



## The impact of tourist sector in the waste management plans

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### ABSTRACT

Hospitality industries often pay little attention to their environmental responsibilities. Solid waste is a key concern in the hospitality industry. Typically, a hotel guest can produce 1 kg of waste per day that accumulates to thousands of tonnes of waste annually. Many hotel operators have very little interest in reducing, minimized and/or recycling waste, believing that such activities are too expensive and time-consuming. The main objectives were to provide data regarding the solid waste management from hotels and present typical practices for waste prevention/minimization at source. Also, this paper describes a cost-benefit analysis of the impact of the hospitality industry in the management of waste from the municipality of Paralimni in the eastern region of Cyprus.

*Keywords:* Waste minimization; Hospitality industry; Waste prevention; Cost-benefit analysis

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### 1. Introduction

With a rising level of prosperity in industrialized countries, an increasing number of products and services are being produced and consumed. This critical expansion is replicated in the amount of waste generated [1]. In the last 30 years, the total amount of municipal solid waste is continuously increasing. In 2008 (according to the official statistics from Eurostat which was published in 2011), the total annual waste generation in the EU-27 was up to 2.62 billion t. This was slightly lower than in the years 2004 and 2006, where the EU-27 total amounted to 2.68 billion t and

2.73 billion t, respectively. In 2008, 98 million t or 3.7% of the generated total were classified as hazardous waste. This means that, per capita in 2008, each EU citizen produced on average about 5.2 t of waste, of which 196 kg were hazardous [2].

The development of the tourist industry is a part of the global tourism trend. The most widely used tourism development model in the region is based on seaside summer holidays and attainment of quantitative goals [3]. Tourism provides substantial contributions to local economies by creating employment and investment opportunities, but rapid growth has been the main cause for many adverse social, environmental and economic impacts. Hotels constitute a key

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element of the organized chain of activity in the travel and tourism industry, and occupy a crucial place in concerns over environmental protection related to tourism and travel. The hotel industry, because of the nature of its functions, characteristics and services, consumes substantial quantities of energy, water and non-durable products. It has been estimated that most environmental impacts created by the hotel industry can be attributed to site planning and facility management; excessive consumption of local and imported non-durable goods, energy and water; and emissions into the air, water and soil [4–6]. These observations have led many interested parties, including academic researchers, to study and criticize the general policies and daily professional practices of the tourism, travel and hotel industries, their mode of organization, the services they consume and provide, and the resulting environmental impacts. At the same time, the hotel industry has faced increasing pressure to pay appropriate attention to environmental issues. A clean environment is a basic component of quality service and is, thus, important for the development of travel, tourism and hotel industries. Sustainable prosperity of travel, tourism and hotel businesses also calls for the inclusion of environmental protection components in every phase of their business venture, from the preparation and application of site plans and business programs and policies to daily routine practices [7].

Regarding The European Parliament and the Council of the European Union [8], the WFD (waste framework directive 2008/98/EC), waste prevention are the measures taken before a substance, material or product has become waste, that reduce the quantity of waste, the adverse impacts of the generated waste on environmental and human health or the content of harmful substances. Preventing waste means reducing the amount of waste generated, reducing the hazardous content of that waste and reducing its impact on the environment. Waste prevention includes strict avoidance of waste generation, qualitative and quantitative reduction at source and reuse of products. It does not include recycling of materials and separate waste collection [9]. Several researches on reducing the environmental impacts of the hotel industry have concentrated on larger hotels and major hotel players [10]. Nevertheless, over much of the world, there are large numbers of hotels. The International Hotel Environmental Initiative [11] indicated that solid waste generation is considered one of the most adverse environmental impacts created by several and especially small hotels. Collectively, they produce a vast amount of waste, much of which goes to landfill. Many hotels consider their environmental responsibilities as a secondary objective [12] and take very little action to

reduce their environmental impacts [13]. Landfill from waste from hotels contributes to the degradation of the environment through the pollution of groundwater resources due to the creation of leachates and the emission of explosive gases, e.g. methane [14]. It also causes problems to the surrounding communities in the form of odour, flies, litter and noise [15].

