



Advancing SDGs: Assessing the Impact of Abu Dhabi's Single-Use Plastic Policy on Consumer Behaviour and Adoption

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ABSTRACT

In response to the significant environmental repercussions of plastic consumption, particularly single-use plastics, many countries have taken measures to reduce their reliance on plastic materials. Abu Dhabi, in the United Arab Emirates (UAE), for instance, introduced a single-use plastic policy in 2022, accompanied by a fee of AED 0.25, aimed at promoting environmentally conscious behaviours and curbing plastic waste. This study explores the impact of this policy on consumer behaviour and adoption, drawing insights from a literature review spanning eight nations. The review underscores the roles of consumer awareness, governmental regulations, fees, media influence, and social pressures in shaping behaviours related to single-use plastics.

The research aims to assess how the policy has influenced consumer actions and adherence. The methodology encompasses two main components: qualitative observations conducted at three supermarkets with varying price ranges, situated in distinct socio-economic contexts, to assess customer choices between single-use plastic and reusable bags; and the administration of a closed-ended questionnaire to gauge consumer acceptance and implementation of the policy. Results reveal that in lower-priced supermarkets, predominantly frequented by individuals from lower socio-economic backgrounds, there is a decline in single-use plastic bag usage, accompanied by a rise in the adoption of reusable bags. Conversely, consumers in higher and medium-priced supermarkets tend to lean towards utilizing plastic bags. The survey, which received 105 responses, delves into the policy's acceptance and integration. Most participants, primarily females aged 18 to 24, possessing undergraduate degrees, and reporting monthly household incomes ranging between AED 5 and 15k, express support for the policy. They view it as a personal responsibility to safeguard the environment and indicate shifts in their shopping behaviours. Drawing on the research findings, it is strongly advised that the EAD takes proactive measures to align with the UAE commitment to achieving Sustainable Development Goals (SDGs) and advancing sustainability efforts.

Keywords: Single-use plastic policy, Consumer behaviour, Sustainable practices, Awareness campaigns, Plastic waste reduction, Environmental protection

1. INTRODUCTION

The realm of polymers encompasses both naturally occurring and synthetically produced macromolecules, formed through the bonding of repeating monomer units. The distinct properties of polymer chains, including repetition levels, arrangement, orientation, and molecular composition, contribute to their diverse characteristics. Natural polymers like rubber tree sap, cellulose, and amber coexist with synthetic counterparts such as polyethylene (PE), polypropylene (PP), and nylon, commonly referred to as plastics (Science of plastics, 2019).

The origin of plastics traces back to unexpected discoveries. In 1898, Hans von Pechmann stumbled upon polyethylene while experimenting with diazomethane. Similarly, in 1933, Eric Fawcett and Reginald Gibson, along with a team of chemists at Imperial Chemical Industries (ICI), unintentionally synthesized a substance resembling von Pechmann's polyethylene during high-pressure ethylene experiments. By 1938, polyethylene was industrially produced to serve the British armed forces, finding use in insulating radar cables (Brunella, 2014).

The advent of single-use polyethylene bags took center stage in 1956, when Sten Thulin introduced an innovative design patented by Celloplast, a Swedish company. This marked the replacement of traditional cloth and paper bags across Europe. Over two decades, single-use plastics surged to account for 80% of shopping bags, expanding their dominance to the US and beyond. Touted as cheaper, superior, and more convenient than reusable bags, this concept reshaped consumer choices (From birth to ban: A history of the plastic shopping bag, 2014).

Today, the global production of plastic waste has doubled since 2000, reaching an astonishing 353 million metric tons. Packaging, consumer goods, and textiles contribute significantly, constituting 40%, 12%, and 11% of the generated waste, respectively. This deluge of plastic waste poses formidable challenges to waste management systems worldwide, as plastic debris accumulates, disrupts, and deteriorates the environment (Global plastics outlook, 2022).

A striking example is the Great Pacific Garbage Patch, discovered by Captain Charles Moore. This massive agglomeration of plastic debris in the North Pacific Subtropical Convergence Zone highlights the consequences of single-use plastics. Primarily originating from Asian, North American, and South American countries, 80% of ocean-bound plastic emanates from land-based sources, with the remaining 20% attributed to activities like fishing (Evers & Editing, 2022). The unique nature of plastic compounds this environmental crisis. Rather than biodegrading, plastics fragment into smaller particles through processes like photodegradation. These microplastics pervade the marine ecosystem, imperiling marine biodiversity (Evers & Editing, 2022).

