

Citation: Azarmi, S., & Vaziri, R., & Cizreliogulları, M.N., Comparison of Waste Generation Rate in Different Size of Hotels (Case Study of North Cyprus), BMIJ, (2020), 8(4): 701-722, doi: <http://dx.doi.org/10.15295/bmij.v8i4.1581>

COMPARISON OF WASTE GENERATION RATE IN DIFFERENT SIZE OF HOTELS (CASE STUDY OF NORTH CYPRUS)

Soolmaz AZARMI ¹ Received Date (Başvuru Tarihi): 29/07/2020
Roozbeh VAZIRI ² Accepted Date (Kabul Tarihi): 22/09/2020
Mehmet Necati CIZRELIOGULLARI ³ Published Date (Yayın Tarihi): 10/12/2020

In the article, the first author is in the role of the Corresponding Author.

ABSTRACT

Keywords:

Hospitality Wastes,

Sustainability,

Environment,

Waste Management Practices

JEL Codes:

Q01, Q56, Q53, Z32

Waste management in hotels has a significant role in reducing the negative impact on the economy and environment. The goal of this study was to discover hotel sector waste (HSW) by quantitative analysis of HSW in different size of hotels. The SPSS software was employed to predict the average HSW generation rate using nationality, type of waste, season, accommodation type, and type of waste management practices as predictors. The results showed that during lean season 2063.4 kg and high season 4160 kg. In the sampled accommodation, also during the lean season, the large hotels waste generation rate was (66.7%), medium hotels (19.4%), and small hotels (13.9%) and in high season HSW generation increase around (45%). From the total amount of waste generated in the sampled accommodation, 36% generated by the kitchen, and in other section, 7% of waste was glass, 8% nylon 4% plastic, 3% bottle, and 5% of wood. Also, 14% of the waste generated was recyclable waste in the sample accommodations. Besides, the result showed that the waste management practice rate in the small hotel is less than another accommodation sample size.

FARKLI BÜYÜKLÜKTEKİ OTELLERDE ATIK OLUŞUM ORANLARININ KARŞILAŞTIRILMASI (KUZEY KIBRIS ÖRNEĞİ)

ÖZ

Anahtar Kelimeler:

Ağırlama Atıkları,

Sürdürülebilirlik,

Çevre,

Atık Yönetimi Uygulamaları

JEL Kodları:

Q01, Q56, Q53, Z32

Otellerdeki atık yönetimi, ekonomi ve çevre üzerindeki olumsuz etkilerin azaltılmasında önemli bir role sahiptir. Bu çalışmanın amacı, farklı büyüklükteki otellerde otel sektörü atıkların kantitatif analizi ile keşfetmektir. SPSS istatistiksel yazılım, atık türü, mevsim, konaklama türü ve atık yönetimi uygulamalarının türünü hesaplayarak ortalama olarak otel sektörü atıklarının üretim oranını tahmin etmek için kullanıldı. Araştırmanın sonuçları, yoğun olmayan sezonda 2063,4 kg ve yoğun sezonda 4160 kg olduğunu gösterdi. Konaklama sektöründe, yine yoğun olmayan sezonda, büyük otellerin atık üretim oranı (% 66,7), orta ölçekli oteller (% 19,4) ve küçük oteller (% 13,9) olmuştur ve yoğun sezonda otel sektörü atıkları üretimi tamamen (% 45) civarında artmıştır. Konaklama yerindeki toplam atık üretim miktarının% 36'sı mutfak tarafından üretilirken, diğer bölümde atıkların% 7'si cam, % 8'i naylon, % 4'ü plastik, % 3'ü şişe, % 5'i ise ahşaptı. Ayrıca numune barınaklarında üretilen atığın% 14'ü geri dönüştürülebilir atıktır. Bunun yanında, küçük oteldeki atık yönetimi uygulama oranının başka bir konaklama örneklem büyüklüğünden daha az olduğunu analiz neticesinde görülmüştür.

¹ Assist. Prof. Dr., Cyprus Science Univ., Faculty of Tourism, soolmazazarmi@csu.edu.tr, <https://orcid.org/0000-0002-9459-8984>

² Assist. Prof. Dr., Cyprus Science Univ., Faculty of Engineering, roozbehvaziri@csu.edu.tr, <https://orcid.org/0000-0002-5229-3285>

³ Assist. Prof. Dr., Cyprus Science Univ., Faculty of Tourism, mehmetcizreliogullar@csu.edu.tr, <https://orcid.org/0000-0002-9884-6084>

1. INTRODUCTION

In this research, the current amount of waste generation of hotel and hospitality industry in North Cyprus has surveyed. Also, the total amount of generated waste has calculated in one year into a lean and high season. For avoiding the negative impact of a solid waste generation of north Cyprus the novel idea and waste management practices would be proposed. Northern Cyprus is in the Mediterranean Sea with an area of 3.355 square kilometres. Based on governmental statistics, the population of Northern Cyprus (TRNC) was 300,000 in 2014 (TRNC SPO, 2015, pp. 2–3). Cyprus is an Island that has diverse landscapes due to attractive climate and geology, which is so vital for travellers and visitors.

On the other hand, due to the strategic location of Cyprus, which is between Africa, Asia, and Europe, the tourism industry has a significant role in economic growth. Tourism is the most identified sectors of the TRNC that has a significant role in the economy; North Cyprus has a reputation because of an unsplit area, history, and attractive climate. Also, the safety level is so high for tourists. (Katircioglu et al., 2007). However, Northern Cyprus had to accept the negative impact of being a non-recognized state and was still a political dependency on Turkey (Alipour and Kilic, 2005). Then this situation led north Cyprus to more focus on the tourist attraction (Altinay and Bowen, 2006). Even by this challenging situation, Northern Cyprus achieve to developing in tourism as a significant sector (Bohdanowicz and Martinac, 2007).

