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Barriers to replacing single-use packaging with circular reuse business models: A UK and Vietnamese context

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ABSTRACT

Replacing single use plastic packaging with repeatedly refilled reusable containers is a 'refill on the go' business model that can contribute to circular economy objectives. Despite potential to enable sustainable consumption, reuse business models frequently fail. Research into barriers to widespread adoption is scant, with blame for poor uptake frequently attributed to consumer behaviour. Knowledge of country specific barriers is also low, thus delaying political engagement with reuse solutions. To address these gaps, we adopted mixed methods combining 11 semi-structured interviews with an online consumer survey (n = 326) in Vietnam and the UK. By triangulating multi-stakeholder views, we identified eight interrelated internal (consumer- and business-related) barriers and external (policy- and regulatory-related) barriers to the adoption of 'refill on the go' business models. Barriers overlapped, and some were country specific: low profit margins, knowledge and product provenance were identified by Vietnamese refill sector stakeholders, whereas hygiene, allergies and customer engagement were barriers in the UK. We observed consumer willingness to engage with refill business models struggling to gain and maintain footing in the competitive retail sector. We argue that effective adoption and scaling require top-down interventions, starting with policy and education, supported by context-specific strategies. Our findings suggest that barriers may be more easily addressed in Vietnam than the UK owing to a more central state role, flexible sector and lower recycling uptake. This research alerts policymakers to the challenges of a circular business model that is unlikely to grow to scale without bold, urgent and regionally appropriate policy support.

1. Introduction

The global rise in single use plastic packaging is leading to health, environmental and social impact concerns along the entire value chain, particularly the over 139 Mt reaching the end of use phase annually (Chen et al., 2021; Cook and Velis, 2020; Mah, 2022; Statista, 2023). Projected to require 20% of the global carbon budget by 2050 and with 95% of the value of plastic packaging lost after its first use, a reliance on linear economy retail models using single-use packaging is unsustainable (Charles and Kimman, 2023; World Economic Forum et al., 2016). Single-use packaging dominating supermarket shelves, our homes and littered in the environment to microscopic levels, provides ubiquitous visible reminders of our throwaway culture and failure to transition wastes management up the waste hierarchy. Recognition that consumption models must change is underpinned by SDG12 with target 12.5 aiming to "by 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse" (UNEP, 2015). It is notable that recycling precedes reuse in this global target. Considered for decades to be the answer to guilt-free consumption, recycling is increasingly regarded as an enabler of the problem, and reuse the solution (Kunamaneni et al., 2019; Mah, 2022).

1.1. Packaging and the circular economy

How goods are packaged and purchased is defined at the product design stage and influences a product's environmental footprint. Impacts can be reduced by adopting circular economy principles (Geissdoerfer et al., 2018), for example through using minimum viable material quantities and repeated reuse of packaging or other containers before they are recycled, recovered or sent for disposal. Reusing containers through repeated refilling is essential for reducing plastic pollution (UNEP, 2023), and a viable alternative to at least 20% of plastic

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packaging (Ellen MacArthur Foundation, 2019) including problematic single-use packaging such as non-recyclable sachets in Southeast Asia (Liamzon et al., 2020; Nurani et al., 2022; Rangel-Buitrago et al., 2024; Sisungkunon et al., 2024).

1.2. Circular reuse models

There are several ways containers such as bottles, jars or tubs can be reused, based on where the container is refilled and who owns the container and dispenser. Lofthouse et al. (2009) characterised eight refill models, influencing subsequent classifications including reuse models proposed by the Ellen MacArthur Foundation (2019), Muranko et al. (2021) and Greenwood et al. (2021).

Research into reuse business models is complicated by globally variable terms used for different reuse systems. The four models described by the Ellen Macarthur Foundation (2019) are widely used. These are 'return from home' and 'return on the go' where business-owned reusable packaging is either picked up from consumer's homes or returned by consumers to drop-off points to be refilled in a factory setting. Plus 'refill at home,' whereby consumers refill their own reusable container with products delivered in lightweight flexible packaging or as concentrated formulas. The fourth reuse system considered in this research requires consumers to dispense grocery products into their own reusable containers from bulk dispensers in retail environments before paying for the product by weight or volume. This is variously referred to as 'refill on the go' (Ellen MacArthur Foundation, 2019), 'package-free' or 'packaging free' (De Temmerman et al., 2023; Fuentes et al., 2019; Moss et al., 2022; Rapp et al., 2017), 'zero-waste' or 'zero packaging' (Beitzen-Heineke et al., 2017; Sang et al., 2022), 'self-dispense' (Lofthouse et al., 2009), 'bulk selling', 'bulk store', 'refill store', 'in-store refill' or 'refill in store' (Condamine, 2021; Conway et al., 2025; Global Plastics Policy Centre, 2023; Nurani et al., 2022). This research extends the above definitions describing both the system and action of refilling to include mobile 'refill on the go', where retailers come to consumer's homes or other accessible environments to dispense products. This was named 'door to door delivery' by Lofthouse et al. (2009), discussed by Nurani et al. (2022) and described as a 'home-refill delivery service' by Yu et al. (2023). Recent interest from UK supermarkets (CIWM, 2025a) and research has featured 'return on the go' (Ellen MacArthur Foundation, 2019), also referred to as 'prefill' (Bocken et al., 2022; Lüdeke-Freund et al., 2019; Magnier and Gil-Pérez, 2023). Whereas this is the preferred way forward in the UK (WRAP, 2025) and may be preferred by consumers (Heeremans et al., 2025), minimum purchase quantities may make this model a less likely solution for sachet users and other low-income consumers than 'refill on the go' (Nurani et al., 2022).

Refill business model descriptive terms can fail to use language familiar to global consumers and are furthermore, not acknowledged by all as being a reuse system (Global Plastics Policy Centre, 2023; World Economic Forum, 2024). Water bottle refilling and coffee cup reuse are also frequently described as being undertaken 'on the go', (e.g. (Keller et al., 2021)) which may imply identical behaviour change requirements. In acknowledgement of the widespread use of the terms presented by the Ellen Macarthur Foundation, we will use the term 'refill on the go'.

1.3. Geographical transitions of circular business models

Before general barriers to circular business models (CBM) and 'refill on the go' are considered, the influence of national and regional contexts they operate within will be summarised. Empirical data for this study has been collected from the UK and Vietnam. The Socialist Republic of Vietnam, is a rapidly developing one-party communist state with centralised political governance and strong state coordination of local governmental bodies with limited influence from non-state controlled institutions and civil society (GOV.UK, 2025a; World Bank, 2023). Conversely, the UK is governed under a democratic system with authority dispersed across central government, devolved administrations and local governments with influence from largely autonomous institutions, public and private bodies, and civil society (GOV.UK, 2025b).

Consideration of how socio-technical systems such as grocery shopping may transition from a niche sustainable innovative business model such as 'refill on the go', to existing alongside, and perhaps replacing current retail norms, can be understood from a Multi-Level Perspective (Geels, 2019). This includes understanding the dynamics between the policies, regulations, technical infrastructure, vested interests and the institutional, social and cognitive mindsets of all stakeholders that can either enable or inhibit systems change. Understanding can be enhanced by focussing on the rules, norms and cultural-cognitive influences shaping these dynamics through the longer established Institutional Theory lens (Dimaggio and Powell, 1983). Although these are not expected to be comparable in high- and low-middle-income countries as different as the UK and Vietnam, factors that may influence barriers to 'refill on the go' from these perspectives are considered in this study.

1.4. Barriers to circular business models

A 'barrier' is any identifiable hindrance to achieving an aim at any point in a system or process. In the context of this study, this means contributing to the prevention of widespread adoption of 'refill on the go' at any point within or outside of this CBM. The identification of CBM barriers and enablers is a popular current research topic. Brändström et al. (2024) highlight the large number of barrier categorisations proposed in CBM literature, with authors using a variety of descriptive terms to categorise similar barriers. Studies may focus on one or multiple barriers with broadly aligned categorical descriptions, with subtle differences depending on context. The 4 barrier categories hindering implementation of circular economy objectives described by Teixeira (2025) for example, are economic/financial, technical, institutional and cultural/behavioural, whereas for de Jesus and Mendonça (2018) they are 'hard' (technical and economic) and 'soft (institutional and social). Conversely, Frishammar et al. (2025) classify barriers under the broad CBM dimensions of value creation, value delivery and value capture.

1.4.1. CBM barrier frameworks

Barriers to sustainable business model innovation have been classified as 'internal' and 'external' for decades (Mont, 2002). Internal barriers are generally influenced or changed by elements within businesses, and external barriers by factors outside of a firm's direct control. Vermunt et al. (2019) are credited with using this broad framework to distinguish categories within these barriers applicable to different business models. The internal (financial, organisational and knowledge and technology), and external (supply chain, market and institutional) barriers identified by Vermunt et al. (2019) have, like most CBM literature, been developed using data from businesses or academics. Consumers were found to comprise just 14.62% of participants in empirical studies in a review of CBM literature by Islam et al. (2025), who further stress that consumer alignment is often neglected. Whereas consumer barriers are included in many CBM barrier studies, including by Vermunt et al. (2019) within external market and soft institutional categories, the melding of consumer data with business frameworks can fail to accurately represent how these overlap.

Furthermore, despite differences in barrier categorisations and sector attention, most CBM research focuses on High Income Countries and "neglects the structural, cultural and institutional contexts of developing nations" (Mishra et al., 2025) with larger informal economies (Deléchat and Medina, 2020). Barriers identified in Low- and Middle-Income contexts including financial constraints, a lack of information (Mishra et al., 2025), regulatory challenges, supply chain issues and cultural resistance (Ndoka et al., 2025) are present in High Income Countries also, but ways to overcome them may differ. An assumption that countries grouped by GDP are somehow homogenous, with shared

CBM transition challenges, is likely to lead to nuances being missed.

1.4.2. CBM frameworks for small to medium businesses

Whereas small to medium sized businesses may encounter different barriers to larger businesses wishing to transition to CBMs, such as reduced financial resources and technical skills (Rizos et al., 2016), these may be different for refill business such as those participating in this study. These businesses were originally founded on circular principles but may need to engage with stakeholders less familiar with them.

The refill businesses participating in this research are typical of the sector in terms of their small to medium size, making widespread adoption, or scalability challenges different to many of the multinational FMCG sachet manufacturers some aim to disrupt. Refill and reuse are recognised as being economically viable CBMs (Conway et al., 2025; Ellen MacArthur Foundation, 2019). However, achieving the break-even point whereby they become profitable takes time and financial resources already identified as lacking.

Instead of classifying determinants of CBM adoption as either internal or external, Assmann et al. (2023) map these in categories ranging from the most external to the most internal; Culture, Regulation, Market, Strategy, Business Case, Collaboration, Operations and Knowledge. This aids categorisation of barriers that can overlap between binary internal or external descriptions. A search of studies citing Assmann et al. (2023) revealed no research on barriers to reuse or refill business models applying these categories.

