Consumer Perception, Awareness, and Behaviour Towards Circular Chemical Home Products

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Executive Summary

The transition to a circular economy represents a fundamental transformation from the traditional 'take, make, dispose' model to one that prioritises reusability, recyclability, and waste minimisation. Within this framework, the chemical home products industry is undergoing a major transformation, aiming to design products with a life cycle focus to enhance environmental sustainability and reduce waste. This report examines consumer knowledge, perception, and behaviour regarding sustainable circular products. It also explores the perspectives of key stakeholders, including businesses and policymakers.

The research has revealed gaps in consumer awareness of the presence of chemicals in our everyday lives. While 80% of consumers correctly identified paints and batteries as containing chemicals, only 36% recognised that bin bags also contain chemicals. Misconceptions about surfactant-based products like shampoo and detergent suggest a need for **clearer product labelling and education**.

Despite knowledge gaps, consumers displayed strong support for sustainable products. However, price sensitivity and brand loyalty often override sustainability considerations. Affordability remains a key barrier to widespread adoption of products considered more sustainable. The research revealed a clear "say-do gap," where stated preferences did not always translate into purchasing decisions.

A significant portion of those surveyed expressed uncertainty about purchasing items made from recycled chemicals, indicating a need for **clearer communication on product safety and benefits**.

Nearly half of respondents reported making efforts to use products more efficiently. However, a third were unwilling to adopt sustainable usage patterns, suggesting that **design improvements** (e.g., packaging that minimises product waste) could drive better outcomes. Furthermore, disposal behaviours were also varied. For example, 8% of respondents disposed of unused paint down sinks or toilets. This highlights the need for clearer disposal **guidance and more accessible recycling solutions**.

There is also limited public awareness of environmental policies related to home products. Only policies with direct consumer interaction, such as the Deposit Return Scheme, had high recognition rates. This highlights the need for more accessible and

engaging policy communication. Additionally, 35% of respondents believed the government should bear the cost of sustainable transitions, reinforcing the need for **policy interventions that support affordability**.

To drive meaningful change, policymakers must align incentives with consumer needs, while businesses should prioritize transparency, affordability, and education. A coordinated approach—spanning government regulations, industry innovation, and consumer engagement—will be essential in advancing a circular economy for the chemical home products sector.

1. Introduction

The transition to a circular economy (CE) represents a fundamental transformation from the traditional 'take, make, dispose' model to one that prioritises reusability, recyclability, and waste minimisation. Within this framework, the chemical home products industry is undergoing a major transformation, aiming to design products with a life cycle focus to enhance environmental sustainability and reduce waste. This shift is particularly critical given the significant environmental impact of the chemical industry—it accounts for 16% of direct CO_2 emissions, is the largest industrial energy consumer, and generates over 40 million tonnes of waste annually in the UK's commercial and industrial sectors [1]–[3].

The environmental footprint of the chemical industry is largely driven by resource-intensive manufacturing and substantial waste production. Decarbonising this sector presents unique challenges, as fossil carbon is not only an energy source but also a key raw material in the production of platform chemicals. These chemicals serve as essential building blocks for a wide range of products across various industries. A circular economy approach specifically tailored to the chemical industry has the potential to significantly cut emissions, reduce waste in chemical processes, and influence other sectors striving to achieve net-zero goals.

The core principles of a CE revolve around keeping materials and products in circulation for as long as possible, minimising waste and pollution while safeguarding natural resources. This approach aligns with the waste hierarchy principles [4]:

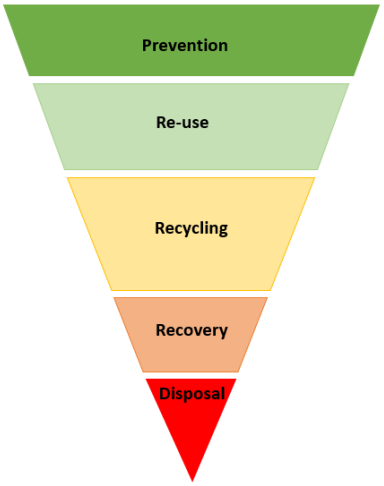

FIGURE 1: HIERARCHY PRINCIPLES, REDRAWN WITH PERMISSION [4]

The chemical home products industry holds a unique position within the chemical supply chain, directly impacting consumers through both products and packaging. Many household items, such as shampoo and hair products, are packaged in plastic containers and contain chemical ingredients like surfactants, which are primarily derived from fossil feedstocks. Successfully transitioning this sector to a circular model requires not only industry innovation but also consumer awareness and behavioural shifts. Research suggests that consumer demand is playing an increasingly important role in driving sustainability efforts [5]–[7]. For instance, the growing adoption of electric vehicles demonstrates how market demand can accelerate sustainable transitions.