The impacts of improper waste management (WM) on the environment have been investigated in India. Their study stated that the health of local people had been affected by unsuitable solid waste disposal site (Sharholy et al., 2008; CPCB, 2006). In 2003, Rushton reported that due to damages of wastes on nature, proper waste management is inevitable. In 1991, the European Council stated that the process of waste management consists of waste prevention, reutilize and secure disposal (European Council,1999). The overarching aim of this study is to survey on current levels of WM practices in the hotel sector of TRNC. This study considers the complex condition of improper WM practices in the hotel sector. Furthermore, the research has

been conducted to determine the potential relationship between hotels and the volume of solid and liquid waste generation.

Hence the significant contributions of the research are as follows:

1. A comprehensive literature review has been accomplished to explore the adverse effects of unfit waste management of the hotel industry, health, and environment.

2. The concept of WM in the hotel industry has been identified in the case study of TRNC.

3. The current WM practices in the hotel industry of TRNC have been analyzed. The volume of waste material generated from hotel in per day basis and per year basis will be determined.

Given the purpose of this research, a quantitative approach was employed. The data collected from 22 accommodations by different size such as small, medium and large hotels. These facilities are located in 3 cities of North Cyprus including Kyrenia (tourism hub), Gazimagusa (port city) and Lefkosia (capital city).

2. LITERATURE REVIEW

Tourism is one of the most significant socio-economic phenomena of the twentieth century and creates remarkable economic advantages for tourist destinations. The tourism industry, as a global and intricate industry, has strong relations with politics, society, culture and the environment (Azarmi et al., 2019). The tourism sector can sustain high levels of employment; unfortunately, the sector is also a source of environmental impacts with consequent public health concerns (Mateu-Sbert et al., 2013). Cyprus politically partitioned into two main parts (south and north) is a significant tourist destination in the Mediterranean region. Practically speaking, recent years have seen tourism growing at a faster rate in north Cyprus (formally the Turkish Republic of North Cyprus (TRNC)). According to the TRNC Hoteliers Association, the room occupancy rate ranged between 78 to 89% in the peak season of 2014–2016. The increasing inflow of tourists in the first quarter of 2017 inferred that the room occupancy rate would increase by 6–8% in the peak season of 2017,

subsequently leading to more hospitality sector wastes. Of concern is the lack of studies which quantify the magnitude of waste generated in the accommodation sector of TRNC and its subsequent effect on the environment.

During the recent decades, international tourism has been growing fast as well as the critical factor for the economy of each country; the tourism industry also has played vital roles in many countries around the world such as the development of local infrastructure, economic benefits, foreign exchange earnings and cultural connections according to World Tourism Organization (WTO, 2002). The tourism industry divided to following sectors: Accommodation, Transportation, Food and Beverage, Travel Trade, Tourism Services, Events and Conferences, Attractions, Adventure Tourism and Recreation. Although all these sectors help attract tourists and capital, the tourism industry generated a lot of job opportunity and increasing household and government income. According to the WTO report in 2019 International tourist arrivals (overnight visitors) worldwide grew 4% in 2019 to reach 1.5 billion, based on data reported by destinations around the world. 2019 was another year of strong growth, although slower compared to the exceptional rates of 2017 (+6%) and 2018 (+6%) which total expenditures of them were 1.7 trillion. Besides, tourist spending is an alternative to exports and foreign exchange earnings. In traditional definition, tourism could bring foreign exchange money which will be used in import and export by helping for producing goods and services.

Based on the environmental protection act (EPA) definition of waste, any material or object that is no longer used, corrupted, scrapped, broken, disposed of is called waste. This kind of product has not got value (Lox, 1994; DEFRA, 2014). The definition of waste is an issue contradictory. In order to waste control, law to be implemented and approved, it must provide a proper definition of waste. Garbage can be defined as any material that the holder discards or intends to destroy (Council Directive, 1975). One person can either be the owner or producer of waste; then, it may be discarded or used as a source (Williams, 2005; Walling et al., 2004). Nowadays, the environment is such as source and waste are a material which has not any value (White, 1995; Pongrácz, 2004). The current definition of waste used in the EU (EU) is not accurate, and so each Member State interprets it differently. This caused problems

within the Recycling industry due to commercial barriers (Lox, 1994; Azarmi et al.,2017). The Environmental Protection Act (EPA) in 1990 defines solid waste as “many types such as industry waste, house waste, residences etc. (Zerbock, 2014; Bohdanowicz, 2006). Waste management systems that consider both the quantity and composition of domestic solid waste are strongly required to address the increasing amount of solid waste (Aziz et al., 2011).

Among the literature, the authors explained the term of food waste as organic waste that has its source in food (Papargyropoulou et al. 2016). In their study, food waste has categorized to avoidable such as plate residue which is edible and unavoidable such a bone. Besides the pollution of water by sewage, lands and the marine waters and coastal areas are contaminated with food waste stemming from tourism facilities such as marinas, resorts and hotels. Besides, vast amounts of waste are produced from tourism sectors like hotels, restaurants, bars etc., is based on several factors. However, food waste is one of the branches of solid waste, which is generated by hotels daily. Young and Parker (1983) investigated the generated food waste of four hotels in the United Kingdom. Their report showed that the unfashionable catering methods of hotels play a significant role in the generation of food waste. According to Aziz et al. (2019) study in Erbil City- Kurdistan of Iraq, the solid household waste generation was 1.27 kg per person, and also plastic generation was the most significant percentage of waste generation in this city by 34.87% and the amount of glass waste was lowest one by 0.5%. In this article author collecting data and categorized the waste to organic, and non-organic wastes. Also, the result has shown that Erbil waste management practices and the facilities are not developed enough to solve the environmental hazards because of solid waste generation (Aziz et al., 2019). In another research from Kurdistan region, Erbil city the researcher determined quality and quantity of municipal solid waste in 2009, the total sample of data collected was 184 form 50 house, the result showed that solid waste generation in Erbil per day is around 400 tones. Out of this amount, 14 percentage is recycled, and 86 per cent also has the potential to be recycled. In addition, this study researcher realized by increasing the level of income, waste generation rate will increase (Shekha,2011).

