

Assessment of Solid Waste Management Practices in Hotels in Zanzibar, Tanzania

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Abstract

This study aims to examine hotel practices on solid waste management in Zanzibar Island in the United Republic of Tanzania. Specifically, the study analyses the solid waste management practices based on size and location of the hotel as well as degree of international influence. Furthermore, the study analyzes the stakeholder participation in solid waste management. A survey was conducted in December 2019 using a questionnaire to the 158 hotels in all three regions of Zanzibar obtained using stratified random sampling method. Data were collected using structured questionnaire and analyzed quantitatively using descriptive and inferential statistics. Results of the study showed that solid waste management by the hotel depends on the type of solid waste generated in which recycled was most preferred for food waste (18.4%), re-use for glass waste (23.4%), incineration for paper and cardboard waste (25.9%). Furthermore, regression analysis results showed that three variables explain practice of dumping solid waste in open space. These are contact with waste recycling firm ($p=0.09$), frequency of waste collection ($p=0.011$) and location ($p=0.75$). Hotels that have established contact with waste recycling firm are less likely to adopt open dumping, whereas high frequency of collecting waste decrease likelihood of dumping solid wastes. It has well been noted that hotel located in rural areas more likely to dispose waste in open dumping. The results also indicated that there was an association between hotel ownership (internationalization) and reduced use of plastic solid waste. Finally, the regression model was significant at 1 percent with p value of 0.001, implying that independent variables specified in the model which were hotel location and monitoring frequency correct determine whether food wastes are recycled at hotel premise or not. It can be concluded that, that management of waste is a combination of hotel related factors and external attributes that relates to regional or local administration. It is therefore recommended that local and national authorities should increase the frequency of waste collection and monitoring to enhance the sustainable waste management practices.

Keywords: Hotel industry, solid waste management, tourism, sustainability, Zanzibar

1.0 INTRODUCTION

The hotel industry is important to the world economy particularly in tourist attracting island as it contributes to economic and social development. Tourism is a major activity supporting an economic sector that is responsible for 9% of global GDP. In recent years it has seen significant growth which is forecasted to continue, especially in developing countries which have seen a rate of increase in visitor arrivals that considerably exceeds the world average (Mensah, 2020). However, tourism activities also have negative influences on solid waste management, in which solid waste is one of the most significant impacts (Kaseva & Moirana, 2010). The main waste generation sources in the hotels include the kitchen, guest rooms, public and function areas, food and beverage outlets, receiving and storage areas, offices, parks and gardens. The negative effect of hotel industry can be more significant in areas with high tourism activities such as Zanzibar.

Currently, there is no proper and effective method of waste (solid and wastewater) disposal in Zanzibar. Thus, there is inadequate national capacity to properly manage (handling, collection, disposal, recycling, reuse and treatment) solid waste and wastewater generated in the hotels. Among strategies that have been identified by the policy in waste management includes promoting public private partnership and community involvement and participation in waste management (Kaseva & Moirana, 2010).

Solid waste is regarded as one of the most adverse types of pollution. It needs to be managed in a sustainable way to reduce the overall burden on the environment. The International Hotel Environment Initiative (IHEI) (IHEI, 2002) reported that waste generation is one of the most visible adverse impacts that hotels have on the environment. The management of solid waste should be in accordance with the best principles of public health, engineering, economics and conservation of the environment. For instance, study by Taleb (2005) asserted that “the disposal of solid waste has always been a problem for the hospitality industry and for many hotel operators there is no route for recovery”. Indeed, the success of the hospitality industry worldwide depends largely on the presence of a clean natural environment (Manaktola and Jauhari, 2007). The improper management of hotel waste can contribute to the emergence of local and global problems (e.g. global warming, ozone depletion and climate change) (Mensah, 2014). Additionally, the biodegrading process causes the formation of a leachate, which has the potential to pollute underground water (Becklake, 1991).