1.5. Barriers to 'refill on the go'

'Refill on the go' studies addressing research gaps identified in Business to Consumer (B2C) reusable packaging (Coelho et al., 2020), primarily focus on consumer behaviour relating to convenience, choice, price and knowledge. Furthermore, studies are almost entirely based on data from in High-Income Countries (Fig. 1) (see supplementary table and CIWM, 2025b; Kemper et al., 2024; Magnier and Gil-Pérez, 2023; Purwanto et al., 2023; Tassell and Aurisicchio, 2023). In the context of 'refill on the go', consumer engagement is considered here as an internal barrier, attributable to businesses failing to change personal motivations. We acknowledge that it can also be an external barrier, influenced by social infrastructure outside the sector's control. Whereas an understanding of internal barriers is essential, and a change in consumer shopping habits a key driving force for transition to a circular economy, this may detract attention from external barriers outside consumer and small to medium business control. We identified a knowledge gap regarding barriers to refill business model adoption in all Low- and Middle-Income Countries (LMIC), particularly in Southeast Asia where reuse opportunities have current and potential future growth (Ledesma et al., 2024; Moss et al., 2022; Nusantara et al., 2025; Sisungkunon et al., 2024). With plastic use also increasing fastest in this region (Statista, 2023) and the impacts of sachet waste of increasing concern (Break Free From Plastic, 2024), there is an urgent need to identify regionally relevant barriers to 'refill on the go' and sustainable solutions.

1.6. Study objectives

In this study, we will build upon valuable insights from previous research by analysing empirical data to identify specific and shared internal and external barriers to 'refill on the go' in Vietnamese and UK contexts. The primary aim is to analyse the links and overlaps between barriers and identify knowledge gaps, challenges and opportunities appropriate to each location through multi-stakeholder, rather than business-oriented perspectives. A secondary aim is to test whether context and subjectivity affect barrier classification, by retrospectively applying Assmann et al. (2023) CBM framework to barriers identified in this study. We aim to contribute to knowledge sought by industry and political decisionmakers concerned about the viability of 'refill on the go' in Vietnam, as a precursor to further research on the impacts of single-use plastic packaging waste in the region.

2. Research method

2.1. Locations and study areas

2.1.1. UK

'Refill on the go' is a niche but widespread business model currently found within around 200-300 health food or zero waste retail locations and a small number of supermarkets and market locations around the UK (BBC, 2021; Re-Gen, n.d.). Although mostly in larger towns and cities, many UK consumers would be expected to be aware of the option of buying groceries this way, even if they do not do so.

The UK has been selected as one of the locations for this study as

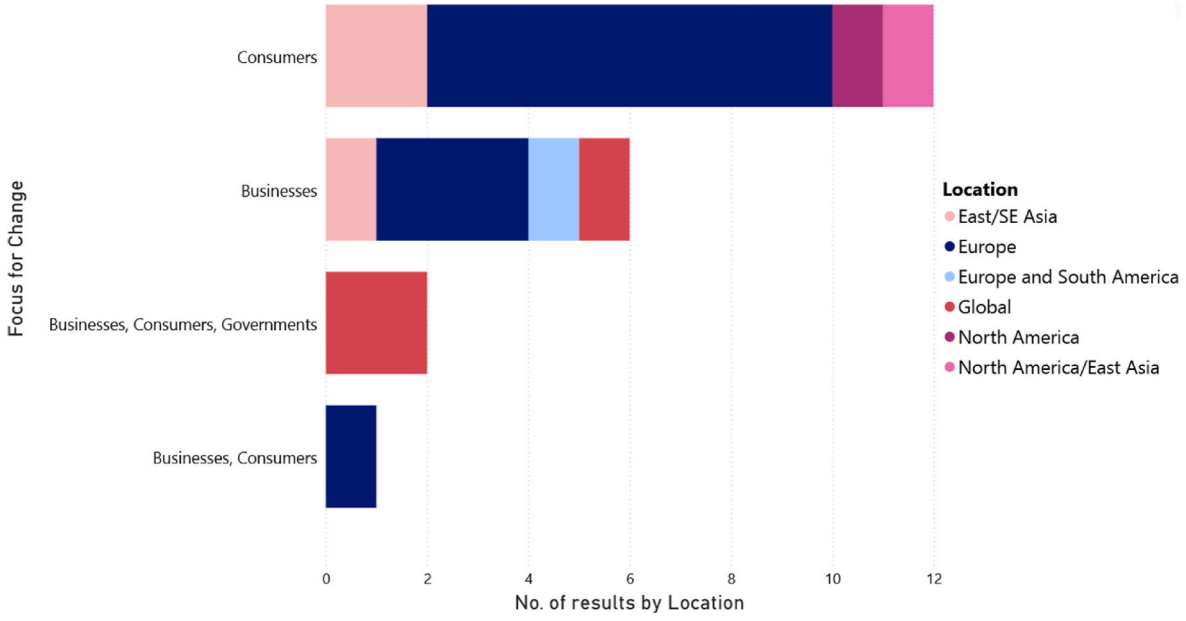


Fig. 1. Regionally grouped literature on refill and reuse barriers taken from the supplementary table illustrating dominance of research targeting consumers and High Income Countries.

'refill on the go' is both an established concept in the UK and familiar and accessible to the authors.

2.1.2. Vietnam

Vietnam is one of several Southeast Asian countries where plastic packaging waste including sachets pollutes land and water environments (Break Free From Plastic, 2024; World Bank, 2022). It's largest City, Ho Chi Minh City, with a population of 8.83m, was selected owing to the small but growing 'refill on the go' sector. Whereas refill and reuse opportunities are relatively widespread in the UK within cities and larger towns and expected to increase throughout Europe (Eunomia, 2020), this was not the case in Vietnam at the time of data collection. UK interviewees were in various locations in England, but Vietnamese interviewees were only in Ho Chi Minh City. Restricting Vietnamese survey responses ensured consumers more likely to be familiar with refill and with experience of barriers were targeted.

Like many LMICs, Vietnam struggles to manage increasing quantities of plastic waste. A combination of factors including a large recent increase in both municipal and plastic waste arisings (Liu et al., 2021), weak waste legislation and government support (Schneider et al., 2017; Tsai et al., 2020; Van Hau, 2024) and delayed measures against single-use plastic use (Alpizar et al., 2020) have contributed to severe levels of coastal plastics pollution (World Bank, 2022). These factors in addition to geographical features and pressure from waste imports and tourism, resulted in Vietnam being identified as the fourth highest global contributor to plastic marine debris (Jambeck et al., 2015; Meijer et al., 2021; Notten, 2019).

2.2. Data collection methods

Gaining a better understanding of the varied and complex barriers and potential interventions at multiple stages of the refill value chain involved qualitative in-depth interviews with key stakeholders fulfilling multiple functions. Triangulating this data with general consumer perspectives and motivations, which may differ in each location, requires a larger sample size more efficiently gained using a quantitative quick and simple online survey. This mixed methods approach can be expanded by in depth interviews or focus groups with selected consumers assessed as less likely to engage with 'refill on the go' in future research, to explore suitable interventions.

2.3. Key informant interviews

Eleven in-depth semi-structured interviews were conducted with Founders, Directors, Senior Managers, or persons otherwise qualified to represent their company or organisation within the waste and refill sectors. Each interviewee is identified by a randomly assigned number and country as outlined in Table 1.

Case Study methods were followed (Yin, 2009), with interviewees contacted directly following sector research or through other interviewees and author contacts. Small to medium retailers were targeted owing to their long-standing domination of the 'refill on the go' sector in terms of consumer engagement opportunity. Limited attempts to engage with larger retailers were unsuccessful.

Hennink and Kaiser (2022) conclude that sample size saturation for narrowly defined objectives such as those in this study is reached between 9 and 17 interviews, with a mean of 12-13. They further observe that larger sample size recommendations in research methodology textbooks are not based on empirical evidence. Extensive experience of the 11 interviewees in specific lines of business and active participation in waste, circular economy and refill networks allowed them to draw on both their own and others' experiences, providing reassurance that the sample size was likely sufficient to meet the study objectives.

Interviews took place between 7th July and September 2, 2021 for between 35 and 65 min. Interviewees were contacted in Spring (2023) with the opportunity to comment and reconfirm informed consent. The interviews were structured around key questions with the semi-structured approach allowing responses to be probed further, and questions to evolve as insights from incoming survey responses arose.

Ten interviews were conducted via video calls, and one by telephone. Recorded interviews were transcribed, with verbal and physical cues such as pause length, increased voice pitch, and gesticulations noted. Commercial information and references to the participant's gender were removed from the final transcripts for commercial reasons, and to reduce the likelihood of participant identification within the small sector.

2.4. Online survey

Despite lower levels of technology adoption with increasing age in both the UK and Vietnam (Kemp, 2021; M.-N. Nguyen, 2024), online surveys are accessible to most consumers. The survey was conducted using Qualtrics software with responses to early questions asking whether refilling is a familiar practice and how often participants refill, affecting branch logic (survey flow) thereafter. Aside from standard sociodemographic information, the questions were designed by the authors, with UK and Vietnamese surveys designed to be identical yet culturally appropriate. The Vietnamese survey was translated within Qualtrics using Google Translate and checked by two Vietnamese nationals for accuracy, with completion possible in English or Vietnamese.

The survey's purpose was to gain a quick low-cost overview of the existence of barriers to 'refill on the go' in both locations. Whilst aware of the limitations, nonprobability convenience sampling as described by Henry (1990) was selected.

The survey was distributed by email and WhatsApp to known contacts and student groups via UK and Vietnamese Facebook groups and LinkedIn between 10/07/21 and August 28, 2021. One response per IP address was permitted, and no incentive for completion was offered. Personal data was not collected, to eliminate the risk of participant identification. Interview and survey questions with a description of their

Table 1
Waste and refill sector interview participants by country, position and sector experience.

Source	Country	Position	Number of years in sector	Interview Length (rounded)	Interviewee ID.
Small Retailer (F/PC)	Vietnam	Co-founder/Director	<2 years	35 min	1, VI
Refill Retail Product Supplier (PC)	UK	Founder/Co-Director	>5 years	65 min	2, UK
Medium Retailer (PC)	Vietnam	Founder/Director/Owner	>2 years	50 min	3, VI
Online Retailer[a] (F/PC)	UK	Co-Founder/Co-Director	>2 years	40 min	4, UK
Medium Retailer (F/PC)	UK	Procurement Executive	<2 years	40 min	5, UK
Small Retailer (F/PC)	UK	Owner/Manager	>5 years	45 min	6, UK
Waste NGO	Vietnam	Project Manager	<2 years	40 min	7, VI
Waste NGO	UK	Co-Founder/Manager	>10 years	40 min	8, UK
Waste and Resources Industry Organisation	UK	Technical Manager	>10 years	45 min	9, UK
Academic & Small Retail (PC)	Vietnam	Senior Academic	<2 years	50 min	10, VI
Waste & Circular Economy Consultant	UK	Founder/Director	>10 years	55 min	11, UK

[a] A combination of 'refill at home' and 'return from home' in line with reuse models described by The Ellen MacArthur Foundation (2019). All other businesses either sell or supply 'refill on the go'. Produce sector: F = Food; P/C = Personal Consumables.

purpose are contained within supplementary information.

