gas	No	No	No
composting	No	No	Yes

If the hotels take the initiatives to reduce their water consumption, the generation of wastewater would automatically reduce, and the performance of wastewater treatment plants would improve.

Data from the hotels A, D and E were used to calculate the potential for biogas production and the feasibility of source separation (using coloured bins) and recycling of the recyclable materials. The prices for recycled material were taken from the current market rates. The results are shown in Table 6.

Table 6: Payback periods for investments on Solid Waste Management

Hotel	A	D	E
Solid waste management			
Investment for sorting (Rs.)	8000	32000	8000
Annual income from recycling (Rs.)	7200	45,144	4272
Payback period (years)	1.11	0.7	1.8
Biogas Production (Chinese Type)			
Investment (Rs)	200,000	1,200,000	200,000
Payback Period (years)	1	1	2

5. Conclusions

The study showed that there is significant potential for improvement in the Sri Lankan Tourist Hotel sector with regard to sustainable practices. Significant water savings can be achieved by using efficient fixtures such as low flow taps and showers and low volume cisterns in guest rooms and staff quarters, and establishing systems for prompt leak repairs and preventive maintenance. Swimming Pool water leakages and inefficient backwashing also should be controlled. Introducing towel and linen reuse programs for the guest rooms with proper training of housekeeping staff and displaying notices to the guests will also help in water conservation as well as energy conservation and reduction in chemical (detergent) use.

As for energy conservation, the hotels seem to have understood the benefits of switching to CFL and LED bulbs, and the larger hotels have invested on equipment such as capacitor banks for power factor correction. Even though it was not possible to calculate the saving potential in these case studies, many hotels have a potential for saving by paying attention to prevention of exchange of cool air from air-conditioned spaces, refrigerators, chillers and freezers.

LP gas saving potential is present in many hotels by proper maintenance of stoves, so that the flames burn at their maximum efficiency, and using the wet garbage in the kitchen for production on biogas.

Potential for waste management is very high, as the present waste management practices in the sector is at a very low level, except for a few special hotels. Study showed that sorting and selling the recyclable garbage would be beneficial to the hotel, even financially, as it would recover the cost of the small investment for purchasing of coloured bins within one or two years. As for wet garbage, the most beneficial method of management is production of biogas, as this would reduce the amount of LP gas used, and the cost can be recovered within 1 or 2 years in most cases. However, the technical feasibility of the system needs to be studied before investing on a biogas system.

6. Recommendations

The Sri Lanka hotels sector needs to focus attention on the conservation of energy and resources as there is a great potential for improvement, resulting in operational cost reduction, increased profits, improve marketability as lower carbon foot print hotels and more sustainable development of the country.

7. Acknowledgements

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Table 1: Current Status of Sustainability Measures adopted in Sri Lankan Tourist Hotels (Data from Greening Sri Lanka Hotels Project*)

	LARGE (>100 rooms)	MEDIUM (50 – 100 rooms)	SMALL (< 50 rooms)	TOTAL
Number of hotels	**24**	**27**	**108**	**159**
Energy Conservation Measures				
Energy efficiency improvement				
Lighting (CFL and LED)	**21 (88 %)**	**21 (78%)**	**87 (81%)**	**129 (81%)**
Air conditioning	**15 (63 %)**	**8 (30%)**	**4 (4%)**	**27 (17%)**
Energy management				
Solar hot water	**8 (33%)**	**17 (63%)**	**25 (23%)**	**50 (31%)**
Biomass boilers	**0 (0%)**	**6 (22%)**	**2 (2%)**	**8 (5%)**
Key switches	**21 (88%)**	**13 (48%)**	**19 (18%)**	**53 (33%)**
Power factor	**17 (71%)**	**12 (44%)**	**11 (10%)**	**40 (25%)**
Alternate power	**0 (0%)**	**2 (7%)**	**4 (4%)**	**6 (4%)**
Water Conservation Measures				
Dual flush toilets	**9 (38 %)**	**13 (48%)**	**24 (22%)**	**46 (29%)**
Low flow showers and taps	**8 (33 %)**	**10 (37%)**	**5 (5%)**	**23 (14%)**
Linen and towel reuse	**2 (8 %)**	**4 (15%)**	**0 (0%)**	**6 (4%)**
Waste Management				
Sewage treatment plants	**15 (63 %)**	**21 (78%)**	**13 (12%)**	**49 (31%)**
Solid waste segregation	**11 (46 %)**	**16 (59%)**	**13 (12%)**	**40 (25%)**
Biogas Production	**1 (4 %)**	**4 (15%)**	**3 (3%)**	**8 (5%)**

* Note- where data was not available about sustainability interventions, it was assumed that those hotels have not implemented such interventions.