The responsibility for the waste management on Zanzibar is on the municipality or the village council in different Shehias. Generally, all types of wastes are mixed and handled together in all steps (Blomstrand *et al.*, 2014). The municipality offers door-to-door services at a few streets in Stone Town, collection and transportation of municipal solid waste from different points and street sweeping (Blomstrand *et al.*, 2014). There are several types of collection

points, for instance open collection on the ground, collection in containers, concrete boxes, bins, wooden sheds and air-conditioned cabins at hotels (ZSDP1, 2005).

Large areas of stone town do not have access to regular collection (ZSDP2, 2005). It is estimated that 220 tons of waste is generated every day in the Stone Town area alone. About 45% of this is taken care of by the municipality. Currently the waste is taken into informal dumping areas and farm areas in the town surroundings (Figure 1). This is due to the fact that, the official dumpsite on Zanzibar was closed in December 2011) (Juma, 2012). The remaining 55% of the waste generated is collected and reused, incinerated, buried, randomly dumped, picked by bird/animals, swept away by the rain or just stay accumulated heaps in many parts of the town (Figure 1).



Figure 1: Informal dumping sites in Jambiani

To achieve hotel goal of best practice of solid waste management, effective and sustainable municipal solid waste management systems must be embraced by local authorities with appropriate organizational capacity and cooperation between numerous stakeholders in the public and private sectors actors (Henry *et al.*, 2005). However, management of MSW is most challenging compared with other types of wastes particularly in the developing world. The management of wastes in most cities of developing countries is highly unsatisfactory (Henry *et al.*, 2005).

Institutional operations regarding waste management in Zanzibar are guided by the Zanzibar Environmental Policy 2015. Specifically, on waste management, the policy state that, there is in-sufficient data for the entire area of Zanzibar (Unguja and Pemba) to estimate the amount of waste generated, but it is estimated that 260 tons of solid wastes are generated daily in Zanzibar Municipality (2017 estimate). According to this policy, over 60% of the total amount of solid waste generated (organic, inorganic, e-waste, etc) in Zanzibar are not properly managed and therefore accumulated in various area. Currently there is no proper and effective method of waste (solid and wastewater) disposal in Zanzibar. The main issue identified by the policy was inadequate national capacity to properly manage solid waste and wastewater generated in the communities. To implement this policy, the government in collaboration with private sectors and other stakeholders sought to improve waste management practices at all levels. Seven implementation strategies were identified in the policy: Promote proper and appropriate infrastructure services required for waste management (handling, reduction, collection, disposal recycling, reuses and treatment); promote proper and appropriate environmental sanitation facilities; promote public private partnership and community involvement and participation in waste management; promote public awareness on proper waste management practices, promote environmental standards and guidelines for waste management; promote cleaner production techniques to reduce waste at sources and to promote polluter pay principles (GOZ, 2013).

Furthermore, to address the problem of waste, the current Environmental Policy of 2021 requires proper legal mandate for coordination of environmental management issues under the auspices of a strong coordinating institution. The Zanzibar Environmental Act (2015) will need to be reviewed in line with policies and strategies for the effective implementation.

On the other hand, the government of Zanzibar recognizes the need for an institutional and legal framework capable of ensuring that the environmental policy is implemented and environmental management is integrated into the regular national planning process (GOZ, 2013). Also, the role of institutions responsible for environment has to be very broad, because environment issues are multi-sectoral, thus the Zanzibar Environmental Policy of 2013 has identified sixteen institutions that are responsible for implementation of environmental policy, these are institution responsible for water, non renewable natural resources, tourism, energy, fisheries, and marine resources, forestry, regional administration and local governments, health, agriculture and livestock, lands, investments, industries and infrastructure, disaster management, gender and vulnerable groups, education and academia, civil society organizations and private sectors, media and development partners. Each institution has developed policy and legislations to manage the environment including solid waste.