2.5. Data analysis

Transcribed interviews were manually coded utilising Nvivo software, with barriers shown in Fig. 2 identified deductively and inductively. Primary, or overarching barriers were identified from previous research (Beitzen-Heineke et al., 2017; Coelho et al., 2020; Henriette Marken et al., 2020). Secondary themes and tertiary topics summarised as keywords in Fig. 2 arose deductively from the first of two reviews of interview transcripts. As each barrier or keyword was encountered in a transcript, quotes were coded under all relevant keywords. For example, concern over fake products would be coded under 'Fake Products' and 'Brands', and if relevant, under 'Choice' too. This allowed for an overview of how prevalent a barrier was by sector and location, whilst facilitating identification of additional barriers in manageable quantities.

Survey data was exported to Excel to be checked and cleaned. Of 438 surveys, (265 from UK and 173 from Vietnamese participants) 107 were abandoned in progress and 5 submitted incomplete. Of 326 remaining complete responses, 230 were by UK and 96 from Vietnamese participants. Analysis was undertaken using IBM SPSS Statistics 27 guided by Field (2017).

As variables including age range, gender and refill frequency are categorical, Pearson Chi Squared and Fisher's Exact tests were applied to test for significance of relationships between them, with results visualised by correspondence analyses. The final survey question gave participants who had previously stated they did not refill an opportunity to state if and why, following survey completion, they either would, might or would not now refill. Responses were coded in Excel and contributed

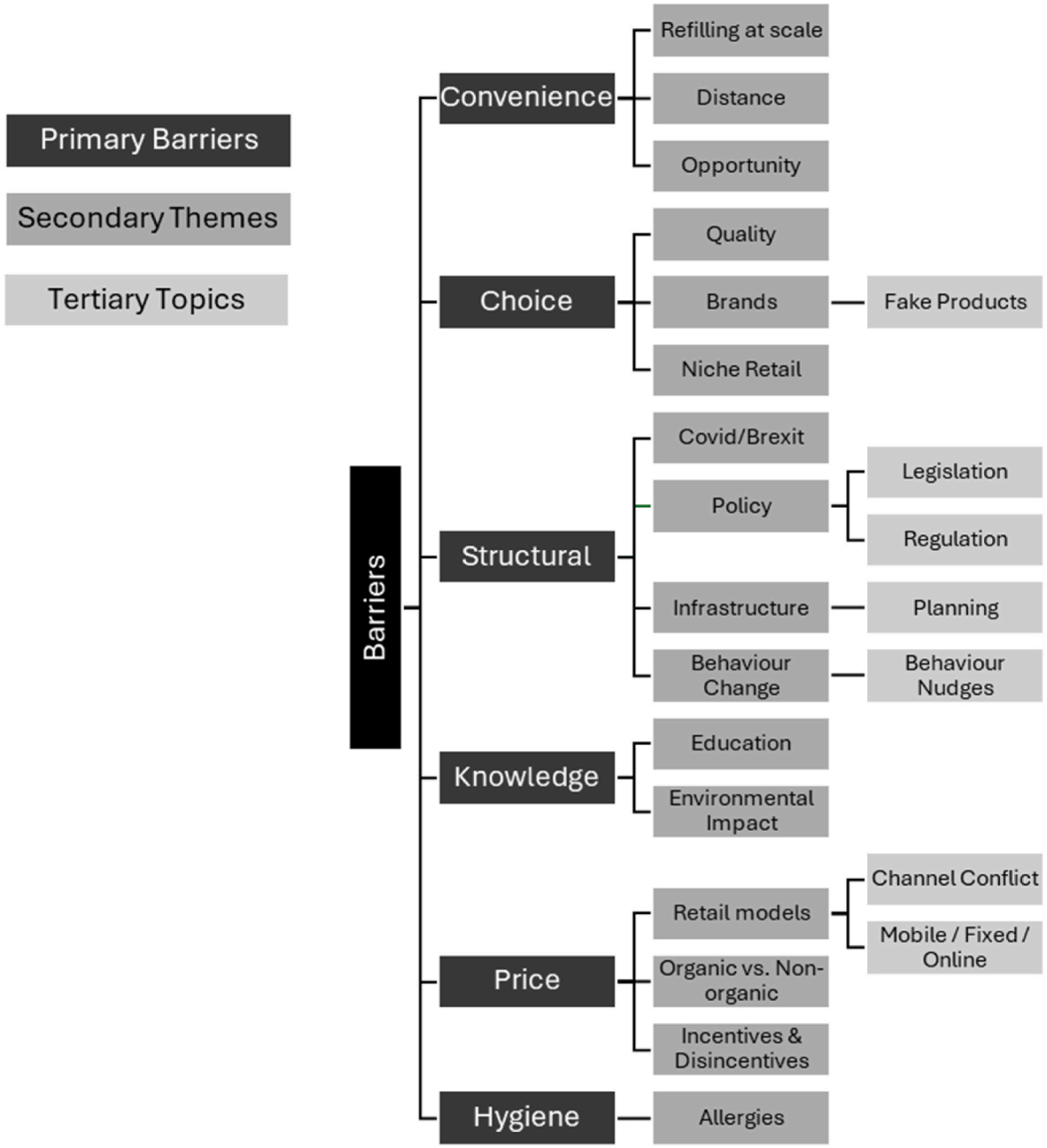


Fig. 2. Thematic coding structure for interview analysis using NVivo. Primary barriers were identified from literature, whereas secondary themes and tertiary topics arose deductively from interview transcripts.

to qualitative empirical data for this research.

3. Results

Comparative demographic and refill activity of survey participants in Table 2, highlights disparities in educational attainment and annual salaries between both each location and national averages attributable to the survey distribution method. Vietnamese respondents were predominantly students, nearly all (87.5%) had at least a university degree, (whereas 18.8% of the Vietnamese population have attended university) and 96% of respondents were aged between 18 and 44 (compared to 58.9% of the population at the time of the survey). Vietnamese contacts sharing the survey were predominantly either recent graduates or academics who were likely to share it among similar peers. UK contacts included older students and professionals, which also explains the higher than UK average annual salary and educational attainment of UK respondents, with 70.5% achieving at least an undergraduate degree compared to 33.8% of the UK population. UK respondents better represented the UK age profile, with 43% between 18 and 44 (compared to 42% being between 20 and 44). Social media (predominantly Facebook) utilised in both countries is likely to have attracted respondents of all ages (Statista, 2025b, 2025c). Most respondents were female.

Responses were analysed according to stated 'refill on the go' recognition and activity.

3.1. Demographic factors affecting 'refill on the go' participation

Very few UK participants were unfamiliar with refilling, and only small numbers of total participants refilled often. Low numbers of Vietnamese survey participants were over 25 or declared a high annual income. High proportions of <5 expected cell counts were therefore encountered, despite combining categories. This rendered Pearson Chi Squared tests mostly unusable. Fisher's Exact Test and Cramer's V calculations can be used to measure the significance and strength of associations between nominal and categorical variables when one or more cell counts are <5. Statistically significant relationships between familiarity with the concept of 'refill on the go' or refill frequency and income, education, age or gender were largely not found. However, a significant positive association between age and familiarity with refill retail (χ^2 p = .025; Fisher's Exact p = .012; Kendall's tau-b p = .008) was observed in the UK sample (analysis in supplementary material).

Table 2
Demographic information and stated refill activity of survey participants.

	Vietnamese (VI) Survey	UK Survey
Number of valid responses	96	230
Majority of participants from	Ho Chi Minh City	England
Age under 45	96%	43%
Male:Female (Other)*	17:70 (5)	78:150
Educational attainment	Higher than VI average: 87.5% have at least an undergraduate degree **	Higher than UK average: 70.5% have at least an undergraduate degree **
Annual Salary	Mostly below VI average: 49% earned <23.800.00VND. annually. ***	Mostly above UK average: 55% earned above £29,001. 35% earned above £42,001 annually ***
Familiar with 'refill on the go'?	79%	97%
Refill more than 1x/wk	4%	10%
Do not refill	58%	54%

*Five Vietnamese participants identified as non-binary/other. Four Vietnamese and two UK participants preferred not to reveal their gender. ** 18.8% of Vietnamese attend university (Duc et al., 2016) and 33.8% of the UK populace have Level 4 and above qualifications (degree level and above) (ONS, 2021) ** Average salaries 51.000.000-80.800.000VND and £31,461. ***Average salaries in 2020: 67.080.000VND (urban) and £31,461 (General Statistics Office of Vietnam, 2021; Statista, 2025a).

3.2. Identification of 'refill on the go' barriers in Vietnam and the UK

Barriers to 'refill on the go' were identified through analysis of key informant interviewee answers to one question: *What are the barriers, from your perspective to more widespread adoption of refilling?* The descriptive answers were categorised into 2 external and 8 internal barriers. Retailers, and frequently also consumers, have direct or indirect control over the influence and impact of internal barriers. Conversely, barriers outside the control of consumers and particularly small to medium businesses, are classified as external. Communication and education deliverables are interchangeable in this context and were combined, whilst recognising that these are the responsibility of both retailers and government. Logistics can be internal or external barriers depending on the context.

Two external and three internal barriers were described by Vietnamese and UK participants, as shown in Fig. 3. Policies discussed by interviewees were in the context of wastes management (e.g. Extended Producer Responsibility (EPR)) and business finance (e.g. taxes). Finance, with reference to low profit margins, choice and product provenance were described as barriers only by Vietnamese interviewees, and hygiene and customer engagement only by interviewees from the UK.

Barriers were also identified by survey participants choosing interventions or influences that would encourage them to 'refill on the go' on a Likert scale (presented in section 3.6.1). These, or rather a lack of them, have been interpreted as potential barriers to refill adoption. Barriers ranked as important with a mean value lower than 2 were included, with the exception of environmentally friendly/organic produce in both countries and smaller choice in the Vietnamese survey, as these are not barriers. In addition, barriers were identified within free text comments from participants who didn't already refill when asked if they would consider refilling following completion of the survey.

The 2 external and 8 internal barriers identified by survey participants broadly aligned between Vietnam and the UK, with opportunity, convenience price, choice and quality selected most frequently. A tax on packaging was selected slightly above rewarding consumers for refilling. Three internal barriers were not aligned geographically between survey participants. These were knowledge and the availability of spare packaging in Vietnam and hygiene and allergies in the UK.