Based on statistics, improper food waste management cost £318 million for the hotel industry in the U.K. annually. Additionally, their study reported that around 80000 tons of food waste have generated by hotel sectors which the majority part of the waste has not recycled (Wrap, 2018). The rate of unavoidable food waste and potato products are more than the other types of food waste. The traditional tourism sector could destroy natural resources such as water, soil and air. The tourism development program of Jamaican government damaged more than 700 acres of wetlands (Bacon, 1987). According to Goodall (1992), tourism development ignored environmental issues and permitted tourism activists to exploit natural resources dangerously. The lack of knowledge and education in tourism firms is the main reason for environmental problems in the tourism sector. Gartner and Regan (1996) reported that off-road vehicle race was abandoned in Nevada and California deserts to protect the tortoise populations. Salm reported damages that emanated from the activities of tourists on coral reefs in Kenya, Madagascar, and Tanzania (Salm, 1986).

The magazine of UNEP reported that cruise vessels are majorly responsible for the production of huge wastes along the coastal as compared with other ship types and every passenger of cruise vessel generates 3,5 kg wastes per day. Furthermore, the tourism industry creates an array of noise pollution. The noise pollution in Grand Canyon was produced by air tour operators who carried around one million passengers on scenic overflights.

As a significant accommodation sector of the tourism industry, the hotel section classification is usually based on a variety of facilities like the number of rooms, target market, services, etc. (Radwan et al., 2010). Typically, based on the size of the hotel, they are classified as a small, medium, large, and significant hotel (Radwan et al., 2010). In 2016, TRNC Ministry of Tourism classified hotels and accommodations into 15 types, and also the whole number of recorded accommodation facilities are 133 with a bed capacity of 21425 (Turizm İstatistikleri, 2016) as presented in Table 1. In 2003, UNEP reported that international tourism sector generated around 4.8 million tons of solid wastes and the tourism industry produced about 14% of the urban solid wastes. Moreover, UNEP announced that every European tourist produces around one kg per day of solid waste and also American tourists generate two kg per day.

Table 1. Tourism Statistics of North Cyprus 2016

FACILITY CLASS	FACILITY NUMBER	% SHARE	BED NUMBER	% SHARE
5* hotel	18	13	12,160	57
4 *hotel	5	4	1,738	8
3* hotel	13	10	2,269	11
2* hotel	17	13	1,303	6
1* hotel	15	11	605	3
II. Class T.K.	4	3	624	3
Boutique hotel	5	4	486	2
Special hotel	1	1	34	0
Tourist bungalow	25	19	1550	7
Apartment hotel	3	2	116	1
Local house	3	2	96	0
Touristic housing	2	1	108	1
Tourist pension	20	15	277	1
Facilities not yet classified	1	1	12	0
Facilities not yet classified and renovated	1	1	20	0
TOTAL	133	100	21,425	100

Source: Turizm İstatistikleri, 2016

However, some investigators stated that waste generation of some people could be twelve kilos per day. Furthermore, high amount of water and energy are consumed in tourism sectors such as in the pool, kitchen, laundry, restrooms, and bathrooms, and also a considerable volume of solid wastes (industrial, animal-based and plant-based wastes) are generated in recreational or lodgings sections. The types of waste that are generated by accommodation sectors of the tourism industry are shown in Table 2. Unfortunately, not enough attention has been to wastes generated in the accommodation industry even though it has a high potential for financial benefit. However, some studies reported on the minimization of wastes via various methods including cost management, waste management, consumers and employees training or recycling of waste. The production of solid waste and disposal processes is one of

the negative environmental impacts of small hotels because small hotels often less pay attention to their environmental practices and responsibilities. (Radwan et al., 2012).

Table 2. Different Categories of Waste

Compostable	Composting: produced by waste material like organic waste, food, garden and paper
Recyclables	Other waste which is collected separately for reprocessing into raw material for creating a new product such as glass, paper.
Non- recoverable	These groups of waste are dangerous, and then there is no permanent recycling option.
General waste	Type of waste which leads to a landfill
Daily waste	The standard waste which generated during the day such as general waste and recyclable
General Daily waste	The standard waste generated during regular day operation
Bulk waste	TV, bed, refrigerator, reconstruction waste
Bulk, general waste	Bulk waste which leads to a landfill

3. RESEARCH METHODOLOGY

3.1. Research Approach and Design

In this study, the data collection methods are used by the authors. An overview of the sample area, data collection procedure, and data analysis procedure are presented. In the current research, a quantitative approach was employed. Pilot study methods are used to minimize ambiguity in the sampling questions. Before data collection, the top management of hotels was assured of their confidentiality to reduce the social desirability bias and improve the credibility of sample data. A total of 22 hotel facilities comprising 6 of the large hotels, six medium hotels, eight small hotels, and two guesthouses were investigated. From this numbers, 13 of these hotels are located in Kyrenia, 4 in Famagusta, and 5 in Nicosia. For the present study, the research approach was primarily quantitative. Also, secondary data were collected to complement the quantitative responses and to gain an in-depth understanding of the findings further. Ethics committee approval was not received since this research was produced from a doctoral dissertation in 2018.

3.2. Data Collection Methods

First, a pilot study was carried out randomly, and the results helped to reduce ambiguity in the sampling questions. The primary quantitative data were collected through the questionnaire. This enabled the author to establish significant statistical relationships between the independent and dependent variables. To maintain an accurate representation, the sampled accommodation sectors were classified based on the capacity into guesthouse, small, medium and large hotels. The questionnaire consists of four characteristics open and closed-ended questions designed to answer the research questions. The questionnaire was delivered to the operating personnel of the accommodation sectors and collected later. The first part of the questionnaire was designed to obtain the accommodation characteristics, including the nationality of most visited tourists, the type of wastes generated etc. The second section of the questionnaire explored the waste management practices employed by each accommodation sector. The third section examined the barriers to implementing the waste management practices. The fourth section collected quantitative data of waste generated in each sector of the sampled facility. The study was carried out in five districts (Girne, Nicosia, Famagusta, Iskele and Guzelyurt) of Northern Cyprus during the lean and peak seasons of 2017. It is worth mentioning that data from previous years were also extracted from the sampled accommodation.