Zanzibar has recently passed the Urban Municipal Council Solid Waste Management (SWM) Regulations, 2019, developed by Delhi-based non-profit, Centre for Science and Environment (CSE) to ensure sustainable SWM (reference). It is the first of its kind in East Africa and is based on the 'Polluter Pays Principle'. This law expects to help Zanzibar revamp its waste management infrastructure and help to enforce SWM practices on various sectors in the island.

To date most of the work dealing with SWM has focused on the local authorities' waste management plans (Phillips *et al.*, 2002). A range of other studies have targeted small and medium sized enterprises (SMEs) to explore and assess their response to the environmental agenda but little or no attention has been paid to SWM aspects (Hillary, 2000; Revell and Blackburn, 2007). Moreover, the emphasis has been so far directed towards household waste and recycling. Yet, previous research has not provided insights into the precise challenges and/or factors that might influence the behavior of hotel operators to implement sustainable SWM practices particularly in Zanzibar. In this regard this paper examines factors influencing wastes management practices on hotel in Zanzibar. The particular concern is whether hotel related attributes of hotel size, location and internationalization determine waste management and disposal in Zanzibar. Understanding this attribute has important policy relevance

2.0 MATERIALS AND METHODS

2.1 Study Area

The study is a cross-section design with the purpose of examining the status of waste disposal and management. The study was carried out in hotels located in Zanzibar Island. Zanzibar is situated at the East coast of Tanzania. Zanzibar has several smaller islands and two main islands. The biggest island namely Unguja, followed by Pemba. Together, Unguja and Pemba have an area of 1, 666 km². Pemba alone has 988 km² with a population of approximately two million and the majority (approximately 1,500 000, census year 2022) lives on Unguja. Zanzibar has two rainy seasons; one is in shorter period (November- December) and one is longer period (March- May). The main economic activities conducted are tourism, retail, marine fishing, and peri-urban agriculture.

2.2 Study Population

The population of the study comprised of 484 hotels available in Zanzibar. The hotels were of different sizes from small to extra large depending on the number of rooms and beds. Sampling frame consisted of 243 hotels in which a total of 158 hotels were sampled for study. However, after data clearing, only 130 hotels were considered for further analysis

- Population: 484 hotels
- Distributed 243
- Sample (Returned): 158 hotels
- Usable : 130 answers

		Size groups (number of beds)					
		0-20	21-60	61-100	101-200	200+	
		micro	small	medium	large	x-large	
- Population: 484 hotels - Distributed 243 - Sample (Returned): 158 hotels - Usable : 130 answers	hotel population by region	hotel population by size					
		295	130	28	20	11	
	URBAN	50	33	7	2	0	
	NORTH (A+B)	84	36	12	13	8	
	SOUTH	129	47	4	2	2	
	WEST (A+B)	16	8	1	1	1	
	CENTRAL	16	6	4	2	0	
		sample by size groups					
sample by region		127	57	28	31		243
	URBAN	18	12	7	2	0	39
	NORTH (A+B)	30	14	12	13	8	77
	SOUTH	47	17	4	2	2	72
	WEST (A+B)	16	8	1	1	1	27
	CENTRAL	16	6	4	2	0	28

Figure 1: Study population

2.3 Sampling and data collection

A questionnaire survey was employed to collect data from a sample of hotels as primary data source. The main tool for data collection was a structured questionnaire, which was self-administered by hotel managers. The questionnaire contained questions relating to waste management practices of the hotels, characteristics of the hotels, and socio-demographic characteristics of the hotel managers. Prior to main survey, a pre-test was undertaken in four hotels in central urban zone. The pre-test was undertaken to address issues relating to respondent comprehension, burden and interest, respondents' tasks, questionnaire issues, sampling, as well as coding and analysis. The major issues identified with the questionnaires during the pre-test were respondents' lack of understanding of some of the questions and some requested the questionnaire to be translated into Kiswahili. The respective questionnaires were subsequently modified based on feedback from the pre-test. The actual data collection was undertaken by a team of twenty research assistants for fifty questionnaires who had received training from main researchers. To ensure a higher response rate, research assistants and researchers made personal calls to the hotels managers. In case the hotel managers were unavailable, the questionnaires were left to be collected at a future date. Hotel managers who failed to complete the questionnaire were substituted with managers of other hotels on the list to maintain the sample size of 158 hotels.