Some commonality was observed between the views of sector stakeholders and survey participants, prompted by the survey design to answer questions from a consumer perspective. Policies and communication and education were external barriers identified in interview and survey data, as were internal barriers of convenience, choice, price and hygiene. Price and choice are indirectly linked to the Policy external barrier, as other internal barriers affect their impact. Empirical data collected here aligns with barriers identified by previous researchers with the exception of hygiene concerns in the UK, which may have been influenced by the ongoing COVID19 Pandemic at the time of data collection and concern over 'touch points'. Results point to areas of alignment and disconnect between stakeholders and consumers, and differing priorities in Vietnam and the UK.

3.3. Links and overlaps between external and internal barriers to 'refill on the go' business models

Further analysis of survey answers, comments, and conversation flows strengthened initial barrier identification and facilitated the emergence of links and overlaps within and between internal and

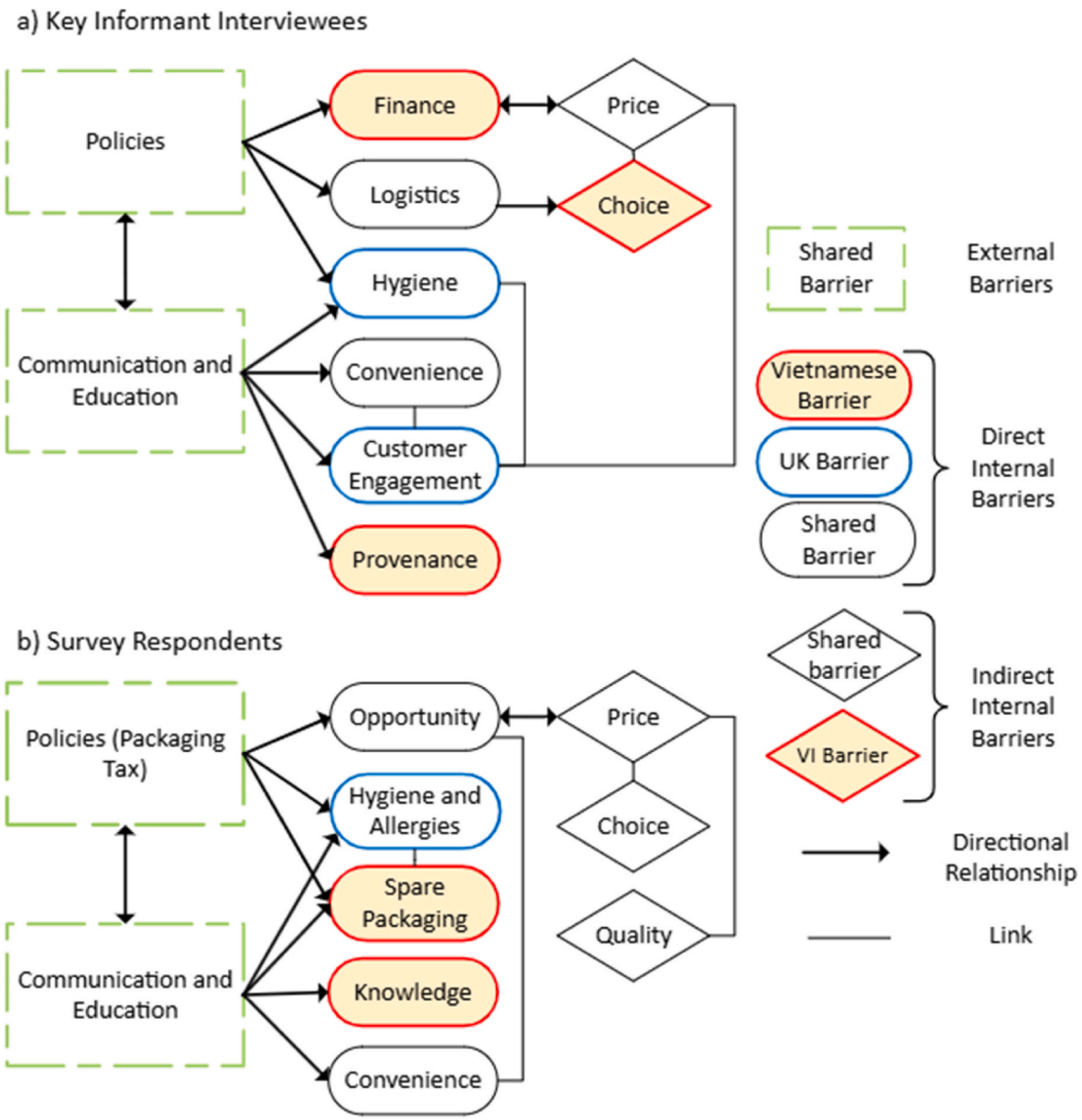


Fig. 3. Diagram illustrating how internal and external barriers to 'refill on the go' raised in specific interview and survey questions differ between industry and consumer respondents. Links and directional relationships observed between barriers indicated and barriers identified in only Vietnam or the UK or in both countries are highlighted.

external barriers presented in Fig. 4.

Moss et al. (2022) suggest that as barriers and solutions are interlocked, they need to be addressed in sequence. However, this is a disruptive business model within a sector that is siloed and fragmented (Nusantara et al., 2025) and we further propose that barriers must be unlocked starting from a top down, policy-led mandate. Our results and analysis presented below, describe how individual stakeholders working in isolation will affect non-target barriers and be less economically and environmentally efficient.

3.4. Markets influencing finance and price

We found higher actual and perceived costs were a barrier arising from the novelty of the business model and tendency for products to be organic in the UK. Market supply challenges such as channel conflict, where similar or identical products in multiple retail model or packaging formats compete, and difficulties agreeing Minimal Viable Product quantities with FMCG companies (Interviewee 10, VI) are barriers to small retailers and suppliers increasing product ranges.

Survey and interview data collected in both countries identified price as a barrier, with refilling viewed as an activity for wealthier, middle-class consumers.

3.4.1. Incentives for the non-organic sector

Survey and interview results point to a clear disconnect between consumer demands for cheaper non-organic produce, and a refill sector reluctant to accommodate this, as a root cause of the price barrier, particularly in the UK:

> "We don't feel we're in a position to sell quite obviously unsustainable food, in a more sustainable packaging format". (Interviewee no. 4, UK)

> "Non-organic produce needs to be prioritised" (ID 622117, UK Male)

This was less of a barrier for Vietnamese interviewees where the

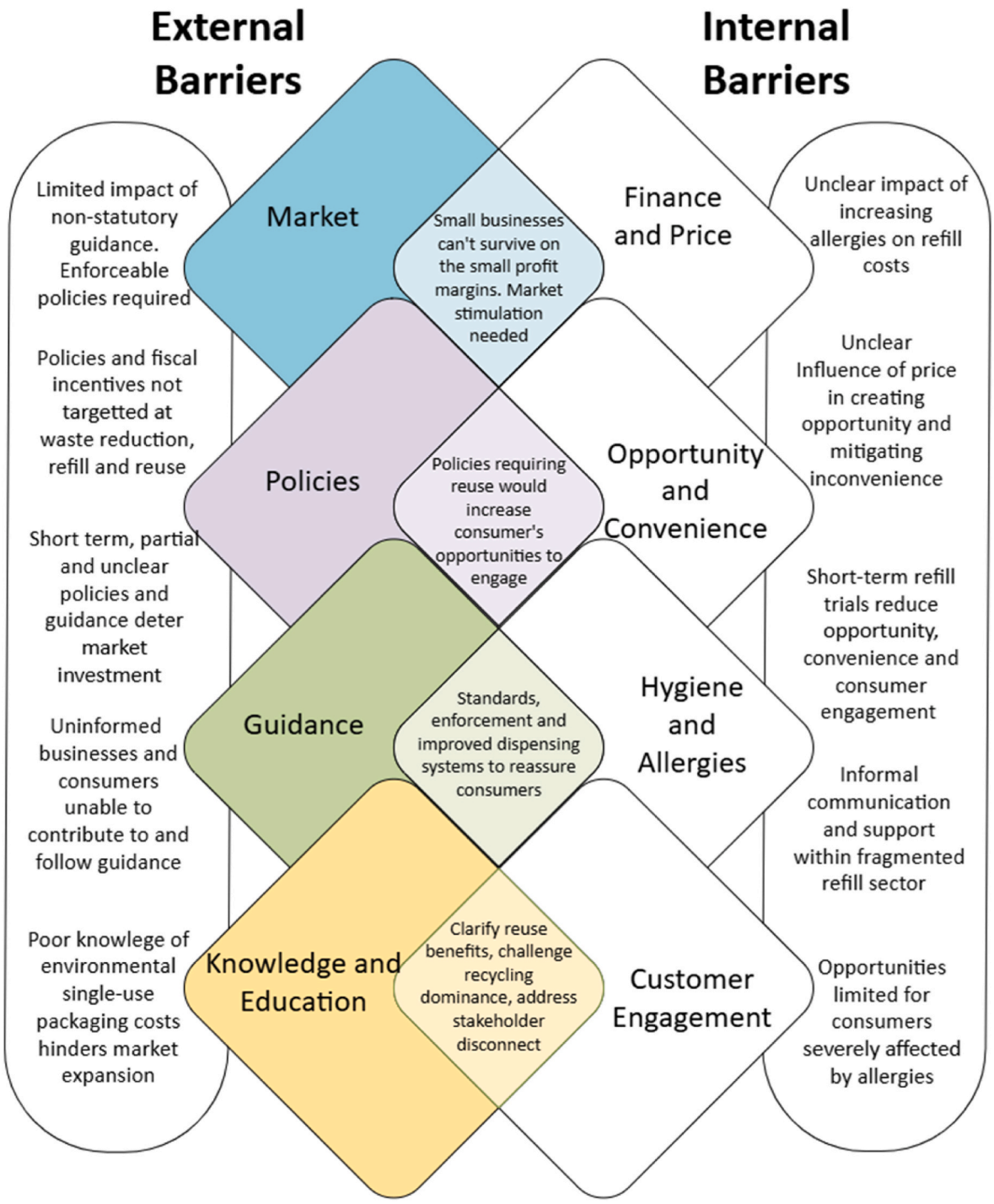


Fig. 4. Model highlighting how Internal and External Barriers hindering widespread adoption of 'refill on the go' business models identified in this study link and overlap. This diagram illustrates how no single barrier can be addressed in isolation.

requirement for produce to be organic was secondary to the objective of encouraging 'refill on the go', with aims to upsell to organic products in due course:

> "I'm absolutely going to use the brand loyalty … if 46% of people are already buying Sunlight (detergent), all I'm going to ask them to do is to keep the container and come and refill … hopefully by doing that, that'll also impact their attitudes and their understanding" (Interviewee no. 10, VI)

The small organic produce sector in Vietnam is growing but expensive even for middle-class households (M. Nguyen, 2021). However, for Vietnamese survey participants, products being environmentally friendly and organic was the most likely reason they would refill more as shown in Fig. 5.