50 questionnaires were delivered; however, less than 50% were returned to the author. Specifically, a 74% response rate was recorded in Girne, while 35% and 22% response rates were recorded in Nicosia and Famagusta, respectively. No responses from Iskele and Guzelyurt, the lower response rates may be due to language (English) of the questionnaire. Midway through the data collection, I suspected a lack of records on waste generated per accommodation facility might also be contributed to the low response rate. As indicated in Figure 1, 13 accommodation sectors were sampled in Girne, and five facilities returned the filled questionnaires from Nicosia and four from Famagusta. The quantitative data collected were examined for consistency and completeness, and then discussed via a descriptive statistic using an SPSS version 22, SigmaXL version 8.0 and Neuroph version 2.94. Data analysis was performed for each

of the 22 accommodation sectors, grouped by class of accommodation sector, and by category of hospitality, wastes generated.

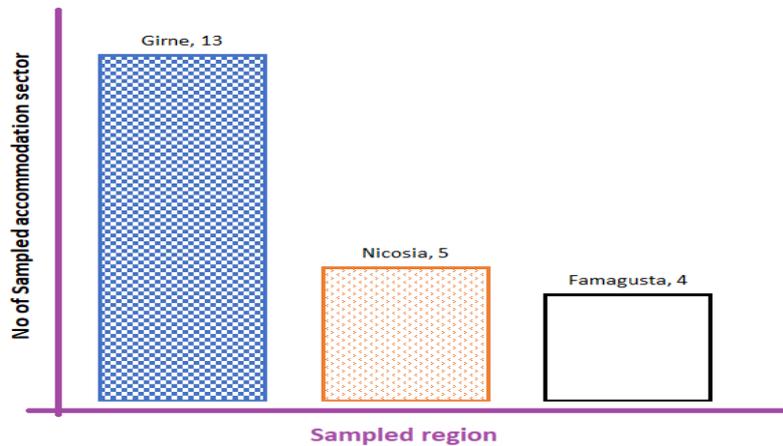


Figure 1. Data Analysis and Findings

4. FINDINGS

The analysis of the data collected and findings drawn from them are discussed both graphically and numerically. Majorly, the research sought to investigate the hospitality wastes generation rates, significant factors contributing to the waste generation, the effect of waste management practices on the operational performance of the sampled accommodation sector, waste disposal and reuse strategies employed by the facility. The data was exclusively collected from questionnaires designed in line with the objective of the research. The analysis is categorized thematically according to the four research questions; both quantitative and secondary data are illustrated side-by-side within each theme. Firstly, analysis of demographical characteristics of the accommodation sectors are presented. Followed by the description of the waste composition of the sampled accommodation sector. Fig. 2 shows the quantity amount and type of wastes generated by the various type of hotels result during lean or high season. The highest waste level was for food waste generation, which in the lean season was 971 kg that had 1.89% growth in high season. Also, during high season the amount of organic wastes generation was 416 kg per day which from this amount 56% generated by large, 25% by small, and 19% by medium hotels. Also, in the lean season, the total waste generation was 178 kg per day which is mentioned in fig 2. the amount

of waste generated by different size of hotels decrease about 63% during the lean season.

