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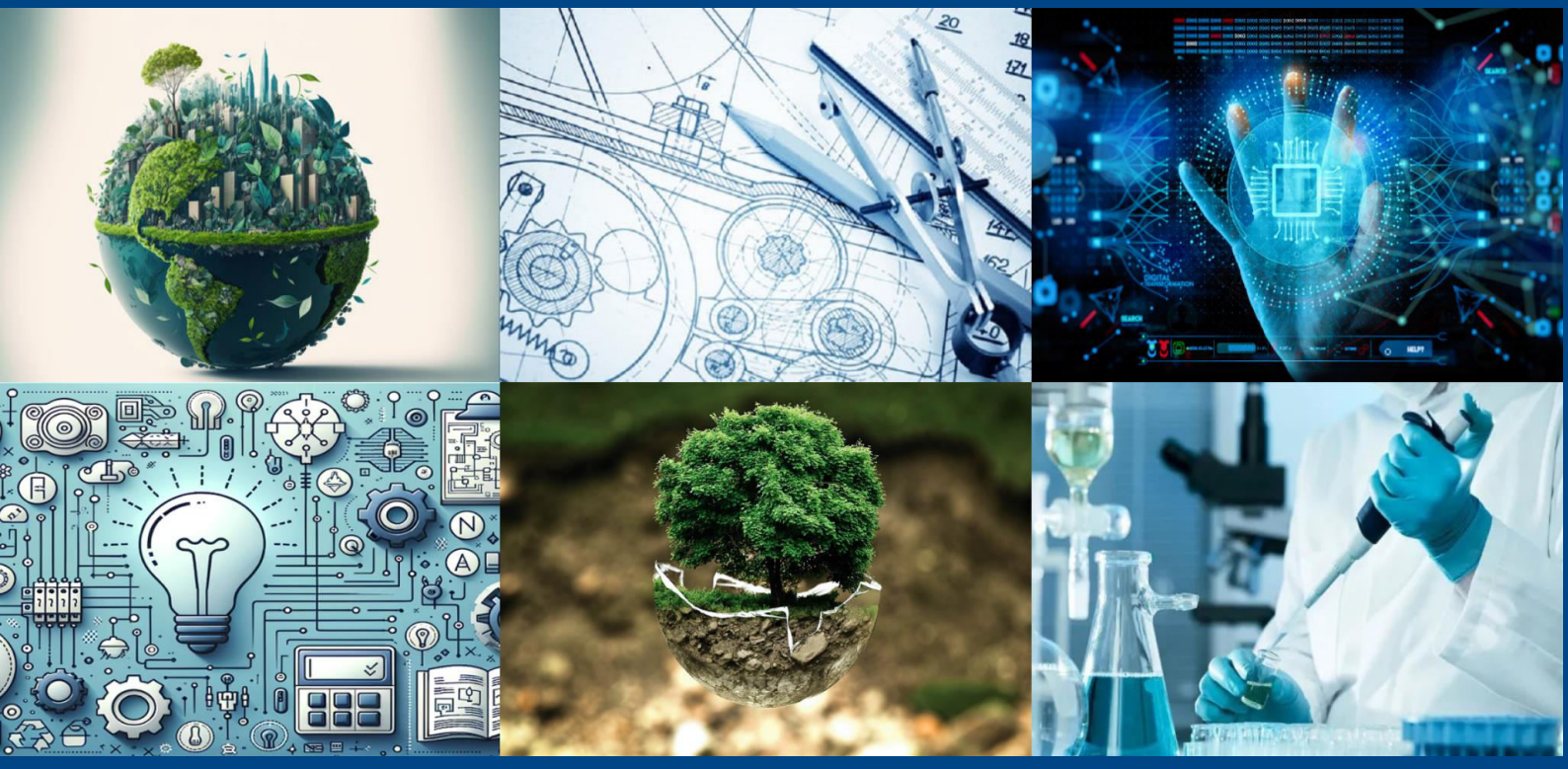

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Refill over Landfill: Exploring Consumer Perceptions of Shampoo Refill Stations

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ABSTRACT: Plastic pollution arising from plastic generation and usage is a global crisis, necessitating innovative solutions to reduce waste. Refilling shampoo kiosks offer a sustainable alternative to single-use plastic bottles, minimizing landfill dumping and plastic pollution. These kiosks promote eco-conscious consumer behaviour through reusable containers, cutting carbon footprints and reducing plastic reliance. Adopting models like the circular economy and triple bottom line enhances their effectiveness. Consumers must be engaged by ensuring convenience, affordability, and trust. This study advocates and emphasizes on the need to scale up refill initiatives to drive sustainable consumption. Refillable shampoo kiosks represent a practical step toward a greener future.