This research was designed to identify the challenges faced by hotels in implementing sustainable SWM (solid waste management) practices and to develop the best practice model for SWM in several hotels for waste prevention/minimization at source. This paper describes a cost-benefit analysis of the impact of the hospitality industry as well as waste compositional analysis.

## 2. Description of the selected area—methodology

Cyprus has almost 1,000 hotels [16] according to the CTO (Cyprus Tourist Organization). In Cyprus, hotels are clarified from CTO in stars (2–5 stars depending on their activities, number of rooms, variety of food, etc.). The selected area belongs to the municipality of Paralimni, which is presented with 115 hotels according to CTO [16] and with a permanent population, according to the last survey carried out from Ministry of Interior Affairs in 2011 [17], of 18,601 citizens, while it has the ability to host up to 50,000–75,000 tourists per day. The municipality consists of the main economical lung of the island due to the fact that, in this area, there are the largest hotel resorts. There is no major water consuming industry in the project area and according to the available development plans, the situation will remain the same in the future. In the nearby area, there are mainly tourist activities like hotels, restaurants, bars, pubs, night clubs and water parks. One wastewater treatment plant, 115 hotels and apartments according to the CTO [16], are present; almost 8,000 houses; around 900 food serving points (restaurants, bars, snacks, etc.); 4 petrol stations and car cleaning services; approximately, 20 machinists craftsmanship; several small industries like bakeries, confectioneries, car wash, food suppliers, supermarkets, schools; 5 clinical laboratories and 1 chemical; 3 private clinics and 1 public hospital, football field and athletic activities; 2 chicken farms (approximately 30,000 chicken/y); 2 big laundries; 2 concrete plants and some small industrial activities are consisted among the main activities of the area. Waste management in the municipality consists of the collection of waste (door by door) twice a week and their transmission in the Koshis Municipal Waste Treatment Plant (KMWTP). The total amount according to 2011 data

was 15093.08 t and according to the statistics from the Waste Department of the Municipality. Also, the recycle materials are collected from Green Dot Cyprus twice a month and the total amount for the year 2011 was 962,615 kg [18–23].

In undertaking this work, the following phases have been carried out: (a) reviewed the current legal framework, policies and pending initiatives in relation waste management as well as conducted a stakeholder analysis in order to firstly identify the main stakeholders and secondly to define their expectations; (b) undertaken an analysis of waste generation and disposal at each of the selected hotels through the use of a customized questionnaire for the collection of data (Table 1); (c) purposed pest practices for waste minimization departmentally; (d) determine waste generation in the municipality and especially in tourist sector; and (e) cost-benefit analysis for the implanted waste management plans and the contribution of the tourist sector.

The sample size consisted of 8 hotels which belong to Protaras area (Paralimni Municipality). Both certified (2), with environmental management systems, and non-certified hotels (6) were included in the sample size. In addition, the sample size consisted of hotels with various ratings/categories (5\*, 4\* and 3\*). The compositional analysis (of the 8 hotels) was undertaken according to the standard EN 14899:2005 [24].

### 3. Results and discussion

The main objective of stakeholder analysis was to identify key groups, bodies and/or individuals and secondly to define their expectations along with their level of involvement in the area of waste management. Main Stakeholder is the CTO, followed by the local authorities and the Cyprus Hotel Association, while the Department of Environment plays a significant rule. All current EU and national legislation in regard to solid waste were found on official websites (e.g. Environmental Department—ED, Ministry of Agriculture —MA, National Resources and Environment—NRE, European Commission—EC) and reviewed so as to provide an understanding of the legal obligation hotels have in regard to SWM. According to the ED, MA are NRE, in Cyprus there are three pending initiatives in regard to SWM which includes: (i) legislation on management of tyres; (ii) legislation on excavation and demolition waste; and (iii) WFD. The collection of baseline data was carried out through the use of a customized questionnaire (Table 1).