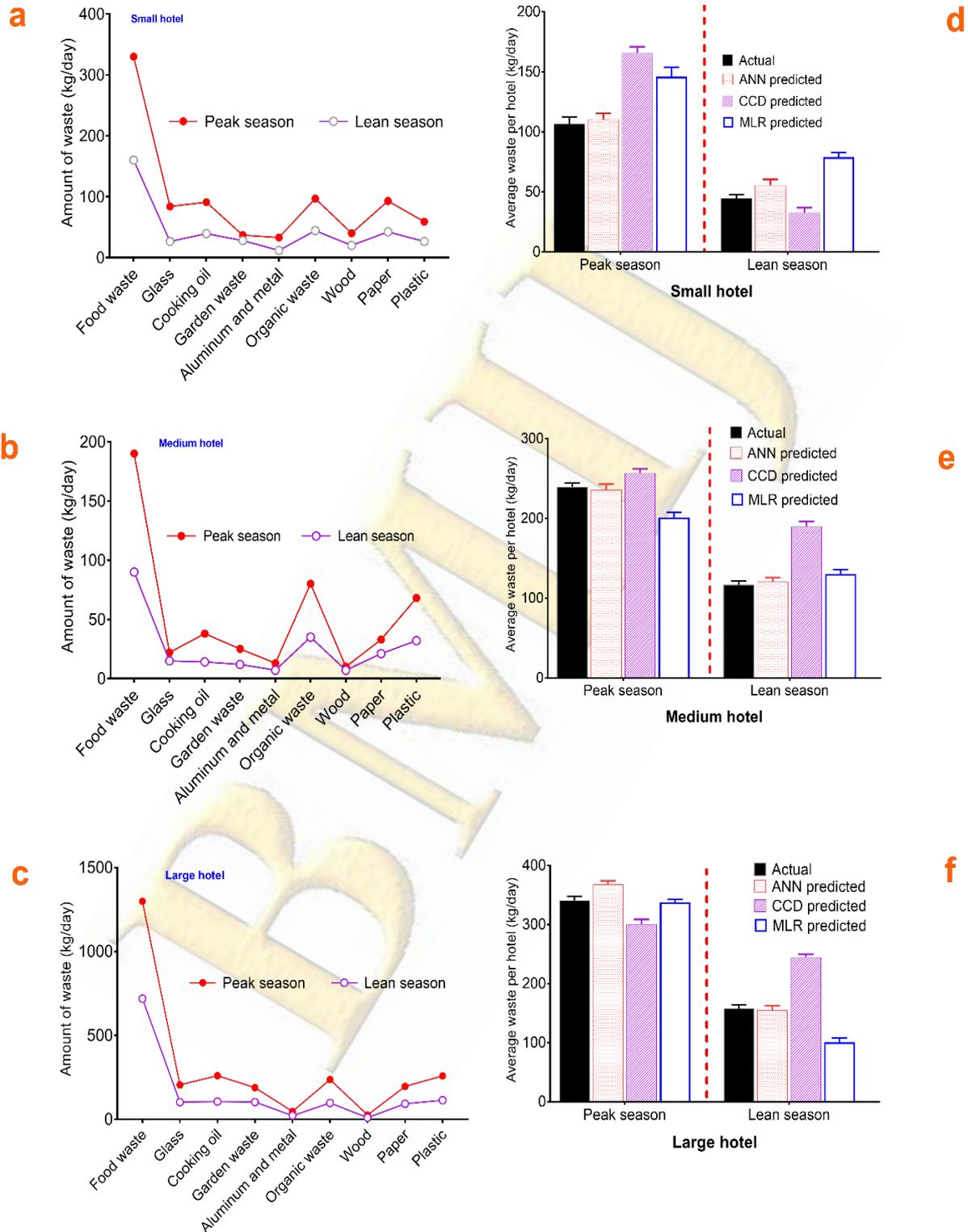


Figure 2. Amount and Type of Waste Generation In Lean And High Season

As obtained, majority of the tourists are British (33%), 18% of the tourists that visited the sampled facilities are Russian, followed by 16% Turkish, 10% guests from Scandinavian countries, 8% arrivals hold German nationality, 7% are Arabs (note that Iranian are classified in this group), French (5%) and the least arrivals are African (3%), Fig 3 & Fig 4.

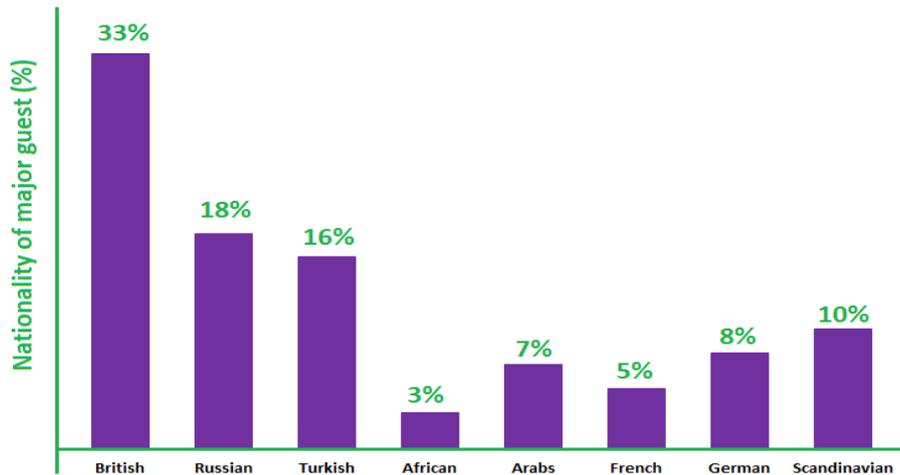


Figure 3. Nationality of The Majority of Tourists Visiting the Sampled Accommodation

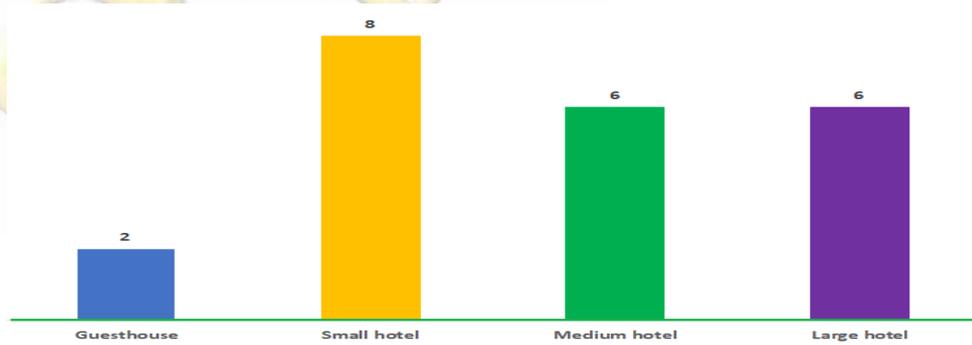


Figure 4. Classification of The Sampled Accommodation

4.1. Descriptive Analysis of the Waste Composition

The graphical display in Figure 5 showed the composition of the wastes generated in the sampled accommodation sector. Notably, wet waste accounted for the highest percentage of 56.3%, including cooking oil (14%), tissue paper (6.3%) and

kitchen waste (36%). Also, about one-fourth (27.3%) of the total waste is non-wet waste which consists 7% of glass, 8% of nylon, 5% of wood, 4.2% disposable plastics and 2.8% of PET bottles. The other components are 4.7% paper and 12% garden wastes. No hazardous wastes were recorded in the sampled facilities, Fig 5.

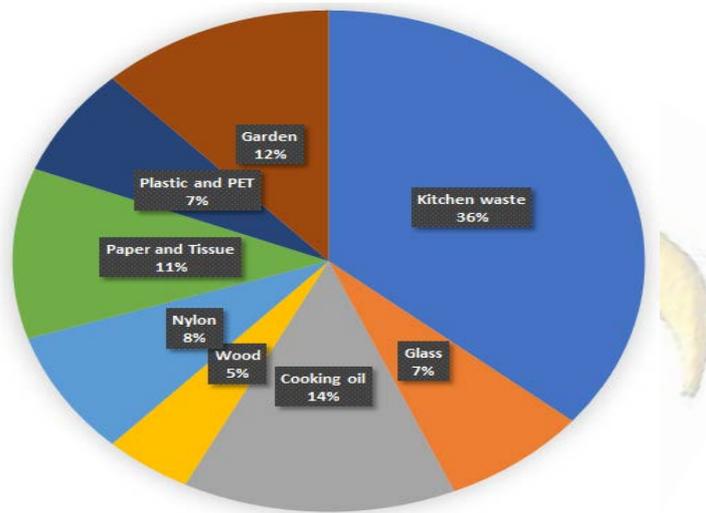


Figure 5. Waste Composition of The Sampled Accommodation Sector

Figure 6 presents the average responses of the categorized sampled accommodation sector. Notably, 70% of large hotels said that they encouraged sustainable waste management practices and responded “YES” to the ten closed-ended questions in section B, while an average of 30% of the large hotels replied “NO” to the questions. A similar trend was observed with the medium-sized hotel, while about half of the small hotels (46%) responded affirmatively. As expected, only 30% YES was recorded for a guesthouse which could be attributed to the size of the facility, the number of wastes generated and volume of guests. It is inferred that almost 60% of the sampled accommodation sector take little action to decrease their environmental impacts. In particular, the guesthouse and the small hotels generate low quantities of waste and consider their environmental responsibilities as a secondary objective (Radwan et al., 2010).

