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The polyethylene terephthalate water bottles problem in Dubai hotels—Would an initiative solve this problem or does it need a law?

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This paper examines the environmental effects of polyethylene terephthalate (PET) water bottles used by tourists in Dubai. Unfortunately, tourists residing in Dubai hotels must depend on these single-use plastic water bottles that have negative environmental impacts associated with their production and disposal. Thus, the government of Dubai launched an initiative to reduce the usage of PET bottles, and this paper discusses whether this initiative is adequate to change hotels' dependence on PET water bottles. Therefore, this paper tries first to find the reasons that would drive hotels to comply with this initiative and then assesses the compliance of hotels with this initiative 1 year after its launch. It is found that pressures from hotels with the same and higher ratings are crucial drivers for hotels to replace PET bottles with other alternatives. Officials affiliated with the Dubai Can initiative confirmed these findings. They have also anticipated that UAE residents who spend their vacations in Dubai hotels will exert substantial pressure on hotels to abandon PET bottle use. Decision-makers affirmed that a good percentage of five-star hotels, in addition to several four-star hotels, have abolished the use of PET bottles. Moreover, it is anticipated that all hotels are expected to stop using PET bottles. Consequently, this study shows that promoting environmentally responsible behavior without enacting laws is possible.

KEYWORDS

PET water bottles, Dubai, greenhouse gases, tourism, hotels

1. Tourism and PET problem

Even though tap water is potable (Ajaj et al., 2022), residents of the United Arab Emirates (UAE) are accustomed to drinking bottled water (Al-Shihabi and Barghash, 2023). UAE residents consume more than 285 L per capita per year of bottled water (Rajput et al., 2022). In Dubai, as in the majority of other cities, single-use water bottles are manufactured from Polyethylene terephthalate (PET). PET is a thermoplastic polymer made from fossil fuels. PET possesses several qualities that make it an ideal material for water bottles. These characteristics include transparency, lightweight, durability, and resistance to carbon dioxide (El Essawy et al., 2017). In addition, PET bottles have low production costs. Despite these benefits, PET's limited useful life, high production volumes, and hundreds of years of decomposition time cause several environmental concerns (Bałazińska et al., 2021). The

TABLE 1 Average weight of PET bottles per capacity based on Islam et al. (2018) and a generic PET bottle used for calculations.

Bottle size (ml)	Average weight (g)	PET g/L
250	6.41	25.64 g
330	14.31	43.36 g
600	19.71	32.85 g
1,500	32.6	21.73 g
Generic (1,000)	30.89	30.89 g

The average generic weight, 30.89 g, is the average of the four bottle sizes.

production of PET is an energy-intensive process that produces a substantial quantity of greenhouse gases (GHGs; Benavides et al., 2018).

Tourists staying in Dubai's hotels would mainly drink water from PET bottles provided by hotels or purchased from supermarkets or vending machines. Dubai was the fourth most visited destination in 2018 with over 16.66 million visitors (Murray, 2018), and Dubai welcomed 4.67 million visitors in the first quarter of 2023 (Performance Reports, 2023). Assuming that the number of tourists per quarter remains unchanged, Dubai is anticipated to receive 18.8 million tourists in 2023. Statistics also indicate that 86.5% of visitors will stay in hotels and furnished apartments for an average of four nights in Dubai (Performance Reports, 2023). Using the conservative assumption that tourists will consume 2 L of water per day, below the Mayo Clinic's recommendations (Mayo Clinic Staff, 2022), hotel-dwelling tourists will drink 130 million liters of water from PET bottles in 2023. PET water bottles in Dubai and other Gulf Cooperation Council (GCC) countries are of four different sizes, as shown in Table 1. Assuming that the four sizes are equally bought by tourists, a generic weight per 1 L of bottled water is 30.89 g/L, as shown in Table 1. Consequently, the expected consumption of PET bottled water would need 4,017 tons of PET to be manufactured and either incinerated or landfilled. Since actual water consumption would exceed 2 L per day in a hot country like the UAE (Cheikh Ismail et al., 2020), actual used PET is expected to be more than 4,017 tons per year.

The production of 4,017 tons of PET material generates 8,072 $MtCO_2e$, and the combustion of this quantity of PET generates 7,409 $MtCO_2e$, based on data provided by EPA (2020). PET bottles can be sent to landfills to generate 50 $MtCO_2e$ instead of being incinerated; however, it takes 450 years for PET to degrade naturally, which is not an option (Chatterjee et al., 2022). In addition, Dubai aims to end the use of landfills (Al-Shihabi et al., 2023). In summary, the water consumed by tourists in 2023 is projected to generate 15,481 $MtCO_2e$.