KEYWORDS: Sustainability, Consumption, Plastic Generation

I. INTRODUCTION

Plastic pollution is becoming an increasingly bigger threat to our world, and the personal care industry, especially with their single-use shampoo bottles, is part of this problem (UNEP, 2021; Geyer, Jambeck, & Law, 2017; Jambeck et al., 2015). Although we have had recycling opportunities, only a small percentage of plastic material is actually recycled, with the bulk disposed of in landfills, or in our oceans (UNEP, 2021; Hopewell, Dvorak, & Kosior, 2009; Geyer et al., 2017). Alternative refill stations have emerged that allow consumers to reuse their container, reducing the plastic being consumed, and supporting the principles of a circular economy (Ellen MacArthur Foundation, 2020; Kirchherr, Reike, & Hekkert, 2017; Magnier & Crié, 2015). Not only do refill stations reduce plastic waste, but they can also contribute to reduction in carbon emissions related to packaging production and transportation, thus demonstrating global sustainability (United Nations Sustainable Development Goals 12 and 13) (Barnes et al., 2009; Geissdoerfer et al., 2017; United Nations, 2015). Longer term indeed, these systems can represent economic benefits to manufacturers and retailers alike; as the more reuse occurring, there is less packaging cost, and importantly, consumer preference for more sustainable products (Sheth, Sethia, & Srinivas, 2011; Gómez et al., 2021). However, it remains to be seen if shampoo refill stations can be popularized, given the assumed convenience advantage with purchasing packaged products (White, Hardisty, & Habib, 2019; Peattie & Peattie, 2009; Haws, Winterich, & Naylor, 2014). In effect, it is undetermined if consumers can forego traditional store products that often exist as market options.

To bridge the divide between consumer knowledge of sustainable consumption and the resulting action, all stakeholders (businesses and government) need to invest in infrastructure and knowledge training for consumers and facilitate greater access to refill solutions with thoughtfully configured refill stations (Sheth, Sethia, & Srinivas, 2011; Prothero et al., 2011; Ajzen, 1991). The attitude-behaviour gap must be correct in order for sustainable intentions to translate to real behaviour change (Haws et al., 2014; Vermeir & Verbeke, 2006). Refill systems can overcome this gap with higher trust, user incentive, and consumer experience to provide practical, scalable solutions to consumer care sustainability (Peattie, 2010; White et al., 2019).

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II. REVIEW OF LITERATURE

The issue of plastic pollution and waste from shampoo bottles has remained a critical concern in the personal care industry, with significant negative environmental effects (Kumar, Shah, & Verma, 2023; Hernandez, Patel, & Singh, 2024). Life-cycle assessments indicate switching to a refillable shampoo bottle can reduce plastic waste between 20%-60% over possible lifetime usage and can reduce CO_2 emissions associated with plastic production and disposal (Kumar et al., 2023). Despite increasing awareness, recycling continues to be inadequate with only a small percentage of plastic waste being recycled correctly (Hernandez et al., 2024). Therefore, considering alternatives for more sustainable packaging, like refillable packaging, which can be a better fit for a circular economy, is an important suggestion (Ellen MacArthur Foundation, 2023).

Consumer behavior is essential to the success of refill stations, and consumer behavior is indicated to be impacted by cultural and psychological factors. In cultures that are collectivist or more community-oriented, the estimated uptake of refill stations is typically higher due to strong social norms surrounding social responsibility (Nguyen, Pham, & Tran, 2023). In more individualist cultures like western consumers, financial-incentives seem to be more powerful drivers of behavior (Nguyen et al., 2023). Psychological limitations such as perceived inconvenience, hygiene, and brand loyalty are substantial barriers to uptake (Smith & Martinez (2023). Researchers note that addressing these psychological barriers may be accomplished with incentives, as well as through convenience of refill stations (Smith & Martinez (2023); Brown & Thompson, 2024). Marketing and communication strategies have proven effective in shaping consumer attitudes toward sustainable packaging. Research suggests that aspirational and empowering narratives are more successful than guilt-driven messages in encouraging sustainable behavior (Johnson & Martinez, 2023). Social media and influencer campaigns have also shown measurable results; for instance, sustainability-focused influencer partnerships led to a 16% rise in refill station use (Garcia & Lopez, 2023). These approaches help reframe refill systems as accessible, modern lifestyle choices rather than sacrifices.