All hotels were stratified according to size in which three categories were considered, micro, small, medium, large and extra large. Random selection was then applied to each stratum and a total of 158 hotels were included in the study but after data clearing, only 130 hotels were suitable and considered for further analysis. Once a hotel was selected, the general manager was contacted for the survey. In the cases of manager's absence, hotel staff member who is well informed on waste management practice was contacted.

2.4 Data, measurements of variables and hypotheses

Three independent variables of interest were hotel size, hotel location and internationalization. The aim was to examine degree of causality between each of these and a selected waste management practice. All three variables were dummies. Since there is no consensus on measure of hotel size, number of employees, hotel ratings or number of rooms can be used as a measure of hotels size. Thus, in this study, number of hotel rooms was considered as an appropriate measure of size (Milohnic (2006),. Thus, hotel with more than 55 rooms was considered as a large hotel, and one with less than 55 rooms was termed as small hotel. Although size might reflect other indicators, e.g, number of employees, building and total investment still number of rooms give a true reflection of other attributes of hotel size. Therefore, it was hypothesized that *large hotels are notorious in terms of waste management, with significant negative environmental effect*. The share size of waste resulting from a large hotel may have management consequences. We should also be cognizant of the fact that small hotels may not pay attention to best solid waste management practices because of insufficient financial investment on environmental best practices

The second variable of interest was hotel location. Hotel location is a dummy for urban located hotel. It was hypothesized that *urban based hotel has greater preponderance of poor waste management measures*. This hypothesis is based on observation that Unguja is a small island with high population density. High density is often associated with waste accumulation in urban settings of developing countries.

The last variable of interest is internationalization. This is measured based on hotel ownership. Hotel with partnership or shareholding with non-citizenship is considered as having high degree of internationalization. An opposite category of this variable is locally owned hotels. It was hypothesized that *internalization of hotels is associated with best waste management practices*. To test the stated hypotheses, a binary logistic regression models were employed with different specification of independent variables (Table 2). Number of controls was included in the model specification based on literature review (Table 2). The selected model of choice was probability regression, which consider binary of dependent variable (s). Prior to running these causal models, descriptive statistics were employed to understand the spread and behavior of variables. In addition, chi square test was used to test the association between variable of interest and waste management practices.

Table 2: Measurement and description of variables of variables specified in the model

Variable	Definition
Contact with firms	This is a dummy variable for hotel contact with waste recycle firm, with 0=contact and 1 otherwise
Distance	Dummy variable for distance in kilometer between hotel and nearest dumping site
Frequency of waste collection	Dummy for frequency of waste collection., with value of 0 for waste collected weekly
No of permanent employee	Total number of employees in a hotel
Hotel ownership	Dummy variable for hotel ownership; 0 =hotel owned by locals, and 1 for foreign/partnership ownership
Waste collection arrangement	Dummy variables on nature of data collection arrangement. Value of 0 stand for licensed company as waste collector and 1 stand for individual /hotel staff waste collectors
Employee in waste management	Number of hotel staff with responsibility of managing waste
Size of hotel	Dummy for hotel size; 0=small hotel and 1 otherwise
Region	Dummy for rural/urban location; 0= rural, 1=otherwise

3.0 RESULTS AND DISCUSSION

3.1 Waste management practices

The results of the study, as shown in Table 3 indicate that, the waste management practice of hotels in Zanzibar depends on the type of solid waste generated in which recycling was most preferred for food waste (18.4%), re-use for glass waste (23.4%), incineration for paper and cardboard waste (25.9%). Furthermore, results indicated that encouraging guests to reduce the use material to reduce the waste being generated was less regularly undertaken. Furthermore, results indicate that solid waste were not processed in some hotel in which most of the waste were collected by the municipal council to the disposal site (93.7%) and some were handled by private individuals (1.9%), buried in the soil (1.3) and some also were collected by private companies such as ZANREC company (0.6%). On the other hand, results indicated that the most common practice regarding waste management in the municipality was the availability of collective waste containers (40.5%) where dumping of waste in roadside was also common (22.8%).