The sample size consisted of 8 hotels belonging to the regions of Protaras area (Paralimni municipality). Both certified (2), with environmental management sys-

tems, and non-certified hotels (6) were included in the sample size. In addition, the sample size consisted of hotels with various ratings/categories (5\*, 4\* and 3\*). It was observed that none of the non-certified hotels has an environmental awareness program available for its employees. As a result, employees of such hotels do not get education or training regarding environmental issues, for example, management of solid waste, recycling, practices for waste minimization, etc. It was also observed that more than 80% of the sample size does communicate environmental efforts made to guests and public. Concerning the seasonality of the hotels, only one is remaining open throughout the year adding to their total waste production. Rest of them from 1/11 until 1/4 every year remain closed. In relation to the nationality of the majority of tourists visiting the hotels belonging to the sample size, it was observed that the British are up to 70%, followed by the Scandinavian, German, Russian and French. Nationality behaviours affect the environmental performance in each hotel.

For example, (according to our research), hotels that have tourists from British are presented with high water consumption (as the water in the UK is typically free of charge), while Scandinavians are presented with high energy consumption (due to the white nights and when they are on holidays, they cannot realize that they have to switch off the lights when they go out of the room). Also, hotels with gardens, grass and green areas are presented with high chemical consumptions and chemical fertilizers. All the examined hotels were presented with high chemicals consumption regarding the pool maintenances. The main chemical that they used includes chlorine, acid and sodium base, in order to balance the pool. It was estimated that the chlorine needed per cubic meter, per pool and per operation day is up to  $3.09 \times 10^{-4}$  kg, while the acid needed is up to  $1.07 \times 10^{-4}$  kg.

Several streams of solid waste generated by the hotels includes lastic, paper, glass, wood, organic (kitchen), old durables, electric and electronic equipment, green waste, clinical waste, hazardous, sands (from the filters of pools), dust, metals, packaging and waste packaging, batteries, solid waste from biological treatments, hazardous substances from funnels and especially from the kitchen funnels. Due to the absence of a specific waste measuring mechanism, the hotels were not able to provide the exact volume of waste produced per department. In order for the hotels to be able to reduce their solid wastes, they should be able to measure their waste volumes and implement waste minimization practices. As a recommendation, hotels should first incorporate a measuring mechanism in order to obtain the total volume of waste produced. As a further recommendation, hotels

Table 1  
Data collection using the sample questionnaire

	<i>Office</i>	<i>Management</i>		
<ul style="list-style-type: none"> <li>• Hotel Category Holding or Not Certification in EMS</li> <li>• Nationality of tourists who visit the hotel</li> <li>• If the hotel has an environmental awareness programme for employees</li> <li>• If the hotel is presenting environmental efforts visibly communicated to guests and public</li> <li>• Does the hotel provide recycling bins around its grounds?</li> <li>• If the hotel is presented with environmental activities</li> <li>• How does the hotel dispose each of the streams of waste</li> <li>• Is the hotel involved in a recycling program</li> </ul>	<ul style="list-style-type: none"> <li>• Do you use double-sided printing and copying in the hotel's offices</li> </ul>	<ul style="list-style-type: none"> <li>• Will you be willing to work in collaboration with other hotels in order to manage your organic wastes?</li> <li>• Are you willing to replace small plastic amenity bottles with refillable soap and shampoo dispensers in guestrooms?</li> <li>• Will you be willing to encourage your suppliers to minimize packaging, re-use packaging and use packaging with recycled content (except for food packaging)</li> <li>• Consumption of energy, water</li> <li>• chemical, raw materials, pesticides</li> <li>• textiles, cooking oils, fertilizers, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• What streams of solid waste does the hotel produce and in what quantities per department</li> <li>• plastic, paper, glass, wood, organic, old durables (old furniture, computers, bed linen, etc.), electric and electronic equipment, green waste (grass, etc.), clinical waste (sanitary towels, etc.), hazardous (plastic containing chemicals, etc.) sands (Backwash) dust (filters), metals packaging and waste packaging and batteries</li> </ul>	
	<i>Housekeeping</i>			<ul style="list-style-type: none"> <li>• Does the hotel use drefillable soap and shampoo dispensers in guestrooms small plastic amenity bottles?</li> <li>• Does the housekeeping department use a dosing system for cleaning chemicals individual cleaning bottles?</li> <li>• Does the hotel regularly purchase recycled products?</li> </ul>
	<i>Kitchen and bars</i>			<ul style="list-style-type: none"> <li>• Do hotel suppliers take back pallets, plastic containers and refillable containers</li> <li>• Does the hotel purchase and serve beverages from dispenser/bottles</li> </ul>