Government policy is another critical driver of sustainable consumption. Policies such as plastic taxes, subsidies for sustainable initiatives, and extended producer responsibility (EPR) programs have successfully boosted refill station participation of up to 40% in some regions even without direct economic incentives (Miller & Davis, 2023). These findings point to the value of institutional support in complementing business-led sustainability efforts. Furthermore, an industry-wide shift requires cooperation across supply chains. Key success factors include consumer acceptance, standardized logistics, and infrastructural readiness for scaling reusable packaging models (Bradley & Corsini, 2023; Stevenson, Lee, & Carter, 2024).

Lastly, research differentiates adoption trends between urban and rural consumers. Urban populations exhibit higher acceptance of refill stations due to better infrastructure and greater awareness, while rural regions struggle with access and logistical challenges (Brown & Thompson, 2024). Additionally, while biodegradable packaging alternatives offer environmental advantages, they remain costly and infrastructure-dependent, limiting their viability as mainstream solutions (Stevenson et al., 2024). In light of these insights, sustainable transformation in the personal care sector must be multifaceted combining innovation, policy reform, consumer engagement, and infrastructure development to reduce the environmental footprint of shampoo packaging.

III. RESEARCH METHODOLOGY

This study has adopted a mixed-method research approach which includes both qualitative and quantitative data thus combining primary data collection through surveys and questionnaires and secondary data analysis from existing literature, reports, and case studies. The methodology is structured to provide a comprehensive and detailed understanding of consumer attitudes toward shampoo refill stations.

3.1 Primary Data Collection Methods:

The primary data was gathered through a structured survey of 105 respondents, selected using random and stratified sampling to ensure diversity in age, gender, income levels, and purchasing behaviour. The survey was conducted through digital mode.

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IV. DATA ANALYSIS AND INTERPRETATION

Linear Regression

Model Summary - How likely are you to use a smart refill kiosk for shampoo?

Model	R	R^2	Adjusted R^2	RMSE
M_0	0.000	0.000	0.000	0.882
M_1	0.178	0.032	0.022	0.873

Note. M_1 includes What is your age group?

Anova

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	2.555	1	2.555	3.355	0.070
	Residual	78.435	103	0.762		
	Total	80.990	104			

Note. M_1 includes What is your age group?

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
M_0	(Intercep)	4.010	0.086		46.557	< .001
M_1	(Intercep)	3.746	0.167		22.421	< .001
	What is your age group?	0.134	0.073	0.178	1.832	0.070

Descriptives

	N	Mean	SD	SE
How likely are you to use a smart refill kiosk for shampoo?	105	4.010	0.882	0.086
What is your age group?	105	1.962	1.168	0.114

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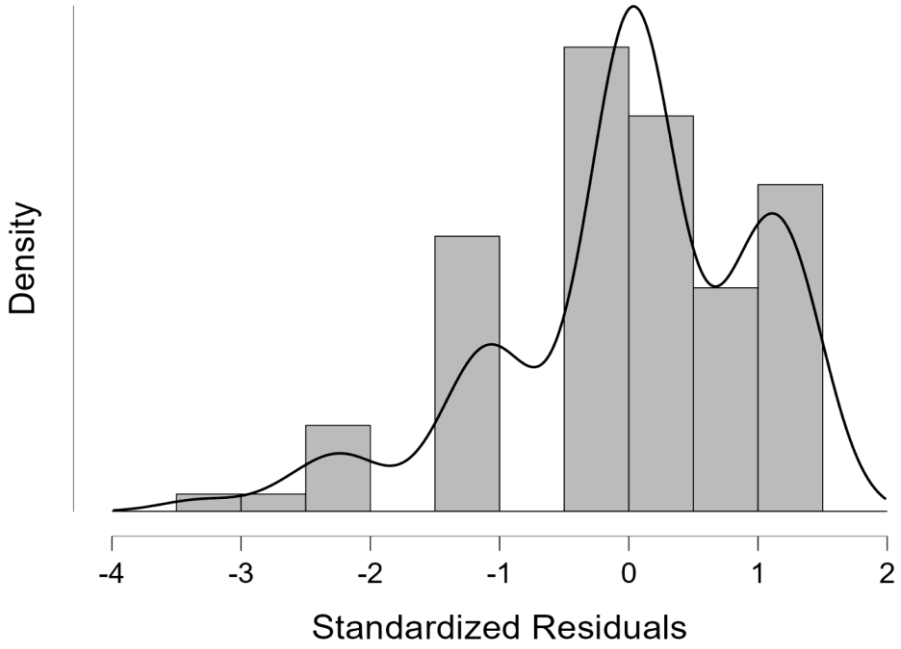
Standardized Residuals Histogram