These results clearly indicate that, hotels owners are less interested in deriving anything from the wastes through reuse, recycling or recovery from the wastes that they generate; rather, they were more interested in how they could get rid of them. This explains why practices geared toward reuse, recycling, reduce and recovery were less popular.

Results of the study affirm that of previous studies that waste disposal is the most popular waste disposal method employed by hotels (Radwan et al., 2012). This is evident in the provision of dustbins for collection and dumping of waste

at landfills by the hotels and employment of the services of waste management companies like ZANREC to collect hotel wastes.

Table 3: Solid waste processes on the hotel

Item	Recycled	Re-use	Incineration	Reused for other purposes	Encourage guests to reduce waste
Glass and porcelain	17.1	23.4	10.8	8.9	7.6
Paper and cardboard	10.8	22.8	25.9	3.8	3.2
Metal	12.7	13.9	5.1	8.9	2.5
Plastic	16.5	21.5	13.9	5.7	12.7
Garden waste	17.7	10.8	17.7	15.2	1.3
Food waste	18.4	14.6	11.4	10.8	3.2
Electronic	13.3	13.9	12.7	7.6	2.7
Textile	10.8	18.4	12.7	10.1	1.3
Toxic waste	5.1	17.7	17.7	6.3	5.7

Further results of the study, as shown in Table 4, indicate that, based on the waste management hierarch model, the most frequent waste management practice of hotels in Zanzibar was at the level of reduce use ($M = 0.32$) which is the most preferred method as per WMH, however, interestingly guests were not encouraged to reduce use ($M=0.18$) probably hotel owners are not fully aware on the business benefits of encouraging to reduce production of wastes. Waste disposal by incineration which is not preferred was also a frequently undertaken waste management practice by hotels in Zanzibar ($M=0.28$). Thus, the hotels frequently practiced reduced use by hotel management and incineration while they occasionally practiced activities geared toward encouraging guests to reduce use, reuse ($M=0.22$) and recycling ($M=0.25$) (Table 4).

Table 4: Mean waste management practices

Waste management practices	Mean
Recycle	0.25
Encourage guests to reduce the use of	0.18
Incinerated	0.28
Reused for other purposes (e.g.: bricks)	0.22
Reduce use	0.32

Hotels in Zanzibar adopt different practice of solid waste management practices which include incineration, open dumping, compositing, recycling, disposal and reduce use among others.

(i) Waste disposal

Different model specification was attempted. The only model that yielded significant result is solid waste open dumping (Table 5). Waste disposal mechanism is an important criterion of assessing waste management behavior of a firm. When other solid waste handling practice were, modeled results were not

statistically significant with no intuitive statistical explanation Table 5 present binary regression results on causal factors that affect solid waste open dumping practice.

Table 5: Determinants of solid waste dumping practice- regression results

Variable	B	S. E	Wald	P values	Exp(B)
Contact with firms	-1.156	.440	6.894	.009	.315
Distance	.454	.461	.972	.324	1.575
Frequency of waste collection	-1.326	.525	6.390	.011	.266
No of permanent employee	-.001	.004	.110	.740	.999
Hotel ownership (internalization)	.713	.436	2.678	.102	2.041
Waste collection arrangement	-.560	.445	1.590	.207	.571
Employee in waste management	-.065	.061	1.111	.292	.937
Size of hotel	-.706	.492	2.054	.152	.494
Region (location)	-.765	.429	3.177	.075	.465