should adopt appropriate measuring mechanisms in order to be able to quantify the volumes of wastes produced per department. By adopting these measuring mechanisms, hotels will be able to set more accurate and effective targets, which will result to a more rational reduction of solid wastes. The various methods that each hotel uses for managing or disposing the above streams of waste are presented in Table 2.

Based on the results, the majority of wastes are managed or disposed by being rejected in landfills or by being recycled. Results indicated that all hotels included in the sample size are involved in a recycling program. The recycling program is under the

responsibility of Green Dot (Cyprus) Public Co Ltd "GreenDot", the only waste stream collection scheme that exists in the country and consists of PMD (packaging made of Plastic or Metal and Drink cartons), paper and glass. Based on the results, all the examined hotels provide recycling bins around their grounds. During the research, the interviewees expressed their views and personal opinions, which reflect their willingness to protect the environment and how they will become more "Green". These views and opinions are: (i) six out of eight hotels are willing to collaborate with other hotels in order to manage their organic waste; (ii) three of the hotels, which are now using individual plastic

Table 2  
Managing/disposal methods of waste streams in the examined hotels

Waste streams	Disposal Methods										Best implemented practices from the examined hotels
	A	B	C	D	E	F	G	H	O		
Plastic	7	3									<ul style="list-style-type: none"> <li>• Use refillable dispensers for soap and shampoo</li> <li>• Use of dosing system instead of individual cleaning bottles</li> <li>• Purchase of reusable or durable material</li> <li>• Turn the glasses in guestrooms upside down instead of using plastic covers</li> </ul>
Glass	8		2								Use of post mix instead of glass bottles. Post mix by definition, is a soft drink that is mixed (syrup with carbonate after (post) leaving the tank, as opposed to pre-mix, which is mixed before (pre) it is dispensed
Paper	8		2								Double-sided printing and use one-side printouts as scrap
Wood			3	6	3					4	Reuse as raw material for other wooden products
Organic			8			4					Not identified any, although they accept composting
Old durables		4		6	4					1	Reuse old linen as cleaning clothes
WEEE	5		2		3					3	Not identified, some hotels reuse items
Green waste			8			2				4	Composting and used as fertiliser
Clinical	8						3				Not identified, some of the hotels burn them
Hazardous	5	5	2		2	2					Refill (e.g. Refill ink-jet and toner cartridges)
Sands			3					8			Not identified some of the hotels disposed to their gardens
Dust								8			Disposed to the land (gardens)
Metals	6	2	1							2	Purchase of reusable or durable material
Packaging waste	8	4									Use of rechargeable batteries
Batteries	8										Recycling

The number indicated the number of hotels that participated in the disposal methods

A: Recycling	B: Re Use & Recycle	C: Landfill	D: Burning	E: Re Use	F: Sanitary land fill	G: Drainage system	H: Return to Supplier	O: Other
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amenity bottles for soap and shampoo are willing to replace them with dispensers; (iii) three of the hotels which are now using individual cleaning bottles are willing to replace them with a dosing system. Of all the hotels, six are willing to encourage their suppliers in order to minimize their packaging, reuse packaging or use recycled packaging and six are willing to stop using plastic or paper glass covers and, instead, turn the glass upside down.