In 2019, a staggering 2.1 million metric tons of plastic waste entered aquatic environments, with 1.7 million metric tons reaching oceans and approximately 39 million metric tons accumulating in oceans, alongside 109 million metric tons in rivers (Global plastics outlook, 2022).

The escalating generation of plastic waste, as revealed by the Organization for Economic Co-operation and Development (OECD), has more than doubled in the past decade. In the Middle East and North Africa region, concerning proportions of plastic waste management indicate substantial landfilling, mismanagement, and limited recycling and incineration rates, with considerable volumes ending up in open pits, water bodies, and terrestrial sites (Global plastics outlook, 2022). This scenario underscores the pressing challenges faced by waste management systems in the MENA region, particularly in developing economies.

This research paper aims to achieve two primary objectives: Examine the socioeconomic impact of the Abu Dhabi single-use plastic policy on consumer behaviour, and to evaluate consumer attitudes toward achieving zero plastic waste.

2. LITERATURE REVIEW

The proactive stance of countries towards addressing the issue of single-use plastics reflects a growing global recognition of its detrimental environmental impact. Bangladesh emerged as a pioneer, enacting a single-use plastic policy, and in 2018, 127 nations pledged action against plastic waste on "Beat Plastic Pollution" day, a UN-organized annual event (From birth to ban: A history of the plastic shopping bag, 2014). Notably, the United Arab Emirates (UAE) stands at the forefront within the Middle East and North Africa (MENA) region, taking significant steps to mitigate single-use plastic consumption. The UAE's Ministry of Climate Change and Environment (MOCCE) signed a commitment with the Coalition of Innovation in Recycling, aiming to investigate the environmental and economic implications of a circular plastic economy (Abu Dhabi Emirate Single Use Plastic Policy, 2020). In line with this, Abu Dhabi's pioneering efforts led to the formulation of a comprehensive single-use plastic policy, driven by the EAD, with clear goals of minimizing plastic use, transforming behavior, and safeguarding the environment (Abu Dhabi Emirate Single Use Plastic Policy, 2020).

Initiatives like these emanate from a broader global trend, wherein the implementation and impact of plastic waste policies have been explored extensively. Xu et al. (2022) delved into the perception and behavior shift of Macao residents and enterprises post the Plastic Bag Restriction Law, finding substantial reductions in single-use plastic consumption and identifying influential factors such as policy satisfaction, environmental concern, and knowledge. Walker et al. (2021) scrutinized Canadian consumer sentiments toward single-use food packaging, revealing a strong motivation to reduce plastic packaging, particularly driven by environmental concerns. Similarly, the 2015 mandatory charge on single-use plastic bags in England led to impressive across-the-board consumption reductions within a month, signifying successful policy implementation and increased public awareness (Thomas et al., 2019).

Meanwhile, Adam et al. (2021) employed a tri-component model to analyze resident attitudes in Ghana's coastal cities towards single-use plastics. Their findings indicated distinct attitude clusters - 'avoiders,' 'potential avoiders,' and 'patrons' - unveiling nuanced variations in behavior and disposition. The connection between consumer attitudes and behavioral intentions was further studied in Malaysia, showcasing the importance of positive attitudes and perceived behavioral control in reducing single-use plastic (Van et al., 2021). In Cairo, Ospina (2022) investigated factors influencing plastic consumption, highlighting the gap between beliefs and actions, and suggesting interventions to bridge this divide.

At the household level, studies explored the dynamics of plastic usage. Research conducted in Portsmouth underscored the influence of demographic factors on plastic consumption patterns, revealing a link between residential location, income, and vehicle ownership with single-use plastics reduction (Northen et al., 2023). Similar findings in Istanbul, Turkey indicated correlations between environmental awareness and socio-demographic factors in the context of plastic bag usage after the implementation of fees (Senturk & Dumludag, 2022). In the Maldives, Naila et al. (2022) exposed prevalent single-use plastic consumption patterns and identified challenges limiting reduction efforts, including a lack of trust in tap water quality.