The dependent variable is a dummy for solid waste disposal in open dumping site. In this model it was interested in understanding the influence of three variables, which are hotel size, location and internationalization. These have been earlier (see section 2.4) hypothesized to influence solid waste management. The overall model is significant at 5 percent with probability value of 0.009. A total of 9 variables were specified in the model, in which two variables were significant at 5 percent ($p=0.05$) and one variable was significant at 10 percent (0.10). Interpretation will focus on the direction and not magnitude as this suffices for policy purpose. It is of hesitation to consider magnitude due to potential endogeneity of the model.

The variable contact with firm is negative and significant at $p = 0.009$. This implies that hotel with that have well established contact with waste recycling firms are less likely to use open spaces for dumping. In Zanzibar, it has become a familiar phenomenon for recycling of solid plastic waste, which constitutes largest proportion of wastes. There are firms that specialize in this activity such as ZANREC and some have established contact with hotels. The findings indicate that hotels with established contacts with waste recycling practices firms are unlikely to dump their solid waste.

Frequency of waste collection is negative and significant (at $p=0.11$). The shorter duration of waste collection from hotels is associated with increased likelihood of having solid waste dumped at open site. This makes sense since hotels may find it rational to dump their waste if waste waste collection is irregular. From policy perspective, it is important to have a well- managed plan of predictable waste collection to avoid environmental consequences of dumping

solid waste. Municipal waste collectors in Zanzibar often have sporadic visits, which cause accumulation of waste in hotels.

Hotel location was specified in the model to control for location specific factors. This dummy was negatively significant at $p=0.1$ and, implying that hotel located in urban areas are less likely to use open dumping sites. This interpretation makes sense since there are few open spaces congested urban areas where one can use as dumping site. Zanzibar is one of region in Tanzania with highest population density although in theory this does not support the hypothesis of poor waste management in urban located hotel, it doesn't necessarily imply that these hotels use best waste management practices. The other variable which is not significant but provides interesting discussion is number of employees in waste management section. The coefficient for this variable is negative. This implies, though loosely, that employing staff with specific task of dealing with waste has positive effect in terms of avoiding environment unfriendly practices of dumping waste in open sites. The regression analysis was also used to examine if there is any kind of relationship between hotel size and waste management behavior of hotel. The test results show no significant relationship, between these variables, with p value greater than a standard p value of 0.05. This implies that the size of hotel is not associated with hotel solid waste management. This particular finding does not corroborate another related study by Menshal (2006), in which large hotels were found to adopt best environmental practices. This indicates that, small, medium and large hotel have the same practice concerning solid waste management.

(ii) Reduced use of Solid Waste

A chi square test was performed to study association between hotel ownership (internationalization) and reduced use of plastic solid waste. Stated hypothesis is lack of association between hotel ownership and reduce use of plastic wastes. The value of the test is $p=0.03$. This result is statistically significant implying rejection of null hypothesis that claim that the two variables are independent of each other. Hence the empirical data suggest that the variables hotel ownership and reduced use of plastic wastes are dependent of each other. Hence results are significant and thus hotel ownership and reduced use are associated. It should be noted that no causality was found between these two variables with positive coefficient. Nevertheless, results in table two indicates local owned hotel are more likely to reduce use of plastic hotels than foreign owned hotel (i.e. 18 out of 60 foreign hotels reduce use, while only 10 out of 70 locally owned hotel have the same practice.

(iii) Food Waste Recycling

One of the main solid wastes with notorious environmental pollution effect is food waste. Hotel in Zanzibar generates large quantities of this waste type. Table 6 present regression results on covariates of food waste recycling.