Assuming between 5 and 10% increase in the number of tourists, Dubai is expected to welcome between 551.5 and 517.3 million tourists in the next 25 years, where the number of tourist per year is $Number\ of\ tourists(year) = Number\ of\ tourists\ 2023 \times (1 + Number\ of\ tourists\ growth\ rate)^{(time+1)}$. The cumulative GHG emissions for the next 25 years due to tourists drinking from PET water bottles are expected to be between 428,781 and 457,173.6 $MtCO_2e$.

2. Initiative

The UAE has passed a law prohibiting the import, production, and distribution of single-use plastic purchasing bags by January 1, 2024 (Staff Reporter, 2023). However, no comparable legislation prohibiting the use of single-use water bottles was enacted. Instead, initiatives were taken in all emirates to reduce the use of single-use water bottles.

The Dubai Can initiative, which targets single-use plastic water bottles in Dubai, was launched in February 2022. "One Small Change, One Big Impact" is the initiative's slogan. The initiative concentrates on three fronts to accomplish this goal:

1. Encourage everyone to use refillable water bottles.
2. Install water stations in Dubai.
3. Raising environmental awareness about the harmful effects of plastics.

Dubai Can initiative targets all PET users, and after the introduction of Dubai Can initiative, few hotels have abandoned PET bottles (Josh Corder, 2022). It is noticed that hotels that responded to the initiative have 5-star ratings (Josh Corder, 2022). Thus, would this voluntary act of a few hotels be a catalyst for other hotels to follow? Will the Dubai Can initiative succeed in the hospitality sector?

3. Investigation

Six experts were invited to help understand factors affecting hotels' decisions to abolish PET bottles in light of the Dubai Can initiative. Three experts were from the hospitality industry in Dubai. One expert was the general manager of a 3-star hotel, while the other two were operational managers of 2- and 5-star hotels. All the experts had over 10 years of experience in the hospitality industry and at least 5 years of experience in Dubai. The other three experts were from academia specializing in marketing, sustainable tourism, and environmental sciences.

Delphi technique (Hasson et al., 2000) was used to identify the factors that might affect hotels' decisions to abolish PET bottles because the Delphi technique is suitable for achieving consensus in relatively new areas (Yeung et al., 2007). Two rounds of the Delphi survey were conducted to identify factors that hotels would consider when abolishing PET bottles. The six experts reached a consensus about the following five factors:

1. **Cost,** hotels are afraid of incurring extra costs if they switch.
2. **Peer pressure,** any hotel needs to keep with the same standards adopted by hotels in the same category.
3. **Superior pressure,** imitation will not be limited to hotels in the same category; hotels will imitate hotels with better classification than their own.
4. **Marketing opportunity,** industry and marketing experts mentioned that providing tourists with water bottles having hotels' logos can be a free marketing campaign.
5. **Tourist pressure,** tourists are becoming more aware of PET environmental problems.

After identifying the five listed factors, hotels and hotel apartments were then surveyed about their perspectives on the

TABLE 2 Questions addressing hotels' perspectives about abolishing PET bottles.

Question	μ	σ
Cost is the major obstacle to not abolishing PET bottles in hotels	1.45	0.56
If hotels of the same category abolish using PET bottles, then my hotel would do the same	4.23	0.73
If hotels of higher category abolish using PET bottles then my hotel would do the same	3.82	0.89
Providing customers with refillable water bottles having my hotel logo would help market my hotel	3.81	1.12
Tourists value sustainable practices like providing them with alternatives to PET water bottles	4.02	0.78

listed factors. Only five questions were asked to guarantee a high response rate, as shown in Table 2. Using a five-point Likert scale for answers provides a balanced range of response options, enabling individuals to indicate their varying degrees of agreement or disagreement (Chyung et al., 2017). The means and standard deviations of the answers are shown in the last two columns of Table 2, where strongly disagree has a value of 1, while strongly agree has a value of 5. Questions were mainly emailed to the hotels, but some hotels were visited. Responses from 412 hotels were received or collected.

Responses show that cost is not a factor to be considered when avoiding the use of PET bottles. Different alternatives are available for hotels to stop using PET bottles. For example, Dubai water is potable; however, it is the responsibility of the hotels to clean the water tanks and pipes to ensure tap water safety (Zakaria, 2022). Contracting an authorized company to clean the water tanks and pipes is cheaper than using PET bottles. Hotels can also install drinking water filters or place water dispensers and provide tourists with glass, metal, or Tritan^{TM} jugs or bottles. Most hotels know that there are cheaper alternatives to using PET bottles. Peer and superior pressures are the two main reasons that would push hotels to abandon PET bottles. Last, customers are expected to be delighted (Matzler et al., 1996) if they would keep the refillable bottles with them, which can be used to market the hotel brand. Moreover, tourists would value any sustainable practice adopted by the hotel. Thus, based on the survey results, cost was removed from further analysis.