These studies collectively emphasize the multifaceted nature of single-use plastic consumption, influenced by individual attitudes, policy implementations, societal awareness, and demographic factors. By assessing these complex interplays, valuable insights can be gleaned to inform effective strategies for curbing single-use plastic consumption and fostering sustainable behaviours.

3. MATERIAL AND METHODS

The research design comprises two main components aimed at comprehensively evaluating consumer behaviour and adoption pertaining to the Abu Dhabi Single-Use Plastic Policy. The initial phase involves quantitative observations conducted across three diverse supermarkets, each representing distinct price ranges. These chosen supermarkets serve as proxies for varying socio-economic levels among consumers. This observational study seeks to gauge consumer decision-making processes regarding the utilization of single-use plastic bags versus reusable alternatives during checkout, see table 1.

Socio-economic level	Supermarket Name	Location
High	SPAR	https://maps.app.goo.gl/ZSCbFwWm9EabJVJS8?g_st=ic
Medium	Carrefour	https://maps.app.goo.gl/3nKSJDPHLiWWrLBh9?g_st=ic
Low	Lulu Hypermarket	https://maps.app.goo.gl/pGhBZ8EWYxoLVAYc9?g_st=ic

Table 1: Socio-economic level, supermarket name, and location

The second segment involves the creation of a structured close-ended questionnaire to delve deeper into consumer adoption patterns vis-à-vis the Abu Dhabi Single-Use Plastic Policy. The questionnaire comprises two distinct sections. The initial section captures essential demographic data, encompassing factors such as gender, age, financial status, and educational background. The subsequent section delves into the core themes of the policy, consisting of three focused inquiries: participants' stance on the proposed ban of single-use plastics by 2024, their sense of environmental responsibility, and discernible shifts in their shopping behaviour, see figure 1 the conceptual framework. The questionnaire will be meticulously crafted using Google Forms, a versatile online survey tool. Upon development, the questionnaire will be widely distributed across various social media platforms to ensure a broad and representative participant pool. The study will strictly adhere to ethical guidelines, ensuring that data collection and usage align with prevailing ethical standards.

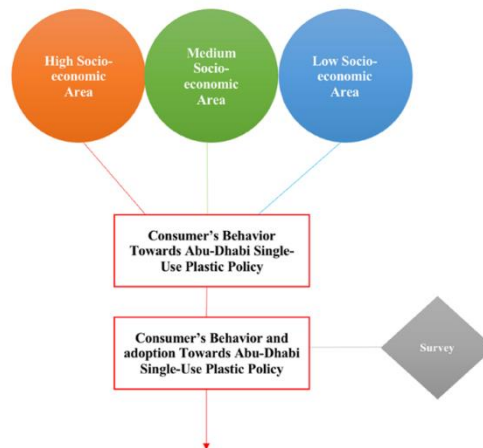


Figure 1: Conceptual Framework

4. RESULTS AND DISCUSSION

Consumer Behavior (1st Phase)

The quantitative observations conducted in three distinct supermarkets provide valuable insights into consumer behavior and choices regarding single-use plastics and reusable bags, see table 2.

At the affluent SPAR supermarket, characterized by a high price range, the observation revealed that 220 consumers opted for single-use plastic bags, while 93 individuals chose reusable shopping bags. In the middle-priced Carrefour outlet located in Al Ain city, 230 consumers utilized single-use plastics, whereas 75 patrons opted for reusable bags. Notably, at the Lulu supermarket, a noteworthy trend emerged where the count of reusable bags surpassed that of single-use plastic bags by 17.2%. The data collection window of 2 hours, strategically chosen during Ramadan when grocery shopping experiences peak demand, enabled comprehensive insights into consumer behavior.

Supermarket	No. Single-Use Plastic bags	No. of Reusable Bags
SPAR	220	93
Carrefour	230	75
Lulu	120	145

Table 2: Summary of the Observational Data

The observations conducted at SPAR and Carrefour supermarkets underscore a notable discrepancy in relation to the policy's third objective, which focuses on changing consumer behavior towards more sustainable practices. The data from these locations highlight a prevailing preference for single-use plastic bags, indicating a gap in the policy's effectiveness within medium and high socio-economic segments. These findings suggest a need for revisiting the awareness-raising initiatives and implemented programs by Abu Dhabi's regulatory agency to better align with the objective of reducing single-use plastic consumption in areas characterized by greater financial means.