Table 3 provides typical practices for waste minimization from selected departments of the hotels. Waste prevention means eliminating or reducing the amount or the toxicity of waste, including recyclables [25]. Waste prevention is one of the easiest methods of reducing waste and can be controlled at the time of purchasing products and services. There is a direct correlation between what a hotel purchases and what

it throws away. However, no matter how well planned your waste reduction and recycling initiatives may be, they probably will not succeed without the support of the hotel department managers and staff. Successful hotel recycling programmes require employee involvement, training and recognition. The benefits from waste reduction can summarize to: savings through reduced purchasing costs; reduced waste disposal costs; reduced energy consumption and pollution; and conservation of natural resources. In Europe, waste prevention has been a key part of waste management policy. In 2008, it was integrated in the legislation WFD [8] and stated that prevention is the first priority of waste management, being at the top of the waste hierarchy, with a requirement from European member states to produce waste prevention plans. In the UK, the government has funded a large



Table 3  
Waste minimization practices per department

Offices	House keeping	Food and beverage	Eco purchasing guidelines for energy efficient equipment
Use a centrally-placed or electronic bulletin board for messages instead of making multiple copies memos	Select vendors who take back reusable containers, pallets and other waste packaging	Use only reusable dishes and flatware in restaurants and employee cafeteria	Purchase A/C equipment sized for the area of use. Install heat recovery units on large A/C systems to preheat water
Shred office paper and use it to package shipments	Request that manufacturers package products in returnable and/or reusable boxes and crates	Use filters in deep fryers to extend the life of cooking oil	Install lighting controls (timers or occupancy sensors) to turn off lights in unoccupied areas such as storage-rooms, employee rest rooms, walk-in coolers, etc.
Reuse envelopes and folders for routing in house, mail and correspondence; Make double sided copies when possible	Use refillable bath soap, shampoo, hair rinse and hand lotion dispensers for guest rooms to eliminate soap pieces and plastic bottles	Request fruits, vegetables and meats to be packaged in reusable crates, or recyclable boxes	Use photovoltaic lighting systems for lighting advertising signs, walkways, plants, trees, decorative water fountains and remote outdoor areas
Use electronic mail for correspondence when possible.	Refinish and reupholster damaged and dated Furniture	Use glass or plastic coasters to reduce cocktail napkin waste	Use dishwashing machines that use final rinse water for the prewash of the next load of dishes
Non-toxic inks, unbleached and chlorine-free papers, nontoxic, biodegradable correction fluid	Use clothes hangers left by guests for employee uniforms or return to the dry cleaners and recycle plastic garment bags	Use dry, concentrated dishwasher chemicals in dispensers to reduce chemical spills and waste	Use copy and fax machines which have power down/stand-by features that operate when machines are idle

research program in waste prevention. It includes a review of evidence analysing the behavioural opportunities and barriers in household waste prevention, associated with the effectiveness of various policy measures [26].

Improving the environmental performance of hotels is important, irrespective of their total as yet unknown impact, because they are a vital part of the enterprise society that collectively can contribute to sustainable development [27]. One mean of bringing about improved environmental performance is through the adoption of EMS (EMS: Environmental Management Systems). The two formal EMS in the market place are EMAS and ISO 14001. Common to both initiatives is the need for an organization to implement a number of management system stages to formalize the organizations' policies, procedures and practices that control environmental aspects. EMAS has the added requirement of an environmental statement, which publicly reports the environmental performance of a site. Both purport to be applicable to both large and small firms. ISO 14001 was reportedly

written with the chip shop owner in mind and as a safeguard of its relevance to SMEs (small medium enterprises), a working group was convened at the International Organization for Standardization to investigate this issue [27].