Descriptive Statistics



Descriptive Statistics

	What is your age group?	How likely are you to use a smart refill kiosk for shampoo?
Valid	105	105
Missing	0	0
Mode	1.000 [a]	4.000 [a]
Median	2.000	4.000
Mean	1.962	4.010
Std. Deviation	1.168	0.882
Coefficient of variation	0.595	0.220
Variance	1.364	0.779
Minimum	1.000	1.000
Maximum	5.000	5.000

The mode is computed assuming that variables are discreet.

V. FINDINGS

LushCycle is considered as a revolutionary product as they cater to the needs of all three pillars of economy – the customer, the environment and the government.

For the Customer: The refillable shampoo kiosk represents an exciting change in the consumer experience around personal care products that form an essential part of our daily hygiene and beauty rituals. This shift is not just about product delivery but reflects a deeper lifestyle transformation toward conscious consumption (White, Habib, & Hardisty, 2019). Most consumers today are becoming more aware of their plastic consumption and the resulting harm to both health and the environment (Mitchell, 2021; Geyer et al., 2017). According to the study, 77% of consumers expressed interest in smart refill kiosks, and over 90% rated the concept as Excellent or Good, reinforcing its market appeal and feasibility. For customers, this innovation offers an optimal balance between value, environmental impact,

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and product quality eliminating excessive packaging (often containing diluted products) and allowing them to purchase exactly what they need (Peattie & Peattie, 2009; Sheth et al., 2011; Carter & Williams, 2023).

Importantly, the ethos behind smart refill kiosks taps into a deeper emotional desire for purposeful consumption where each refill is seen not just as a transaction, but as a personal contribution to sustainability (Haws et al., 2014; Williams, Greene, & Taylor, 2021). The study provides solid evidence that customers now prioritize transparency, hygiene, and product quality in their purchase decisions (O'Connor & Murphy, 2023). Hygiene emerged as the top concern (33.3%), followed by product quality (28.6%). These insights reflect broader post-pandemic trends where safety and trust are increasingly valued in public-use systems (Lee & Chen, 2023; Baldassarre et al., 2024). Customers need visible, well-communicated cleanliness and quality assurance to confidently adopt such innovations.

For the Environment: Small changes made by individuals can collectively result in significant environmental impact. Studies show that the use of refill systems can reduce plastic waste by up to 80% and cut CO_2 emissions by nearly 50% during both production and distribution (Kumar, Sharma, & Mehta, 2023; Ellen MacArthur Foundation, 2023; Van Sluisveld & Worrell, 2013). This is crucial, especially when considering that only 9% of the 7 billion tons of plastic produced globally has been recycled, with the rest clogging up landfills and marine ecosystems, where it takes 400+ years to decompose (Geyer et al., 2017; UNEP, 2021). Refill kiosks offer a sustainable alternative that disrupts this cycle. By enabling reusable containers and reducing dependency on single-use plastics, they also eliminate the energy-intensive processes of manufacturing and transporting new plastic bottles (Geissdoerfer et al., 2017). Bulk product delivery to refill stations not only reduces plastic packaging but also minimizes logistical carbon emissions, making this a powerful solution in terms of supply chain efficiency (Gómez et al., 2021; Bradley & Corsini, 2023).

This model supports the circular economy, emphasizing reuse, resource efficiency, and waste minimization (Bocken et al., 2014). It aligns with the United Nations Sustainable Development Goals, particularly SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) (United Nations, 2015; Ellen MacArthur Foundation, 2023). Thus, the refill model reinforces the principle of "Think globally, act locally", showing that small-scale, local consumption shifts can lead to large-scale environmental progress.