The encouraging outcome from the Lulu supermarket, where reusable bags exceeded single-use plastic bags by 17.2%, demonstrates a positive shift in consumer behavior and serves as a potential model for achieving the desired reduction in single-use plastics. These findings highlight the role of consumer awareness campaigns and the importance of strategic timing, as evidenced by the observations conducted during Ramadan's peak shopping period.

Adoption of The Policy (2nd Phase)

The survey is structured into two distinct sections, encompassing demographics and consumer adoption, and garnered a total of 105 responses. An overview of the participant composition offers valuable insights into the survey's reach and the characteristics of the engaged respondents. A gender distribution analysis reveals that the majority of respondents are females, constituting 59.7% of the survey participants. The age distribution points towards a dominant presence of individuals between 18 to 24 years old, followed closely by the 25-34 and 35-54 age groups, emphasizing a broad representation of age demographics.

In terms of educational attainment, participants hold a diverse range of qualifications. The largest proportion possess an undergraduate degree, accounting for 46.3% of the respondents, followed by those holding a High-school secondary certificate, making up 35.8% of the participant pool. Marital status data indicates that a substantial portion of respondents are single (76.1%), with a smaller percentage identifying as married (19.4%) and divorced (4.5%).

The participants' socio-economic profiles offer a comprehensive view of their financial situations, see table 3. When considering average household income per month, the responses are distributed across various income brackets. The highest frequency lies within the income range of 5-15k, encompassing 37.3% of respondents. Subsequent income categories include 16-30k (29.9%), 31-45k (11.9%), 46-60k (9%), and more than 60,000 (11.9%), revealing a broad spectrum of financial backgrounds. Exploring the occupational status of survey participants, a noteworthy proportion are employed full-time, constituting 49.3% of respondents. In comparison, a significant 32.8% represent those who are not currently employed, providing a snapshot of diverse professional situations.

Demographics					
Gender	Male			Female	
	40.3%			59.7%	
Age	18-24	25-34	35-54	55 or above	
	52.2%	35.8%	11.8%	0%	
Education	High-school	Undergraduate	Postgraduate		
	35.8%	46.3%	17.9%		
Marital Status	Single	Married	Divorced	Widowed	
	76.1%	19.4%	4.5%	0%	
Average Household Income Per Month	AED 5-15k	16-30k	31-45k	46-60k	<60k
	37.3%	29.9%	11.9%	9%	11.9%
Employment Status	Employed (FT)	Employed (PT)	Not Employed	Retired	Disabled
	49.3%	10.4%	32.8%	2.5%	5%

Table 3: Summary of the Demographics Section

The findings from the second section of the survey offer revealing insights into participants' perspectives on the Abu Dhabi Single-Use Plastic Policy, shedding light on their attitudes and behaviours, see table 4. Among the respondents, the majority (38.8%) expressed agreement with the policy, while a significant proportion (23.9%) maintained a neutral stance. Notably, 22.4% indicated strong agreement with the policy's objectives. Regarding the perception of personal responsibility, a substantial 31.3% agreed, and an additional 58.2% highlighted a noticeable shift in their shopping habits following the policy's implementation. It's intriguing to note that a considerable segment of respondents falls within the young adult category, suggesting a potential alignment between youth and receptiveness towards sustainable initiatives. Additionally, the presence of participants who are currently unemployed and engaged in university education underscores a specific demographic group that could play a pivotal role in driving awareness and change. These insights hold significant implications for the Abu Dhabi regulatory agency's endeavors. The dominance of young adults, especially those in university, signifies a receptive audience for awareness-raising efforts. The presence of a neutral stance within respondents points to an opportunity for targeted educational campaigns to address potential misconceptions or doubts.

Furthermore, the noteworthy proportion of participants indicating altered shopping habits implies a tangible impact of the policy on consumer behaviour. This suggests the policy has effectively influenced shopping choices, demonstrating its potential to drive broader change.