An assessment of tourism's contribution to economic development in host regions requires an analysis of the backward and forward linkages between tourism and other sectors, an understanding of the spatial location of tourism activities and identification of the beneficiaries of its economic and other impacts. This means that if tourism is to have a major influence on the economy of a country or a particular region, it should have strong linkages with the rest of the domestic economy. Tourism can, therefore, be a catalyst for national and regional development, bringing employment, exchange earnings, balance-of-payments advantages and important infrastructure developments benefiting locals and visitors alike. On the other hand, tourists produce, somehow, large amounts of waste [3]. Municipality's waste management consists of the collection of all the waste (door by door) twice

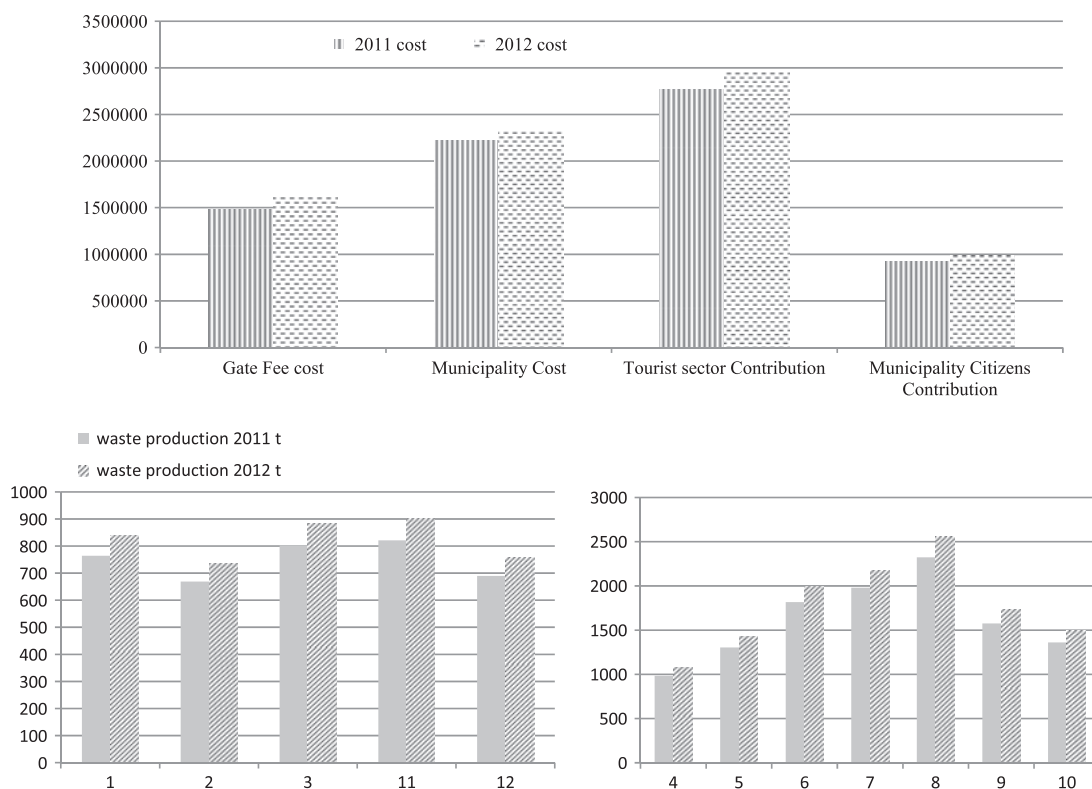


Fig. 1. Tourist sectors contribution in waste management cost (the numbers in the axes X indicated the months).