Table 6: Determinants of food waste recycling (binary logistic regression)

Variable	B	S.E	Wald	Sig	Exp(B)
Hotel type	-.400	.551	.527	.468	.670
Location	-2.791	1.096	6.482	.011	.061
Hotel size	.524	.682	.589	.443	1.688
Monitoring frequency	-2.478	1.128	4.822	.028	.084
External support	-.250	.840	.089	.766	.779
Use of waste container	-.210	.604	.121	.728	.811
Distance to dumping site	-.360	.637	.318	.573	.698
Collection frequency	.479	.635	.569	.451	1.614
Policy statement	1.019	.627	2.637	.104	2.771
P.0.001; R =0.314					

Food waste recycling which was measure as a dummy variable (recycling =1; no recycling =0) intended to assess the manner in which solid wastes are processed on the hotel premises. Apart from recycling other waste processing procedure were reduced use, incineration, reuse for other purposes and encourage guest to reduce the use of solid waste. With respect to procession of food waste the only model that was significant was one of recycling (Table 6).

The regression model was significant at 1 percent with p value of 0.001, implying that independent variables specified in the model correct determine whether food wastes are recycled at hotel premise or not. Two variables were significant. These dummy variables for monitoring frequency and a location dummy.

Monitoring frequency is negative and statistically significant ($P = 0.03$) The variable monitoring frequency captures the frequency at which government agencies monitor the implementation of waste management. The frequency was dummy variables on whether monitoring was twice per year or otherwise, meaning less frequency of one in two or three years. Results imply that high frequency of government monitoring increase likelihood of food waste recycling. This probably may entail adoption of best environmentally sustainable practice when there is frequent monitoring of implementation of waste management practice at hotel premises. Recycling requires community involvement and social awareness to be successful. In recognition of the importance of public participation in the success of recycling programs, recycling policy and legislation need to be geared toward promoting people centered approaches to recycling with public education as the main driver towards increasing public participation (McAllister, 2015). Location was negative and significant. This implies that hotels that are located in urban areas have increased likelihood of recycling waste. This makes sense since earlier results have indicated that urban located hotel do not adopt open dumping, instead they recycle some of solid wastes such as food.

4.0 CONCLUSION AND RECOMMENDATIONS

This study aimed at unveiling key attributes that affect hotel solid waste management practices. Results generally indicate that, the key variable that is associated with solid waste management is location. Urban located hotel are less likely to adopt open dumping as a waste disposal practice. These hotels are also more likely to recycle their food waste. Our empirical evidence indicates that hotel ownership (whether locally or internationally owned) has no bearing on solid waste management. However, results give an impression that hotel with international partnership may adopt reduced use of plastic waste. Although this particular finding results from correlation analysis it may loosely imply causation between waste management and hotel ownership.

Furthermore, evidence from econometric estimation presented in our findings indicates three factors that influence solid waste open dumping practice. These are contact with waste collecting firm, frequency of waste collection and hotel location. Hotels with well-established contact with waste collecting firm are less likely to adopt poor environmental practice of open dumping. These collecting firms have desirable environmental practice of recycling some of wastes with additional economic appeal. As expected, hotel with more frequency of waste collection have reduced likelihood of adopting open dumping practice. Similarly, as far as hotel location is concerned, urban located hotel have limited space to adopt the use of open dumping practice.

From policy perspective, these findings present two relevant recommendations, firstly, it is suggested for a more targeted policy on waste management among hotels in Zanzibar. For example, since hotels in rural areas have increasing tendency for open waste dumping, then a rural based intervention may be appropriate and will be cost effective. In the same vein, hotels owned by locals should be encouraged to establish contacts with waste collecting and recycling firms. Secondly, at broader policy level, hotels should be advised by who? to establish contact with a waste collecting firm. These engagements may ensure timely waste collection and reducing temptations for solid waste dumping. Furthermore, increased community participation and introducing incentives may be some of the most effective social interventions in establishing sustainable solid waste management. With this objective, local governments should financially encourage the hotel sector and provide more effective and cheaper waste recovery services than the disposal in landfills, aiming at the reduction, reuse, and recycling of wastes.

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