3.4.2. *Incentives to encourage lower income consumers*

Retail sector interviewees conceded that pricing structures can be confusing for customers used to purchasing pre-packaged or non-organic goods, but felt that prices were competitive. Higher perceived prices were attributed to produce being ethically produced and through consumers dispensing larger quantities than pre-packaged alternatives (Interviewees 2, UK; 3, VI; 5, UK; 11, UK). Vietnamese consumers were

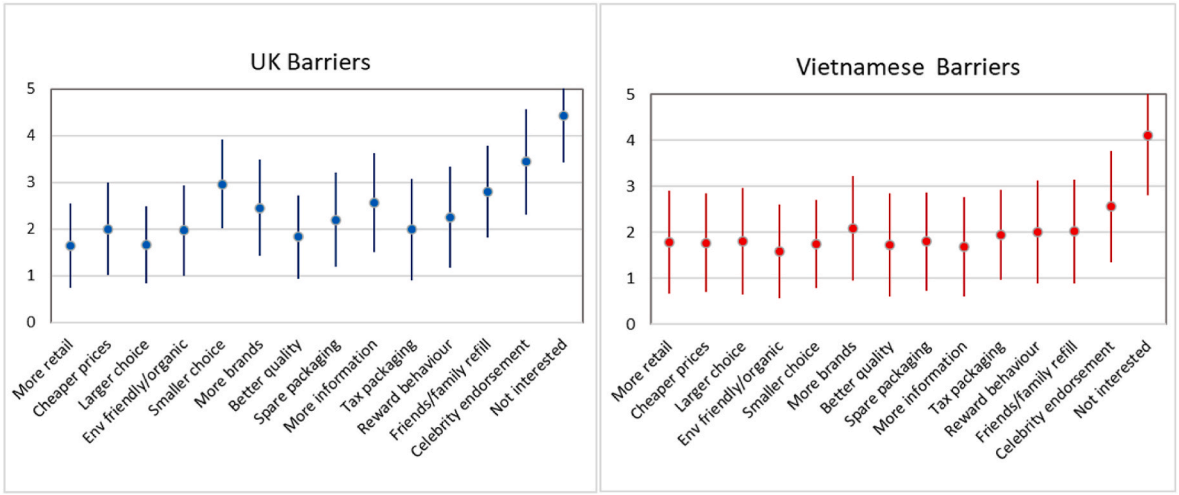


Fig. 5. Interventions that would encourage 'refill on the go' selected by survey participants are interpreted as barriers if absent or lacking. Less variation was observed in the Vietnamese sample attributed to lower familiarity with 'refill on the go'. Mean Likert Scale Response and Standard Deviations. 1 = Strongly agree; 3 = Neither agree nor disagree; 5 = Strongly disagree.

described by interviewees as being price sensitive, and 49% of survey participants would expect to pay less for refill purchases, compared to 28% in the UK. Acknowledgement was observed in both locations that refilling was a niche activity that appealed to wealthier consumers:

> "..there's got to be cost savings here. It is actually a way for people with low incomes to … save money and it (shouldn't) become seen as almost like a middle class … pep project …. It just strikes me that … it should be cheaper". (Interviewee no. 9, UK)

> "… I haven't returned to the refill way (of shopping) due to the high prices of the goods. In the 80's/90's it was much cheaper than pre-packaged." (ID68749, UK Female)

Most small to medium sized businesses participating in this research reported negative impacts at the time of data collection owing to Brexit, changes in retail engagement and reduced ability to trade during the Covid19 Pandemic on top of a global cost of living crisis. The impact on consumers was noted by Interviewee 2 (UK): "some people are barely surviving" and from a business perspective, Interviewee 3 (VI) stated "so now, it's not about growing, it's about surviving". All were facing significant challenges and three subsequently ceased trading.

3.5. *Policies influencing opportunity and convenience*

We observed strong opinion that policies and fiscal incentives were needed to address barriers, but mixed opinions regarding the likelihood of successful implementation. In highlighting socioeconomic structures of Scandinavian countries facilitating ethical consumption, Interviewee 2 (UK) points to unsustainable consumption being a systemic problem needing top-down solutions.

Interviewees agreed that supportive policies and legislation could also facilitate better data acquisition and expansion of the 'refill on the go' sector, with greater confidence expressed that this would be implemented, enforced and accepted in Vietnam:

> "… in my experience …, when the government says "hey, we want to do something", generally it happens, and it can happen very quickly. So, from a policy standpoint, I think that the government's already on board" (Interviewee no. 10, VI).

UK interviewees expressed mixed confidence in Extended Producer Responsibility (EPR), Deposit Return Systems (DRS) and the UK Plastics Tax with difficult policy decisions delayed to avoid "upsetting people" (Interviewee no. 9, UK). Concern was expressed that policies were considered "politically valuable" and not underpinned by sustainability motivations (Interviewee no. 4, UK).

3.5.1. *'Refill on the go' opportunities*

More UK survey participants were familiar with the concept of 'refill on the go' because opportunities are higher, but in both locations a similar proportion of participants did not refill (Table 1). Most Vietnamese 67% (n = 26) and UK 66% (n = 79) participants who were familiar with the description of 'refill on the go' but did not refill, also did not know where they could. However, around a third of survey participants familiar with the concept did not refill despite knowing where to.

For UK survey participants given a choice of thirteen factors, an increase in opportunities was most likely to encourage refilling, followed closely by larger product choice and equal or superior product quality (Fig. 5). Vietnamese participants agreed that increasing retail outlets would encourage refill behaviour, however, five other factors were preferred. These were environmentally friendly and organic products, information about the environmental benefits, equal or superior product quality, smaller choice of carefully selected products, and cheaper prices. This may be because of lower existing engagement and familiarity with 'refill on the go' in Vietnam.

In both locations, survey participants stated that a tax on packaging would encourage them to refill slightly above being rewarded, but ranked factors such as increased retail opportunities, cheaper prices and more choice as more important (Fig. 5).

3.5.2. *Convenience of 'refill on the go'*

In addition to fiscal incentives, other policies could effectively address non-financial barriers whilst moving the responsibility of catalysing change from consumers to policymakers. Two barriers confirmed by this research that could benefit from policy intervention are the opportunity to engage with 'refill on the go' and the convenience of the activity:

> "I haven't considered it because I'm not aware of anywhere locally to me where I could refill shop, but will look out for these in future." (ID51044, UK Male)

> "If refills are widely available, I will definitely refill often." (ID 3743, VI Female)

86% of Vietnamese and 82% of UK survey participants were unwilling to travel more than 5 min to refill, with survey participants who

were already refilling willing to walk further. This also links with concerns raised by interviewees and survey participants regarding the inconvenience of carrying empty containers to potentially multiple refill locations. Free cleaned reusable containers donated by customers were available in 1 Vietnamese retail location only.

3.6. Guidance impacting hygiene and allergies

Hygiene and allergen concerns were identified in UK data only as barriers to 'refill on the go' business models. Unlike previous research highlighting cleanliness, hygiene and wear and tear of containers as barriers (Baird et al., 2022; Matthews and Webb, 2023), participants were concerned with others having touched food products and allergies:

> "My daughter has a severe tree nut and peanut allergy. Food refill shops with loose nuts are a death trap for her". (ID613595, UK Female)

Concern regarding hygiene and food preservation was expressed by all food retailers interviewed. Considerable effort was made to keep food safe through careful stock management, stock rotation between locations, and ambient storage temperatures, with larger retailers able to invest in technology to achieve this. Some products, such as rice, were described as arriving in woven plastic sacks and difficult to store airtight, increasing vulnerability to pests and spoilage. The effort to keep refill areas tidy was cited as a barrier to wider supermarket adoption by several UK interviewees (8, UK; 4, UK; 6, UK). The challenges of hygiene and food preservation caused retailers in both locations to consider ceasing the sale of food products.

3.6.1. Product provenance concerns

A further finding relevant to the Vietnamese refill sector is the perception of some consumers that organic produce is of lower quality (Interviewee 7, VI) and the prevalence of "fake" products. Low quality or counterfeit consumables could contain dangerous ingredients or allergens:

> "… one of the bigger issues is they're worried it's a fake product, because they've never seen (company name) sold like this before - they've never seen something sold like this before, and in this part of the world there are a lot of fake products.". (Interviewee no. 10 VI)

3.7. Knowledge and education impacting customer engagement

Whereas a need for clarification of refill business model benefits was identified in both countries, we observed higher demand for information in Vietnam of the process, and how this retail channel impacts the environment compared to alternatives. Survey participants and interviewees raised concern about environmental and financial impacts of additional journeys owing to insufficient choice and product ranges.

Information gaps such as how reuse, including 'refill on the go', compares with the wider, externalised costs of single-use plastic use were also highlighted by Interviewee no. 8, UK, and below:

> "I haven't really seen any studies that … prove the benefits of it. I think we all see it as a good way forward and the right thing to do, but I personally have never seen any Lifecycle Analysis work done on it" (Interviewee no. 9, UK).

Smaller retail environments, where consumers may have affordability concerns and feel uncomfortable browsing may deter first-time customers:

> "… It feels quite a daunting, scary way to shop shrouded in mystery. I am from a supermarket generation." (ID 518628, UK Female)

Consumers unaware that FMCG packaging costs can exceed those of ingredients (Interviewee No 4, UK), are also uninformed of the full lifecycle costs of packaging materials. Nonetheless, in both locations the highest ranked reason for refilling among survey participants who claimed to refill already was because of the environmental benefits, followed by having opportunities close to home.

The informal nature of knowledge sharing and cooperation within the sector and the potential for this to be unhelpful, or for ideas to be taken without acknowledgement, was also raised with particular reference to the UK (Interviewees 2, 6 and 11, UK). Conversely, Interviewee 1 (VI) described how refill businesses would help each other, by moving stock around to where it will sell better if it is getting close to a use by date.

3.7.1. Dominance of the recycling sector

UK based interviewees agreed most strongly that the focus on communication and education on recycling detracts from the understanding of the benefits of options higher up the waste hierarchy:

> "… waste reduction is like the poor cousin in the waste hierarchy, because nobody has an economic incentive to promote it"

> "Recycling is being marketed and pushed way too much by the plastic sector at the moment, considering how the vast majority plastics are still non-recyclable" (Interviewee no. 8, UK)

> "there is a lot of greenwashing going on and people bending the wording of closed loop" (Interviewee no. 6, UK)

Furthermore, disparity was observed between engagement in waste reduction and reuse behaviours ahead of recycling in each location. Nearly all (93.5%) UK survey participants stated they recycled, whereas between 48.7% and 72.6% claimed to reduce packaging and food waste and avoid single-use products and disposable items (Fig. 6). However, the converse was claimed by Vietnamese participants of these five behaviours. Recycling was the least popular option (42%) with the other four actions practiced by between 48.4% (reducing food waste) and 72.6% (reducing packaging) of participants. Claims of adoption of less environmentally damaging behaviours was slightly higher in the UK sample, with a mean of 5.84 compared to 5.34 among Vietnamese participants. This small difference is attributed to the higher age and wealth of UK participants and increased access to certain interventions, such as green energy suppliers. Adoption of fewer environmentally beneficial behaviours was associated with UK survey participants who did not refill (χ^2 p = .003; Kendall's tau-b p=<.001). Although like Gordon-Wilson et al. (2022), we found 'greener' consumers are more likely to refill, the absence of significant demographic relationships with behaviours in our data points to this being an association requiring further research.