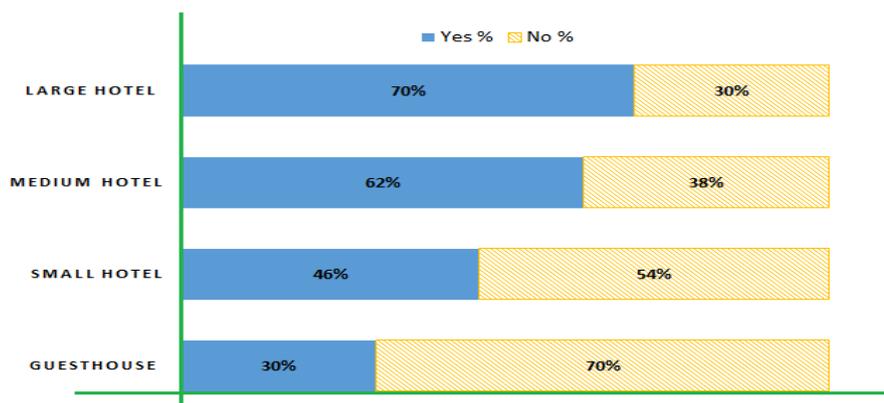


Figure 6. Status of The Categorized Accommodation Sector Regarding WMP

Figure 7 shows all of the factors which affect and depict on waste generation in the sample accommodation, such as type of accommodation, waste management practice, type of waste, and season.

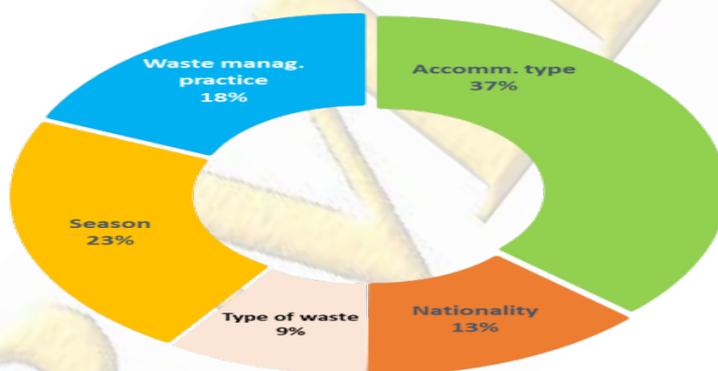


Figure 7. Depicts the Contribution of Each Input Factor

4.2. Regression Analysis of WMP on Operational Cost

Regression analysis was performed to investigate the relationships between selected waste management practice independent variables (biodegradable disposable products, sustainable waste management practices, monitoring customer food wastes and development of waste reduction strategies) and dependent variable (operational cost). The regression model used in this research is expressed as follows:

$$Y = \beta + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \varepsilon \quad (3)$$

Where;

Y= Operational cost;

β_1, \dots, β_4 represents regression constants to be estimated;

x1= biodegradable disposable products

x2= sustainable waste management practices

x3= monitoring customer food wastes

x4= development of waste reduction strategies

ϵ = error-index

The waste management practices were measured using the mean score indices as the independent explanatory variable and regressed against the operational costs as a measure of accommodation sector's performance (dependent variable) to explore the relationship. Table 3 presents a summary of the obtained statistics estimated by the regression model. The correlation regression coefficient $R^2 = 0.968$ shows the strength of the relationship between the selected independent variable and the response variable. The regression model was able to explain 89% of the observations.

Table 3. ANOVA Parameters for The Regression Model for WMP On Operation Cost

Source	Std Dev.	R2	Adj. R2	Pred. R2	PRESS	Remark
Linear	34.89	0.4345	0.6541	0.8961	2255.11	
2FI	4.678	0.8023	0.7681	0.6893	3109.23	
Quadratic	1.678	0.9680	0.10211	0.9833	334.45	Suggested
Cubic	4.678	0.7891	0.8679	0.5691	5302.44	Aliased
Source	SS	df	MS	F-value	Prob > F	
Model	16283.54	9	1809.282	329.55	0.0006	Significant
x1	738.38	1	738.38	6.5161	<0.0001	
x2	10544.33	1	10,544.33	679.87	<0.0001	
x3	6318.32	1	6318.32	14.788	<0.0001	
x4	307.43	1	307.43	2.0871	0.0494	
Residual	1239.345	11	112.667			
Lack of fit	678.4321	8	84.804	1.758	0.6588	Not significant
Pure error	560.9128	5	112.183			
Total	17522.89	20				

Note: SS: Sum of squares; MS: Mean square; df: the degree of freedom

Also, note that the adjusted R2 indicate that there was 10.2% positive variation observed in the operational accommodation cost due to the adopted waste management practices explained by the regression model. In summary, the statistical significance of the regression model is significant (Sig. = 0.0006) with, hence, the author concluded that there was a statistically significant relationship between the operational costs and the waste management practices adopted by the accommodation sectors, Fig 8.

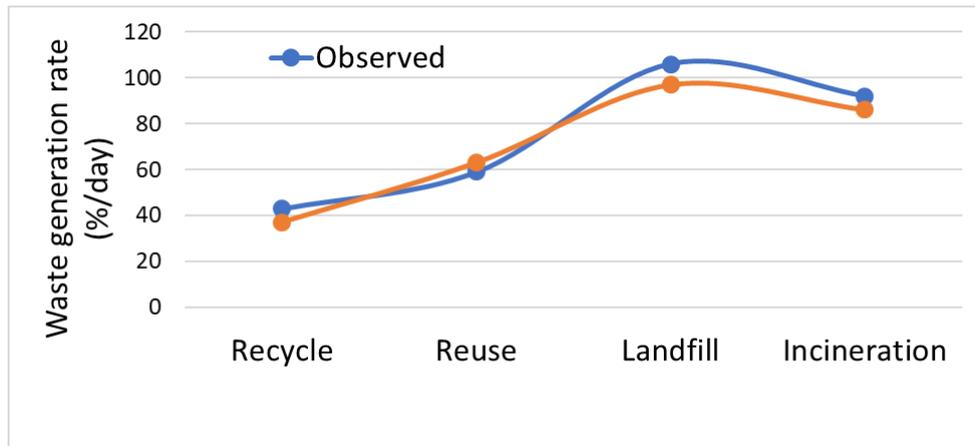


Figure 8. Regression Analysis of WMP on Operational Efficiency

Figure 9 shows all of the variety of nationalities waste generation rate in the sample accommodation based on kg per day. The result obtained that British tourists generate the highest amount of waste in large and small hotels and Turkish tourists generate the highest amount of waste in medium-size hotels.