Consumer Adoption	
1. Do you agree or disagree with Abu-Dhabi's single-use plastic policy?	
Strongly Disagree	7.5%
Disagree	7.4%
Neutral	23.9%
Agree	38.8%
Strongly Agree	22.4%
2. To what extent do you believe that adopting policies on a personal level is our responsibility to the environment?	
Strongly Disagree	7.5%
Disagree	4.4%
Natural	29.9%
Agree	26.9%
Strongly Agree	31.3%
3. Has Abu Dhabi's single-use policy changed your shopping habits?	
Yes	58.2%
No	19.4%
Maybe	22.4%

Table 4: Summary of the Consumer Adoption Section

Challenges in Data Collection and Evaluation

There are several challenges encountered in collecting observation data such as:

- Identifying the shopping bags specifically for the designated supermarket.
- Number of bags per customer.
- Duration and location for data collection.

The challenges are overcome by identifying the specific shopping bags, choosing the customers at checkout rather than the number of bags, specifying a fixed duration of two hours for each supermarket, and choosing a strategic location at the nearby supermarket checkout.

5. CONCLUSION AND RECOMMENDATION

The implementation of the Abu Dhabi Single-Use Plastic Policy stands as a significant step towards mitigating plastic waste and fostering a shift towards sustainable practices. This policy has emerged through collaborative efforts between governmental and business stakeholders, with a robust emphasis on awareness-raising strategies spanning various communication channels and partnerships. The multi-pronged approach reflects the policy's overarching aim of curbing single-use plastic waste to preserve the environment.

This study's findings resonate with the effectiveness of the EAD awareness campaigns, which successfully permeated diverse media outlets and communication channels. Survey participants wholeheartedly supported the policy and acknowledged their personal responsibility toward the local environment. A positive change in reliance on single-use plastic bags was reported, showcasing the policy's influence on consumer behaviour. However, an observed constraint emerged within the high and medium socio-economic areas of the emirate, coupled with a notable representation of young adults, predominantly university students and the unemployed. This warrants targeted strategies to further embed the policy's principles in these segments and enhance its reach. To enhance the policy's efficacy and address the identified limitations, the EAD is advised to undertake the following measures:

- **Educational Outreach:** Implement focused awareness sessions in schools and universities located in areas where single-use plastic bags persist, to engage and educate the younger generation.

- Field Trips: Initiate educational field trips to waste management facilities for primary and secondary school students, offering firsthand exposure to the environmental challenges linked to single-use plastics.
- Social Media Campaigns: Collaborate with social media influencers to disseminate impactful campaigns across diverse platforms, highlighting the adverse effects of single-use plastic on fragile ecosystems like the desert and emphasizing health implications.
- Gradual Fee Increase: Gradually escalate fees imposed on single-use plastic, creating an incentive for alternative choices while raising awareness among medium and high socio-economic communities.
- Restrictions and Incentives: Restrict supermarkets to a daily allowable number of plastic bags, encouraging consumers to seek sustainable alternatives. Supermarkets can integrate sustainability initiatives into loyalty programs, rewarding customers who opt for eco-friendly practices.
- Continued Research: A continued research effort is recommended to assess the third objective's progress and identify any shortcomings, enabling necessary adjustments to existing awareness programs.

Based on the research findings, it is strongly advised that the EAD takes proactive measures to align with the UAE commitment to achieving SDGs and advancing sustainability efforts. The EAD can initiate comprehensive outreach programs in educational institutions, fostering awareness and educating students about the detrimental impact of single-use plastics on the environment.

Organizing educational visits to waste management facilities will provide a tangible understanding of the challenges posed by plastic waste and encourage responsible consumption.

Furthermore, the EAD should consider imposing higher fees on single-use plastic items progressively, creating a financial incentive for individuals to transition to sustainable alternatives. Simultaneously, impactful social media campaigns can be employed to leverage the power of digital platforms, effectively conveying the urgency of reducing plastic consumption and aligning these efforts with the UAE's sustainability agenda.

In line with the UAE's commitment to sustainability, the EAD need to explore the implementation of restrictions on the quantity of plastic bags sold per supermarket each day. This measure will not only prompt consumers to be more conscious of their plastic consumption but also encourage supermarkets to actively promote reusable alternatives.

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