3.7.2. Language communication barriers

We observed differing terminology for refill 'on the go' being used in Vietnam and education gaps:

> "So 'refill' is an English name, so I would say it is a new thing … a new trend that we have started and … it took us the whole first year to explain to people what is this station, what is refill? And during the second year people stopped asking like, what is it? And like what do … what is available in the refill station? So, I think we're educating; we have to educate the market". (Interviewee no. 3, VI)

> "..so they don't say refill, they say 'make full' they make the bottle full and, you know, as soon as you say that to people, oh, you see the lightbulb go off …" (Interviewee no 10, VI).

The process of completing the survey was found to have had an educative effect, with 98% of Vietnamese and 88% of UK participants who had previously stated they did not refill stating they now would or may be interested doing so. Most comments were positive, but scepticism of benefits was expressed by a small number of UK participants.

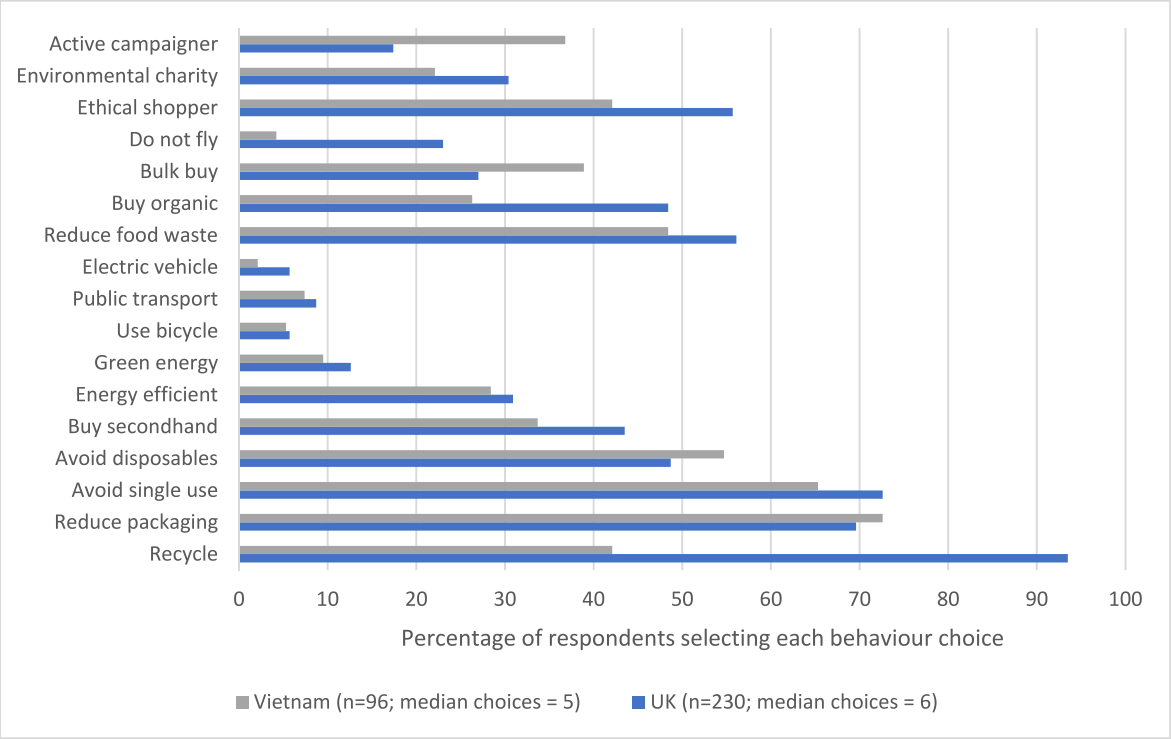


Fig. 6. Adoption of Environmentally beneficial lifestyle choices by UK and Vietnamese survey participants showing the large difference between recycling activity, organic food purchasing and actively campaigning for environmental issues. Smaller numbers of Vietnamese respondents choosing not to fly or drive electric vehicles may be explained by lower age and income levels.

3.8. CBM framework test

Frameworks created to visualise and explain well-defined concepts or relationships within systems should be broadly applicable by others to the same concept or system. Through a thorough systematic review process, Assmann et al. (2023) drew upon a large selection of literature on determinants of CBM adoption to generate 8 broad categories on a sliding scale from 1 (External) to 8 (Internal). We identified this framework as the best fit to test our own framework, based on considerably less data, as the sliding scale was more likely to attenuate the inherent subjectivity of classifying barriers.

If our barrier classification matched Assman et al.'s, the external barriers at the top and the internal barriers at the bottom of the Sankey Diagram in Fig. 7 would connect horizontally, with some crossover in

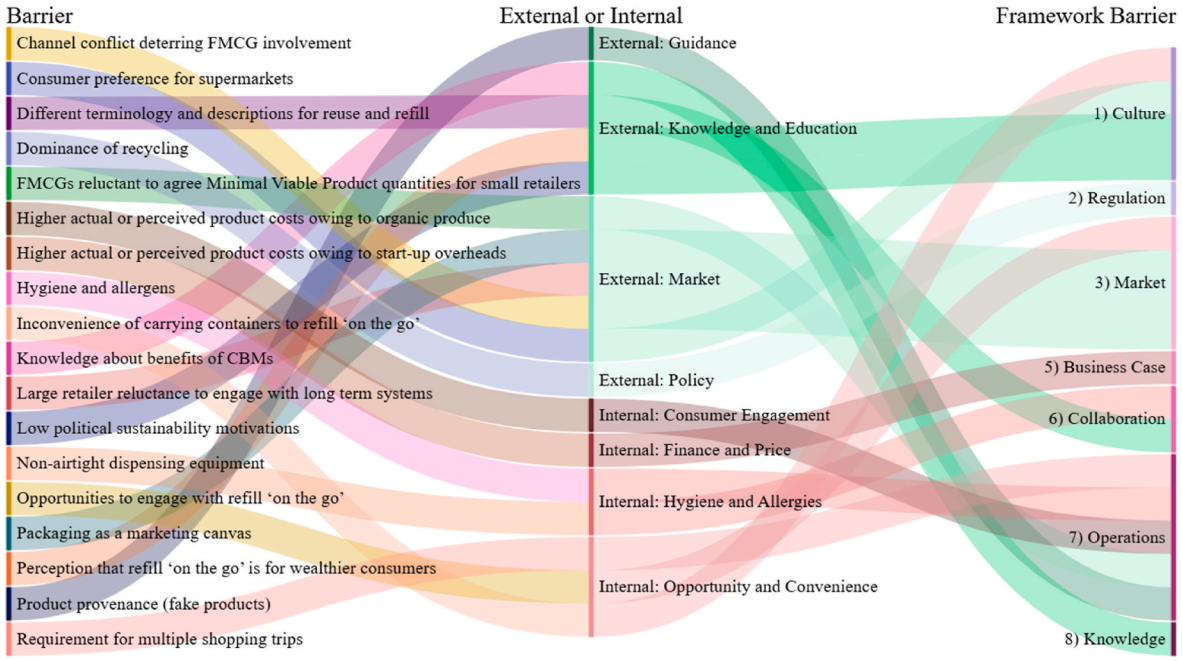


Fig. 7. Sankey Diagram illustrating the synergies and differences between our barriers and those by Assmann et al. (2023). External and internal barriers approximately match, except where subjective classification of barriers applied to our specific study differ.

the middle where barriers have internal and external influences. Notwithstanding the limitations of diagram creation, this is almost the case, with the notable exceptions of knowledge, which was viewed as an external factor owing to the state's responsibility for education and information control, and the inconvenience of carrying containers to refill, which Assman et al.'s framework conversely points to being strongly external. In this study, we found no barriers classed by Assmann et al. (2023) as '4. Strategy', which likely reflects the independent small to medium business and consumer focus of our data.

Using this framework as a basis for future research would greatly assist data collection methodology and analysis. However, as most CBM data predominantly arises from High Income country businesses, the subjectivity and nuance required to apply it to data such as ours should be noted before applying it with caution and explanation.

4. Discussion

Research into sustainable packaging that quantifies the effectiveness of either command and control or nudge policies is again dominated by High Income Countries (Meherishi et al., 2019). However, data presented by Ertz et al. (2017) pointed to a preference for positively framed policy interventions in Western cultures (e.g. reward) and negative interventions in Asian cultures (e.g. taxes), whereas our results indicate a slight preference for taxes in both locations.

Regulations, systemic norms, and cultural-cognitive influences in the UK and Vietnam shape and influence 'refill on the go' barriers and contribute to how they are addressed. Our qualitative data collection methods did not focus on these influences, analysis of our quantitative data yielded useful but largely non-statistically significant results, and data collection was during a global Pandemic. As such, any learnings should be transferred to other locations with caution. Further research particularly in Vietnam considering post-COVID19 pandemic shifts in retail systems, how people cook and store food at home, incentives or nudges to invest in 'refill on the go', reuse model preferences and urban and rural variations could yield useful insights into successful transition pathways to this CBM.

4.1. Influence of location on barriers

As outlined in the introduction, the discrete political, institutional, social, technological and environmental settings of each location will influence the potential Multi-Level Transition pathway to widespread adoption of 'refill on the go'. Data was collected during the Covid19 Pandemic, when all stakeholders had to adapt rapidly to change, including in the way consumers shopped and retailers operated. Companies already reluctant to change from efficient and profitable retail systems to CBMs (Interviewee no. 4, UK) experienced reduced pressure to do so when consumers faced more pressing challenges.

Research points to 'context' strongly influencing reusable container consumption for Asian consumers, and 'attitudes' for Westerners (Ertz et al., 2017). This aligns with Interviewee 10 describing how Vietnamese business and citizens comply with rules imposed upon them even when, as was the case during the COVID 19 Pandemic at the time of data collection, decrees could be issued at short notice.

In a pre-interview meeting, Interviewee 10 further described how Vietnamese purchasing habits differ, with eating out rather than cooking at home being common in particularly in urban areas. This could be a further barrier to grocery refill 'on the go' and favour body care products. Property loans were described as being typically paid off within a year; inconceivable to UK homeowners used to 30-year mortgages. Interviewee 7 (VI) also describes Vietnamese consumers as "short term oriented" referring not only to financial commitment of upfront investment in reusable products, but also environmental attitudes.