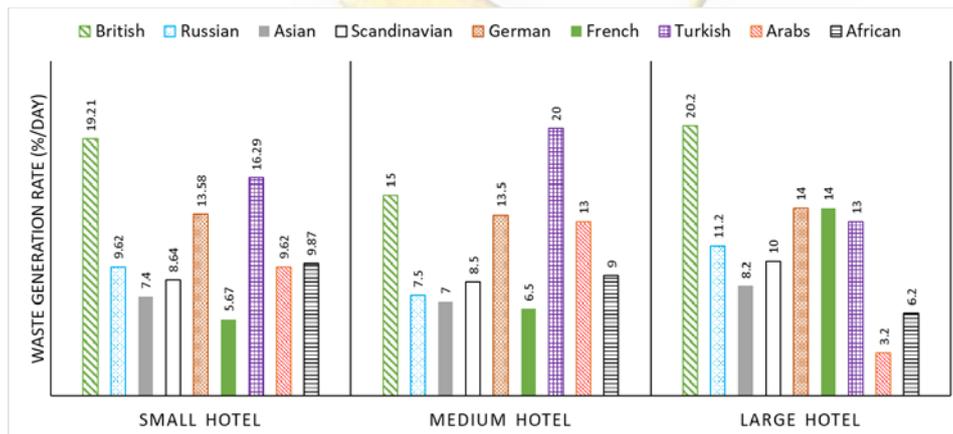


Figure 9. Descriptive Analysis of Waste Generation Rate Based on Nationality

5. CONCLUSION

This is the first time one research to be conducted in Northern Cyprus about waste generation rates in the accommodation sectors, and no similar study has been done before. According to the significant role of tourism on the North Cyprus economy and GDP, this is so important to pay attention to the negative impacts of the tourism industry. Because ignoring environmental crises caused by waste generation by accumulation and pollution in the future could damage the nature of North Cyprus. Also, this is the novelty of this research which compared the amounts of waste

generation in different sizes of hotels. The result has shown that big hotels implement 70% of waste management practices and the guesthouses do so at 30%. According to this result, the role of small hotels in generating waste is more significant than big hotels because of a lack of waste management practices.

When the past literature is examined, Pham Phu, Hoang and Fujiwara (2018) analysed the waste characteristics and management practices of the hotel industry in Hoi An, a tourist city in the centre of Vietnam. They found that the larger size of the hotels, the higher percentage of biodegradable and less proportion of recyclable waste. Moreover, Matsui and Thanh (2018) conducted research on solid waste generation and recycling potential on hotels in Hue City, Vietnam, and high-class hotels should be considered as the highest priority targets. In this context, this study aimed to investigate the waste generation rate of accommodation sectors in the hospitality industry, apply predictive models to forecast waste generation. The accommodation sector is an essential component of the tourism and travel business. It is mentioning that increases in hospitality sector operations result in increased quantities of municipal waste, constituting ecosystem damage and a significant increase in the environmental footprint. To curtail the ugly face of tourism activities, precise prediction of the quantity of hospitality waste generated is required to enable the development of integrated waste management and utilization system. Note that the inaccurate prediction of hospitality waste generated may result in a negative impact on the environment. One of the most significant sectors in the tourism industry is the hotel or accommodation section. By developing and increasing in this sector, the amount of waste generation will be increased, which is so dangerous for the environment and sustainable development. For avoiding the negative aspect of tourism activities, some waste management practices are required and also recycling of waste is one of the solutions. The SPSS software was employed to predict the average HSW generation rate using nationality, type of waste, season, accommodation type, and type of waste management practices as predictors. These predictors were selected based on the correlation test and Cronbach's alpha of 0.93. The investigated result showed that out of 4160. kg waste generation by various sample accommodations in high season 59% of waste was recyclable, general waste 23.6% and

food residue was 19%. Also, the lean season result showed total 2063.4 kg of the waste generation that from this amount of recyclable waste was 33.6%, general waste was 19.5% and food waste was 46.9%.

Findings of this study are essential for policymakers, environmentalist and development of sustainable green hotels. Recommendations concerning separation and re-utilization of generated wastes are suggested, and future research directions are outlined. It is also advised to hotel managers to use other sustainable green growth methods in the future to help their economies as well as the environment. One of the basic requirements for this purpose is to accurately record the appearance of the hotel waste generation in different parts and sectors of the hotel to increase economic and environmental benefits. The limitation of this study is that the majority of the accommodation sector did not record the sources where the wastes are generated. Besides, responses from accommodation sectors located in other cities (Guzelyurt, Famagusta and Iskele) were inadequate, specifically the lower-class accommodation sectors. Also, the majority of the sampled accommodation sectors only record quantifiable number of wet wastes (food wastes, cooking oil), suggesting that not all wastes generated are accounted for.