For the Government: From a policy and regulatory standpoint, the refill kiosk concept is aligned with India's national mission for sustainability and a zero-waste economy. With multiple states adopting plastic bans and the Central Government committing to drastically cutting plastic waste (CPCB, 2021; UNEP, 2022), refill stations emerge as a scalable, regulatory-compliant infrastructure that engages both consumers and retailers effectively. By reducing dependency on single-use plastics, refill kiosks can ease pressure on municipal solid waste management systems and lower long-term environmental remediation costs (Fernandez & Rodriguez, 2023; Taylor & Green, 2024). Additionally, global success stories such as Unilever's implementation of refill kiosks in Indonesia, Mexico, and the Philippines show that public-private partnerships, when supported by governments, can reduce plastic waste by up to 50% (Unilever Clean Future Initiative, 2022; Bain & Company, 2022).

India could replicate and expand such efforts across urban centers and eco-conscious communities, potentially becoming a model for sustainable development in South Asia. Moreover, smart refill kiosks can create employment opportunities, fostering green jobs and enabling local entrepreneurs to manage kiosk networks, thus contributing to economic empowerment and supply chain innovation (Nguyen, Pham, & Tran, 2023; Deloitte, 2023). In essence, supporting refill infrastructure not only addresses plastic pollution but also strengthens India's strategic goals under Swachh Bharat, Startup India, and Make in India initiatives making it a win-win for the government, public, and the environment.

VI. RECOMMENDATIONS AND IMPLICATIONS:

The recommended development pathway is to acquire market access through individuals who frequent shampoo usage and foster shifting behaviour from traditional shampoo purchase to refill systems. Influencer marketing, followed by individual users providing each other an opportunity to try with purchase, messaging that entails refill options that contribute to sustainability, would be the starting point in determining the initial refill user engagement group. A broad adoption of branding aesthetics centred on environmental impact transparency can positively attach credibility to social media messaging by organizations and long-term fulfilment by refill users.

The implications for the business plan confirm strong alignment between market demand for sustainability and the product offering of organic refillable shampoo. Educational efforts will drive adoption, especially among moderately concerned consumers drawn to convenience. Strategically, placing kiosks in accessible areas and offering incentives will boost user acquisition. Sustainability messaging will enhance customer resonance. High consumer willingness, low resistance, and favourable feedback suggest strong market viability, with word-of-mouth and testimonial-based campaigns playing a key role in expansion and customer retention.

VII. CONCLUSION

The increasing demand for refillable kiosks and minimalistic packaging also indicates a growing consumer-led movement toward more sustainable personal care practices, and a rising consciousness about plastic waste is driving the shift (Akehurst et al., 2012; Peattie, 2010). Even with the shift towards environmentally conscious consumption, consumer perception regarding convenience, price and brand trust remain the most important variables in the purchase decision (Sheth et al., 2011). Businesses will need to prioritize transparency and adopted practices to standardize sustainability aspects around refillable kiosks and related product (Geissdoerfer et al., 2017). Refillable kiosks will only thrive through breaking down barriers for the consumer (e.g. price sensitivity, limited access to refilling). Access should be addressed to make refillable kiosks commonplace and standard for consumers (Vermeir & Verbeke, 2006). The reasoning behind refillable kiosks must also address supply chain and logistical costs of providing refilling at scale, all while striving to do so environmentally responsibly (Hopewell et al., 2009; Kirchherr et al., 2017).

In order for refill systems to build sustainable momentum over time, organizations must take a holistic approach to consumer awareness of improved hygiene practices, and education to combat fears associated with safety and quality (Nguyen et al., 2023; Smith & Martinez, 2023). Regulatory mechanisms like plastic bans, extended producer responsibility, and government incentives have been effective in fostering adoption (Miller & Davis, 2023; Geissdoerfer et al., 2017). Cooperation among businesses, consumers, and policymakers is vital to apply refill methods at scale to help solve global waste from plastic (Ellen MacArthur Foundation, 2020; Thögersen, 2006; Jambeck et al., 2015). By embedding innovation and consumer aspects we can ensure that sustainability does not compromise usability and cost (Stevenson et al., 2024; Chen, 2010; Testa et al., 2016). As demand for sustainable solutions trickles down to consumers, we can expect positive sentiment around positive consumer sentiment, social influence, and government will accelerate adoption of smart shampoo refill kiosks (Prothero et al., 2011; Magnier & Crie, 2015; Luchs et al., 2010).

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