4.2. Market support and stimulation could lead to sustainable profit margins and lower prices

'Refill on the go' is a challenging business model to bring to scale with barriers at every stage of the value chain. Le Thanh et al. (2022) concluded the survival of environmentally innovative small to medium firms in Vietnam depended on adoption of conventional innovation models. With almost half (49%) of Vietnamese survey respondents expecting to pay less for refilled produce, policy and fiscal incentives alone may be insufficient. This observation could arise from an unwillingness to pay more for products within reusable packaging found by Miao et al. (2023), or indicate that a retail channel shift may depend on products being non-organic despite survey participants in Vietnam expressing otherwise. Triangulation of our results suggest the commitment by Vietnamese participants to refill more if organic and environmentally friendly products were available, reflects sector novelty and may be aspirational, especially as wealthier communities have been found to be more likely to refill (Sisungkunon et al., 2024).

An additional factor impacting price perceptions may be the expectation, from the experience of using reusable coffee cups, that reuse should be rewarded. However, as survey participants favoured taxes slightly above rewards, the need for forceful incentives may have been recognised.

Unintentionally large quantities can be dispensed by consumers using certain dispensing equipment. Cost controlled dispensing systems recommended by The Global Plastics Policy Centre (2023), whilst being too expensive for most small scale 'refill on the go' retailers participating in this study, could be a solution.

4.3. Policy measures may have limited impact on consumer inconvenience but can increase opportunities to refill

For consumers, inconvenience can include being unable to purchase large product ranges and needing to visit multiple locations, whilst also bringing containers to refill. This broad term overlaps with the inconvenience of reduced opportunities to engage with 'refill on the go' because it is unavailable or perceived as socially inaccessible.

A lack of refill opportunities was a primary barrier for survey participants, particularly in the UK. However, as survey results indicated that knowing where to refill is not a prerequisite for doing so, simply increasing opportunity may not increase participation.

Support for policies and fiscal incentives to increase financial viability and availability of refill business models was expressed by interviewees and survey participants.

Analysis of CBMs in the EU confirms the positive effect of consumption policies, such as regulation and informational (Arranz and Arroyabe, 2023). Fiscal incentives including landfill taxes and carrier bag charges are established and effective system and behaviour change tools in the UK (Panzone et al., 2021; Thomas et al., 2019). However, interviewees reflected cautiousness expressed within the waste sector of the reliance on EPR to change consumer behaviour (Lattimore, 2021) or increase reuse and refill uptake. Delayed clarification and introduction of both EPR and DRS programmes in the UK are justifiable reasons for uncertainty and scepticism. Modulated fees payable under EPR designed to make packaging more expensive, will be partially absorbed by manufacturers potentially unwilling to invest in reuse and refill, despite being an economically viable contributor to reducing EPR costs (Conway et al., 2025). Furthermore, certain consumables within DRS packaging are not typically available as 'refill on the go'.

Vietnamese consumers are yet to reap the benefits of an increasingly environmentally proactive Vietnamese policy landscape, including upcoming single-use plastic bans, being the first Southeast Asian country to enact EPR legislation, and targets to reduce ocean plastic pollution by 2030 (Tran et al., 2025; UNDP, 2020). However, as in the UK, there have been delays in clarification of data collection and compliance requirements (KPMG, 2025; Tran et al., 2025). Uncertainty has been

highlighted through an Institutional Theory lens as a sociological and economic circular economy barrier in Vietnam by Do et al. (2022). Delayed or selective measure policies and unenforced industry set targets add yet another layer of uncertainty to an already challenging innovative business model.

Our results align with others observing that bold policies and incentives are vital in supporting changes in consumer behaviour (Löhle et al., 2021; Van Hau, 2024). In both locations, fiscal incentives not being considered, such as business rate and tax relief and subsidies, could improve profit margins and stimulate investment in refill business models.

Vietnamese interviewees (1 and 10) pointed to swift business and individual compliance with government rules and guidance both before and during the COVID19 Pandemic and described how new refill locations could be quickly sourced and operational based on customer location and purchasing data. Our results therefore indicate that the Vietnamese 'refill on the go' sector is likely to be more flexible and reactive to policy intervention and consumer demands, although further research is needed to strengthen this observation.

Policies that could encourage 'refill on the go' include requirements for larger retailers to offer refill opportunities and reusable packaging. These requirements form part of Circular Economy Legislation introduced in France in 2020, demonstrating that bold and disruptive legislation is possible (Ellen MacArthur Foundation, 2022). Corporate preference for recycling and reluctance to commit to reduction and reuse activities (Rhein and Sträter, 2021) may influence the absence of reuse focussed policies. However, Vietnamese participants and interviewees repeatedly raised a lack of knowledge and education as a key barrier. It is essential that any policy changes are accompanied by clear communication and education. Furthermore, as all retailers confirmed that most customers are female, the burden of additional inconvenience on women, and especially low-income women, should also be considered.

4.4. *Improved guidance and dispensing equipment can reduce hygiene concerns and allergen risks whilst keeping perishable products fresh*

The logistical challenge of keeping products at risk of spoilage fresh and free from pests until consumption was raised by interviewees. This was of particular concern, because each stakeholder only had responsibility for one stage in the product's journey. Poor design of dispensing equipment is a recognised challenge within the sector (Bradley et al., 2023) and was raised by interviewees. The limited range of non-airtight dispensing equipment available to retailers can be difficult to use, raise freshness concerns, wasted expired products, spillages by customers and limitations on product ranges, as high turnover is required to keep products fresh.

Food allergy and hygiene concerns were not found to be barriers among German consumers surveyed by (Henriette Marken et al., 2020), but an increasing number of consumers affected by food induced allergies have good reason to be cautious of 'refill on the go', with hospital admissions for food-induced anaphylaxis in the UK doubling between 1998 and 2012 (Loh and Tang, 2018).

Although concern was not raised by Vietnamese participants, previously low, or underreported levels of food allergies in the so-called global south are increasing (Prescott et al., 2013). This has been attributed to economic growth and adoption of western and urbanised lifestyles (Leung et al., 2018; Loh and Tang, 2018). Food allergens typically reflect local diets, with fish, shellfish and cow's milk being among the most common allergens in Asian diets (Loh and Tang, 2018). These substances are less likely to contaminate predominantly dried foodstuffs contained in refill dispensers than nuts, which may be processed alongside other dry foods. These reasons, alongside participants being more likely to purchase home and personal care products than food, and the smaller Vietnamese sample, could explain why allergen concerns were not raised. The challenges of managing allergens in a typical 'refill on the go' retail setting remain, owing to non-airtight dispensers, spillages and touch points. Pre-filled returnable containers or airtight dispensers for selected products that are filled off-site in controlled environments, or separate areas for allergen containing foodstuffs are potential solutions.

Consumer concern regarding counterfeit products was raised by a Vietnamese interviewee. Reluctance by household name manufacturers and supermarkets to engage with 'refill on the go' makes this a potentially significant barrier that can only be overcome through sector cooperation and political pressure. As the dominant player in supply chains, Glover et al. (2014) used Institutional Theory to identify the challenge of dismantling the overriding focus on cost reduction in supermarkets preventing alternative sustainable models, also stressing the essential role of Government.

Interestingly, concern was not raised that consumers would fraudulently claim refilled containers contained a cheaper product, as has been observed with supermarket self-service checkouts (Taylor, 2016). This may be less likely to occur in the smaller independent retail environments in this study where staff are close by, or because participants feel wealthier consumers are less likely to do this.

Food safety, hygiene and quality control guidance, standards and laws are in place in both the UK and Vietnam food retail sectors, although compliance and enforcement can vary (Ababio et al., 2016). Clear and accessible guidance, enforcement of standards and improved communication and equipment to encourage hygienic behaviour from consumers may provide the reassurance needed to increase participation.

4.5. *Knowledge and education is vital to increase customer engagement*

Poor communication, knowledge and education preventing customer engagement was raised by interviewees and survey participants. This barrier ranges from variance in the language used to describe 'refill on the go', to a lack of data on the benefits, and dominant recycling communication and education. Kunamaneni et al. (2019) emphasise the idiosyncratic nature of refilling to consumers unfamiliar with it, pointing to several UK based trials that have been abandoned. Further information including Lifecycle Assessments (LCA) may allay concerns regarding greenwashing, as not all forms of refilling are equal in terms of economic and environmental impact (Conway et al., 2025).

Published LCA and Cost Benefit Analyses have, apart from reusable water bottles and coffee cups, largely been undertaken on business owned packaging such as milk bottles and takeaway containers (Coelho et al., 2020; Greenwood et al., 2021; Zero Waste Europe and Searious Business, 2023). Despite recent attention, this information gap hinders policymaker and consumer ability to weigh up the pros and cons of reuse business models.

This research highlights that different descriptive phrases are used to describe the action, behaviour and systems of refilling and reinforces calls for further research on the language used to describe reuse schemes (Greenwood et al., 2021). The recent emergence of the refill sector in Vietnam explains lower familiarity with the stated description of 'refill on the go' observed, with access to more information selected as the intervention most likely to encourage participation. However, as this sector grows and competition increases, different descriptive terms could become a small consumer barrier that also hinders research synthesis. The authors recommend that colloquial language evolving to describe reuse and refill be incorporated.

Lack of attention to reuse observed particularly by UK interviewees can be attributed to increasing evidence demonstrating the dominating of recycling within the top section of the waste hierarchy. Research indicates it can be considered interchangeably with and environmentally superior to reuse (Greenwood et al., 2021; Rhein and Sträter, 2021) and enable guilt-free permission for wasteful consumption (Kunamaneni et al., 2019) with incentives rewarding recycling rather than waste reduction (World Economic Forum, 2021). Although this dominance

was observed less in Vietnam, where recycling was practiced by fewer survey participants, research by Van Hau (2024) has since identified the dominance of the recycling sector as a barrier to eliminating single use plastics in Vietnam.

Increased likelihood to recycle ahead of environmental behaviours higher up the waste hierarchy by UK survey participants, reflects widespread access to recycling services, decades of recycling education initiatives, and requirements for recycling guidance on packaging. Significantly lower recycling activity reported by participants in Vietnam is likely to reflect reduced recycling infrastructure (Löhle et al., 2021) and could indicate that recycling dominance is a barrier in the UK and a surmountable barrier for 'refill on the go' in Vietnam.

Stated willingness to refill following survey completion demonstrates that even a small educative intervention can increase knowledge and trigger intentions to try it. Demographic variables were not found to have a statistically significant relationship with knowledge and participation and like Steinhorst and Beyerl (2021), our results also tentatively point to consumers not being the most important drivers for 'refill on the go' adoption.

4.6. Identification of gaps, challenges and opportunities

4.6.1. Gaps

'Refill on the go' business models are challenging to bring to scale with no single barrier in either location impeding growth. Identification and quantification of specific and regionally appropriate reuse-enabling policies to enable small to medium businesses deliver financial and accessible refill opportunities is needed in both locations, with suggestions in Table 3. These could include business rate reductions, refill product subsidies or rewards, or transparent packaging pricing. A requirement for retailers above a certain size to offer reuse options could stimulate the normalisation of 'refill on the go' and other reuse options. Our research suggests measures are more likely to be successful in Vietnam.