REFERENCES

- Alipour, H., & Kilic, H. (2005). An institutional appraisal of tourism development and planning: the case of the Turkish Republic of North Cyprus (TRNC). *Tourism Management*, 26(1), 79-94.
- Altinay, L., & Bowen, D. (2006). Politics and tourism interface: The case of Cyprus. *Annals of Tourism Research*, 33(4), 939-956.
- Azarmi, S. L., Alipour, H., & Oladipo, A. A. (2017, July). Using artificial neural network and desirability function to predict waste generation rates in small and large hotels during peak and lean seasons. In *Proceedings of the 7th Advances in Hospitality & Tourism Marketing & Management (AHTMM 2017) Conference, Famagusta, Cyprus* (pp. 10-15).
- Azarmi, S. L., Vaziri, R., Kole, A., Oladipo, A. A., & Göksel, A. B. (2019). Environmental impact of the ugly face of tourism: Pollution and management perspectives. In *The Routledge Handbook of Tourism Impacts* (pp. 312-326). Routledge.
- Aziz, S. Q., Aziz, H. A., Bashir, M. J., & Yusoff, M. S. (2011). Appraisal of domestic solid waste generation, components, and the feasibility of recycling in Erbil, Iraq. *Waste management & research*, 29(8), 880-887.
- Aziz, S. Q., Ismail, S. O., & Omar, I. A. (2019). Recyclable Solid Waste Materials Management in Erbil City-Iraq. *International Journal of Engineering Inventions*, 8(1), 57-62.
- Bacon, P. R. (1987). Use of wetlands for tourism in the insular Caribbean. *Annals of Tourism Research*, 14(1), 104-117.
- Bohdanowicz, P. (2006). Environmental awareness and initiatives in the Swedish and Polish hotel industries—survey results. *International Journal of Hospitality Management*, 25, 662-682.
- Bohdanowicz, P., & Martinac, I. (2007). Determinants and benchmarking of resource consumption in hotels—Case study of Hilton International and Scandic in Europe. *Energy and buildings*, 39(1), 82-95.
- Council Directive EEC of 15 July (1975). On waste. Retrieved from <https://www.eea.europa.eu/policy-documents/council-directive-75-442> [10.06.2020].
- CPCB, (2006). *Municipal solid waste management in Kolkata and Chennai. Control of urban pollution series. CUPS/62/2005-06*, report by, Government of India, India.
- DEFRA, Department of Food and Rural Affairs, (1992). *Securing the future*. the UK Delhi, Oxford university press.
- European Council, (1999). Council Directive 1999/31/EC of 26 April 1999 on the Landfill of Waste.
- Gartner, S. S., & Regan, P. M. (1996). Threat and repression: The non-linear relationship between government and opposition violence. *Journal of Peace Research*, 33(3), 273-287.

Goodall, B. (1992). Environmental auditing for tourism. in C. Cooper and A. Lockwood (eds) *Progress in Tourism. Recreation and Hospitality Management*, 4, 459-476.

Katircioglu, S. T., Arasli, H., & Ekiz, E. H. (2007). Trends in tourism in North Cyprus: A historical perspective. *E-Review of Tourism Research*, 5(2), 37-46.

Lox, F. (1994). *Waste management-Life cycle analysis of packaging*. Brussel: Vrije Universiteit Brussel.

Mateu-Sbert, J., Ricci-Cabello, I., Villalonga-Olives, E., & Cabeza-Irigoyen, E. (2013). The impact of tourism on municipal solid waste generation: The case of Menorca Island (Spain). *Waste management*, 33(12), 2589-2593.

Matsui, Y., & Thanh, N. P. (2018). Estimation of the solid waste generation and recycling potential of the hotel sector: a case study in Hue City, Vietnam. *Journal of Environmental Protection*, 9(7), 751-769.

Papargyropoulou, E., Wright, N., Lozano, R., Steinberger, J., Padfield, R. & Ujang, Z. (2016). Conceptual framework for the study of food waste generation and prevention in the hospitality sector. *Waste Manage* 49(3), 326–336.

Pham Phu, S. T., Hoang, M. G., & Fujiwara, T. (2018). Analyzing solid waste management practices for the hotel industry. *Global Journal of Environmental Science and Management*, 4(1), 19-30.

Pongrácz, E., & Pohjola, V. J. (2004). Re-defining waste, the concept of ownership and the role of waste management. *Resources, conservation and Recycling*, 40(2), 141-153.

Radwan, H.R., Jones, E. & Minoli, D. (2012). Managing solid waste in small hotels. *Journal of Sustainable Tourism*, 18(20), 175–190.

Radwan, M. A., El-Gendy, K. S., & Gad, A. F. (2010). Biomarkers of oxidative stress in the land snail, *Theba pisana* for assessing ecotoxicological effects of urban metal pollution. *Chemosphere*, 79(1), 40-46.

Salm, R. V. (1986). Coral reefs and tourist carrying capacity; the Indian Ocean experience. *Industry and Environment*, 9(1), 11-14.

Sharholly, M., Ahmad, K., Mahmood, G., & Trivedi, R. C. (2008). Municipal solid waste management in Indian cities–A review. *Waste management*, 28(2), 459-467.

Shekha, Y. A. (2011). Household Solid Waste Content in Erbil City, Iraqi Kurdistan Region, Iraq. *Zanco Journal*, 23(3), 1-8.

TRNC SPO,(2015). Retrieved from www.devplan.org/mevzuat/eng/guide%20for%20foreign%20investors.pdf [08.06.2020].

Turizm İstatistikleri (2016). Retrieved from <http://www.tpd.gov.ct.tr/Portals/1075/Turizm%20%C4%B0statistikleri/2016%20%C4%B0statistikleri/Ekim/YATAK%20KAPAS%C4%B0TES%C4%B0%20EK%C4%B0M%202016.pdf>. [25.05.2020].

Walling, E., Walston, A., Warren, E., Warshay, B., Wilhelm, E., & Wolf, S. (2004). Municipal solid waste management in developing countries, Nigeria, a case study. *Group*, 9(1).

White, M. K. (1995). *Re-authoring lives: Interviews & essays*. Adelaide: Dulwich Centre Publications.

Williams, P.T. (2005). *Waste disposal and treatment*. John Wiley, Chichester.

WRAP, (2011). The composition of waste disposed of by the UK hospitality industry, UK. ISBN 1-84405-452-7.

WTO (2017). World Tourism Organization. Retrieved from www.e-unwto.org/doi/pdf/10.18111/9789284419807 [15.06.2020].

WTO (2019). World Trade Organization. Retrieved from https://www.wto.org/english/res_e/publications_e/wtr19_e.htm [20.09.2020].

Young, P. J., & Parker, A. (1983). The identification and possible environmental impact of trace gases and vapours in landfill gas. *Waste Management & Research*, 1(3), 213-226.

Zerbock, O. (2003). Urban solid waste management: Waste reduction in developing nations. *Written for the Requirements of CE*, 5993.