Removing cost from the list of factors, it was needed to rank the remaining four factors regarding their influence on hotels' decisions. The ranking is based on weights given to each factor where weights are found using the analytical hierarchy Process (AHP; Saaty, 1990). AHP is a Multi-Criteria Decision Making (MCDM) method (Singh and Malik, 2014) that utilizes pairwise comparisons in order to do the ranking. The AHP method represents the human decision-making process and helps to achieve better judgments based on pair-wise comparisons and judgment scales (Saaty, 1994).

TABLE 3 AHP scale used to compare the identified factors.

Rank	Description
1	Equally important
3	Moderately important
5	Strongly important
7	Significantly important
9	Extremely important

Twenty new hotel industry practitioners were requested to participate in the AHP study. Using the scale shown in Table 3, each expert was required to rank the significance of each factor relative to the other three. After aggregating the results, the consistency ratio (CR) was checked and found to be <0.1 (Saaty, 1988), which makes the AHP ranking acceptable. The ranking and weights of the factors are as follows: 0.52 for peer pressure, 0.37 for superior pressure, 0.08 for tourist pressure, and 0.03 for marketing opportunity. The consulted experts have agreed with the AHP ranking; however, they expected more weight to be given to tourist pressure and marketing opportunities.

4. Interpretation and validation

The AHP findings show this environmentally friendly behavior, abandoning PET bottles, will spread among hotels under the influence of peer and superior pressures. Since several 5-star hotels have already stopped using PET bottles, other 5-star hotels are expected to follow due to peer pressure. Due to superior pressure, 4-star hotels will follow the 5-star hotels, and again, peer pressure within this group of hotels will push all of this group to abandon PET bottles. This behavior is expected to cascade down to other hotel groups.

ACCOR hotel management group was one of the first to abolish PET bottles in two 5-star hotels it managed in February 2022 (ACCOR, 2022). ACCOR managed 59 properties and planned to phase out PET bottles from all its managed properties before the end of 2022. A Sheraton-managed hotel (Report, 2022) and another 5-star hotel (Zawaya, 2022) eliminated PET water bottles in October 2022. IHG Hotels and Resorts group has also discontinued the use of PET bottles in two of the hotels it manages (1) a new hotel in December 2022 and (2) a cluster of hotels it manages in May 2023, with plans to extend this practice to all of the hotels it manages in Dubai.

In discussion with Dubai Can officials, it was revealed that the number of hotels that ceased using PET bottles exceeded the number of hotels whose news appeared online. In addition, they reported that four hotels had eliminated PET bottles since the initiative's launch in February 2022. This number has surpassed fifty hotels by May 2023, and it is anticipated to surpass one hundred by the end of 2023, given the plans of management groups such as ACCOR and IHG. The majority of hotels that have eliminated PET bottles are international 5-star establishments, such as Sheraton and

Holiday Inn; however, some 4-star and even 3-star hotels have also done so.

Officials from Dubai Can acknowledge the significance of pressure exerted by peer and superior hotels on the decision of other hotels to stop using PET bottles. However, they argued that the weight given to hotel customers should be greater than what AHP found. Some hotel guests are UAE residents who would like to spend their vacations in the UAE, known as a staycation. Internal tourists would compare hotels; their word-of-mouth is more influential than that of international tourists.

Since no law prohibiting PET bottles in hotels has been enacted, decision-makers are satisfied with the current transitional behavior. If this trend were to slow down, they could take action to expedite the elimination of PET bottles. For example, giving preference to hotels that do not use PET bottles for official and governmental visitors or establishing a new rating system for hotels that take environmental practices into account.

5. Conclusion

This paper illustrated the magnitude of the environmental problem caused by tourists who use PET bottles in Dubai. Due to the importance of tourism to Dubai's economy, this issue is anticipated to intensify. Instead of passing a law prohibiting the use of PET bottles, Dubai started an initiative. Several 5-star hotels in Dubai responded to the initiative by discontinuing PET bottles.

To determine whether this action by a few hotels will spread to others, the factors that influence hotels' decisions to stop using PET bottles are examined. The factors were initially determined using the Delphi method. These elements included cost, peer pressure, superior pressure, marketing, and tourist pressure. However, one of the factors, the cost of phasing out PET bottles, was eliminated based on a hotel-distributed survey result. Following this, an AHP study revealed that pressure from hotels in the same or higher category is the most influential factor in hotels' decisions to ban PET bottles.

This is how the impact of these factors can be interpreted: 5-star hotels will be the first to stop using PET bottles, followed by 4-star hotels, etc. Published facts and decision-makers observing the situation validated this interpretation. Decision-makers are satisfied with the number of hotels that banned PET bottles after a year after the initiative. Nonetheless, decision-makers must monitor the situation and intervene if the rate of change is insufficient. This research demonstrates that laws are not always required to alter societal behavior. Initiatives and responses from members of society can substitute for laws.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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