Clarifying the benefits of 'refill on the go' as one of many steps required to put the benefits of each option in the waste hierarchy into perspective is challenging, however comparative LCA of various packaging formats would contribute to filling this knowledge gap.

4.6.2. Challenges

Allergen sensitivity is increasing globally but was identified as a barrier in the UK only. This could be solved by adopting alternative reuse systems to 'refill on the go' or zoning of retail areas to reduce contamination risks.

Vietnamese consumer concern regarding the provenance of refill products was found to be a further barrier, which may be overcome by branded dispensing equipment or 'return on the go' retail. Distrust regarding quality, consumer price sensitivity and retailer experience suggests that as in the UK, demand for non-organic products in reusable packaging should be prioritised.

4.6.3. Unintended consequences

Benefits, costs and unintended consequences of policies facilitating 'refill on the go' are difficult to measure and assign, as factors can be context specific and highly variable.

Financially, low-income consumers, already paying poverty premiums on small purchase quantities such as sachets, may need to purchase unaffordable larger quantities for 'refill on the go' to be feasible. EPR costs will predominantly be passed onto consumers, with annual costs in Vietnam as yet unclear and forecast to be approximately £1.5bn in the UK, (Edie.net, n.d.). Low-income consumers and small businesses may struggle to absorb extra costs. Whereas FMCG companies may have the capacity to adapt to CBMs, sachet sellers and small-scale manufacturers may be unable to adapt. Sector precarity and the space required to facilitate some reuse options can make pioneers and early adopters vulnerable to disproportionate cost burdens.

Table 3
Suggested policy and Fiscal Incentives by barrier and location that could initiate barrier reductions.

Internal or External	Barrier	Policy and Fiscal Incentives	Location
External	Channel conflict deterring FMCG involvement	• Packaging taxes and EPR to push FMCGs to unpackaged options • Minimum requirement for reuse retail for retailers over a certain size	VI
External	FMCGs reluctant to agree Minimal Viable Product quantities for small retailers	• Packaging taxes and EPR to push FMCGs to unpackaged options	VI
External	Low political sustainability motivations	• Global cooperation on climate goals	UK
External	Product provenance (fake products)	• Trusted retailer schemes or product passports underpinned by regulatory guidance • Publicised agreements between FCMGs and retailers	VI
External	Consumer preference for supermarkets	• Business rates or alternative tax relief and grants to support smaller businesses • Minimum requirement for reuse retail for retailers over a certain size	UK
External	Different terminology and descriptions for reuse and refill	• Regulatory support including simplified guidance and standards on hygiene and administration requirements using globally agreed terms	UK and VI
External	Dominance of recycling	• Funded awareness campaigns • Waste reduction targets starting at the design phase under EPR • Single-use packaging taxes regardless of recyclability • DRS for reuse, not just recycling	UK
External	Knowledge about benefits of CBMs	• Government funded research focussed on prevention and reuse (e.g. LCAs) and education in schools • Transparent whole-life packaging costs, potentially a traffic-light system of red (high env cost) to green (lower env cost)	UK and VI
External	Packaging as a marketing canvas	• Tech enabled access to product and brand information via QR codes	UK and VI
External	Large retailer reluctance to engage with long term systems	• Minimum requirement for reuse retail for retailers over a certain size • VAT and similar tax exemptions or reduction to attract consumers and increase turnover • Regulatory support including simplified guidance and standards on hygiene and administration requirements	UK

(continued on next page)

Table 3 (*continued*)

Internal or External	Barrier	Policy and Fiscal Incentives	Location
External	Perception that 'refill on the go' is for wealthier consumers	• Funded awareness campaigns • Minimum requirement for reuse retail for retailers over a certain size	
Internal	Higher actual or perceived product costs owing to start-up overheads	• Business rates or other tax relief • Grants for small businesses • VAT and similar tax exemptions or reduction • Regulatory support including simplified guidance and standards on hygiene and administration requirements	UK and VI
Internal	Higher actual or perceived product costs owing to organic produce	• Business grants and rates or other tax relief • VAT and similar tax exemptions or reduction to encourage wider product ranges	UK
Internal	Opportunities to engage with 'refill on the go'	• Minimum requirement for reuse retail for retailers over a certain size • Business grants and rates or other tax relief • VAT and similar tax exemptions or reduction • Procurement policies that favour reuse	UK and VI
Internal	Requirement for multiple shopping trips	• Minimum requirement for reuse retail for retailers over a certain size to increase likelihood of everything being in one place	
Internal	Hygiene and allergens	• Regulatory support including simplified guidance and standards on hygiene and administration requirements	UK
Internal	Non-airtight dispensing equipment	• Minimum requirement for reuse retail for retailers over a certain size to stimulate innovation • Simplified guidance and standards to cut costs	UK
Internal	Inconvenience of carrying containers to 'refill on the go'	• VAT and similar tax exemptions or reduction to encourage local and mobile businesses • Regulatory support including simplified guidance and standards on hygiene and administration requirements for donated packaging • Support covering a range of reuse options, including those with leased containers	UK and VI

Socially, there is a risk that the retail sphere becomes fragmented with different systems (Ellen MacArthur Foundation, 2023) that exclude consumers without capabilities to adopt reuse and refill during the transition phase and beyond. This includes systems that are not designed for consumers with different physical and cognitive abilities. Supermarket adoption of CBMs could also put smaller retailers out of business. It is also unclear how the formal and informal waste management sector will adapt to changes in waste composition, should transitions to refill and reuse be successful (Löhle et al., 2021).

Environmentally, the benefits of reuse are largely undisputed, but production and end of life impacts of sturdier reusable containers made from alternative materials to plastic may also disproportionately affect poorer and vulnerable communities in similar ways to single-use packaging.

4.6.4. *Opportunities*

'Return on the go', also referred to as 'prefill', shares some consumer behaviour requirements and quantification opportunities with existing and proposed packaging DRS. It can facilitate branded packaging and mitigate hygiene concerns. However, the container lease and centralised cleaning requirements of this system may be unfeasible for low-income consumers who purchase groceries in sachets or prefer cheaper unbranded products.

Price is an acknowledged barrier to reuse systems, but we found this to comprise of a focus on organic produce by retailers, and a lack of fiscal policy incentives and support for consumers and businesses. Consumers surveyed for this study want opportunities to purchase cheaper, non-organic groceries in reusable packaging alongside other products, and the younger, more entrepreneurial and nimbler Vietnamese refill sector may be better placed to deliver this.

Consumer acceptance of refill and reuse models is essential to bring CBMs to scale. However, consumers should not be blamed for making poor environmental choices when retailers encourage such behaviour with cheaper prices. Acceptance may be achieved by normalising refilling in one sector, such as home cleaning and self-care, before moving to foodstuffs, just as normalisation of water bottle reuse is preceding the increase of reusable coffee cups. Buy-in from larger retailers reluctant to adopt this currently low-profit business model is required. Rather than relying on consumers to lead a bottom-up effort to consume in ways that align with circular economy objectives, barriers are concluded from this research to start at the top with external barriers that need to be addressed first.

5. Conclusion

We asked whether 'refill on the go' business models are a viable alternative in Southeast Asia and the UK and aimed to identify gaps, challenges and opportunities.

Insufficient policy support, communication and education were revealed as external barriers hindering the adoption of 'refill on the go' at scale in Vietnam and the UK. Opportunity, convenience, logistics, price, choice and quality were identified as internal barriers in both locations. Low profit margins, product provenance concerns and knowledge were barriers observed in Vietnamese data, and customer engagement and hygiene and allergies only in the UK. Analysing the perspectives of stakeholders rather than only existing or potential consumers, revealed behaviours of the latter to be of secondary relevance.

Our contribution, with which we aim to support policy decisions using empirical methods to test selected theoretical principles, suggests that operational and systemic challenges and solutions are predominantly location specific and unlikely to move to scale without top-down support and guidance. We tested a thorough CBM framework, finding that barrier solutions based on other geographical locations or general frameworks may miss local nuances. We have made suggestions for further research, including our methods being built upon and repeated using a larger consumer sample and post-COVID19 interviews to quantify transition and support costs.

We present a distress call on behalf of the 'refill on the go' sector for urgent bold policy measures and communication for the small to medium business pioneers operating within it. Failure to focus on this business model is a missed opportunity to support transition to a Circular Economy.

6. Limitations

The nonprobability sampling technique selected for the survey can be prone to selection bias and applicability of the results to wider populations should be applied with caution (Fowler, 2009). A lack of detail in some survey questions, such as quantities refilled at each visit made little impact to the results but would benefit from further research. A small number of inconsistent survey answers were observed, particularly from Vietnamese participants who, for example, wanted larger and smaller product ranges almost equally. Overly positive responses may have arisen from low understanding of refill systems, or indifference to the survey. The impact of this on the results was negated through an emphasis on stronger aspects of the data collected, such as qualitative responses and questions that were answered with more care. Differences in views on refilling food and non-food products were not explored owing to insufficient data. We acknowledge that participants, who in both locations were more likely to refill non-food items, may have had different views to barriers on different items. Interviews with Vietnamese participants were conducted in English, which may have affected the depth of detail some participants were able to give.

Samples are not demographically representative of either Country and large demographic variance can be found within and between samples. Collection of data from consumers country-wide in the UK and within 1 Vietnamese city although intentional, further limits comparison. Data was collected when countries were under varying Covid19 Pandemic restrictions, with Vietnam under 'lockdown' during the interview phase. The study would benefit from being repeated with amendments to assess the impact of the Pandemic and create further insights. All participating retailers are small and medium in size with parts of the 'refill on the go' sector not represented, including supermarkets and the logistics industry, which may exclude opinions and knowledge from large, multinational and FMCG businesses and introduce a risk of bias. We acknowledge that the authors are based in a High-Income Country with privileges and lived experiences that may influence data interpretation. Our results from research undertaken in one European and one Southeast Asian country are not presented as being representative of these large and diverse regions.

7. Further research

Time and resource impacts of barriers identified from a gendered and income perspective is suggested, as primary users of reuse models are female. Consumers purchasing products in sachets are a specific target population highlighted for further research, particularly in the field of Lifecycle Assessments, owing to the socioeconomic and environmental impacts of sachet use and waste. Barriers to food and non-food 'refill on the go' differ and further research into prioritisation of policy and fiscal measures is suggested. Finally, location specific financial quantification of business support needed to make reuse models viable and sustainable would aid the direction of policy development in this area. Further research should be region specific with results applied elsewhere with caution.

CRediT authorship contribution statement

E. Cullen: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **M. Yang:** Writing – review & editing, Supervision. **M.N. Sule:** Writing – review & editing, Supervision.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.clrc.2026.100405.

Data availability

Data including all transcripts is available from the Cranfield University data repository via https://doi.org/10.17862/cranfield.rd.25827832.

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