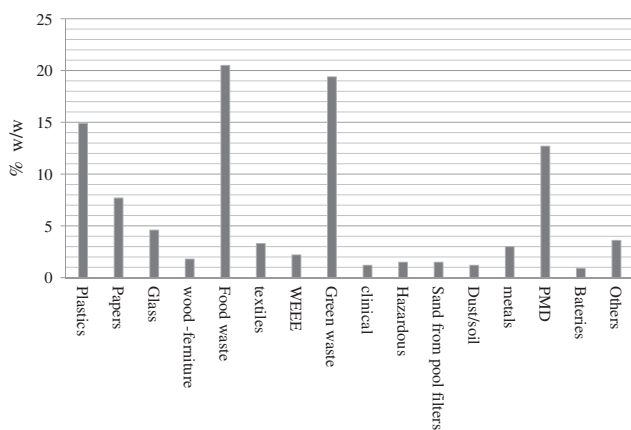


Fig. 2. Waste compositional analysis for selected hotels.

a week and their transfer to the KMWTP. The total amount according to 2011 data was 15093.08 t, while the total cost (gate fee) was up to 1.47 m €. The other cost (collecting, transportations, employees, maintenance, repairs, etc.) were, at the same time, up to 3.6 m€. KMWTP charges 54.8 €/t for the mix waste, 46.8 €/t for the green waste, 80.80 €/t for the recyclable waste and 100.80 €/t for the rest of the waste. From the 15093.08t, the 75% (11319t) were during the

tourist period which lasted from 1/4 to 30/10 every year. Thus, it means that the tourist sectors contribution to the waste production is up to 75% (Fig. 1). After evaluating the total expenses, it was found that during the tourist period, the municipality has total expenses up 3.8 m€. The per capital (permanent) waste generation is up to 811 gr/d for a period of 12 months. However, the tourist sector contributes to the waste production up to 75% of the per capital (permanent) waste generation is decrease to 202 gr/d during season period (1/4–30/10 each year).

The total compositional analysis from the study area, as described above, is presented in Fig. 2. In reverse series, the analysis consists of more than 20% food waste, 19% products that can be composted (green waste, yard waste) and almost 15 and 13% of plastics and PMD respectively, 4.6% of glass, 3.3% of textiles, while the rest of the waste streams are less than 2%. It is important to mention that waste compositional analysis (especially for the hotels) varies from hotel to hotel, and this has to do with the hotel policy as well as with the requirements of hotel tour operator. For example, the hotel with all inclusive policy is presented with largest food waste than hotels without all inclusive policies. Also, hotels that decide to have glass cups for ice coffee, juice, soft drinks, beers, etc.

in the pool areas have less waste than others which are used for the same purpose plastics or solid paper cups. Very worrying is the fact that almost 40% w/w of the total compositional analysis consists of foods and green wastes. This is very important and hotel managers must organize their daily meals better in order to avoid the production of food waste. On the other hand, green waste can be easily be composted [28] and not discharged to landfill site. Moreover, compositional analysis technique is used to estimate in detail the nature, scale and origin of food waste with survey work on household attitudes, claimed behaviour and socio-demographics [25,29]. When using this approach, it is a good practice to verify the data using separately collected data on waste generation, treatment and disposal, especially in cases, where they are based largely on modelling. Waste composition is one of the main factors influencing emissions from solid waste treatment, as different waste types contain different amounts of degradable organic carbon and fossil carbon.

#### 4. Conclusion

The United Nations World Tourism Organization defines sustainable tourism as tourism that meets the needs of present tourists and host regions, while protecting and enhancing opportunities for the future. Sustainable tourism can only be achieved if all the stakeholders are involved (tour operators, environmental bodies and local authorities). The CTO operates as policy-making body at the strategic level as well as a competent authority at the hospitality unit level. Local government has the responsibility to implement the waste management directions at the local level with the assistance of the approved recycling companies. With the proposed new legislation (directive 2008/98), municipality has a better say on the management of waste within their sphere of influence. On the other hand, if the pay-as-you-throw principle is adopted, hospitality businesses could potentially save thousands of € that could potentially finance their waste management actions. Additionally, the hotels should be able to measure solid waste reduction. For this reason, it is recommended that hotels begin to measure the total volume of waste produced.

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