Policies and campaigns have primarily focused on sustainable packaging rather than the chemicals within products. The UK's 2022 plastic packaging tax, which requires a minimum of 30% recycled content to avoid charges [8], and the 2015 single-use bag charge, which led to a 95% reduction in plastic bag usage [9], are notable examples of successful interventions. However, while chemicals are essential to modern life, their environmental impact often goes unrecognised. Achieving a sustainable future requires a systemic shift in how we produce, consume, and dispose of chemical-based products.

Public perception and behaviour are critical factors in the successful adoption of circular chemical home products. Without consumer acceptance and engagement, market expansion and policy effectiveness could be hindered. To better understand these dynamics, researchers at Edinburgh Business School, Heriot-Watt University (HWU), the Interdisciplinary Centre for the Circular Chemicals Economy (CircularChem), and WRAP conducted an extensive online consumer survey in August 2022. The study gathered insights from over 3,000 UK citizens aged 18 and above, with 2,613 responses retained after validation. The sample was carefully structured to reflect the UK population's demographic profile, ensuring balanced representation across age, gender, and region.

This report summarises key findings and methodology, examining consumer knowledge, perception, and behaviour regarding sustainable circular products. It also explores the perspectives of key stakeholders, including businesses and

policymakers. The report concludes with actionable recommendations to support a successful transition to a circular economy in the chemical home products sector.

2. Demographic

Before presenting the key findings and insights from the survey, it is essential to understand the demographic composition of the respondent population. This ensures proportional representation across different groups, enhancing the validity and applicability of the study's conclusions.

This section provides an overview of the demographic variables considered, such as gender, age, education, employment status and household income. The diversity within these categories strengthens the relevance of the study's findings.

- ***Gender***

The survey aimed for a balanced gender representation and succeeded in obtaining a nearly even distribution of male and females and aligns closely with government data for the UK population [10]. Male respondents accounted for 48.3% of the sample, females made up 50.9%, while approximately 0.5% identified as non-binary, and 0.3% preferred not to disclose their gender.

- ***Age Groups***

The respondents represented a broad range of age groups, ensuring insights across different life stages. Table 1 presents the proportional distribution of respondents by age.

TABLE 1: DISTRIBUTION OF RESPONDENTS BY AGE.

Age Group	Proportional Distribution (%)
18-24	9.5
25-34	18.8
35-44	19.6
45-54	23.1
55-64	20.2
65+	8.7

- ***Geographic Distribution***

As illustrated in Figure 2, the majority of respondents were from England, reflecting the overall population distribution of the UK. A comparison between the demographic distribution of survey respondents and UK census data is provided in Table 2, using figures from the Office for National Statistics [11].

TABLE 2: COMPARISON OF UK POPULATION DISTRIBUTION AND SURVEY DATA.

	UK Population (2021)	Population Distribution (%)	Survey Distribution (%)
UK	67,026,000	--	--
England	56,536,000	84	82
Wales	3,105,000	5	5
Northern Ireland	1,905,000	3	3
Scotland	5,480,000	8	10

The data in Table 2 demonstrates that the survey provides a proportional representation of the devolved nations of the UK for this study.

- ***Education Level***

Respondents were asked to indicate their highest level of education attained, and the options ranged from 'Secondary education or lower' to 'Master's degree/higher or equivalent'. Figure 2 illustrates the distribution of education levels among respondents.

Currently, circular economy principles are not included in the national curriculum across the UK's devolved nations. However, a case study undertaken by Sitra in Finland, highlights the role of education in driving systemic change towards a circular economy [12].

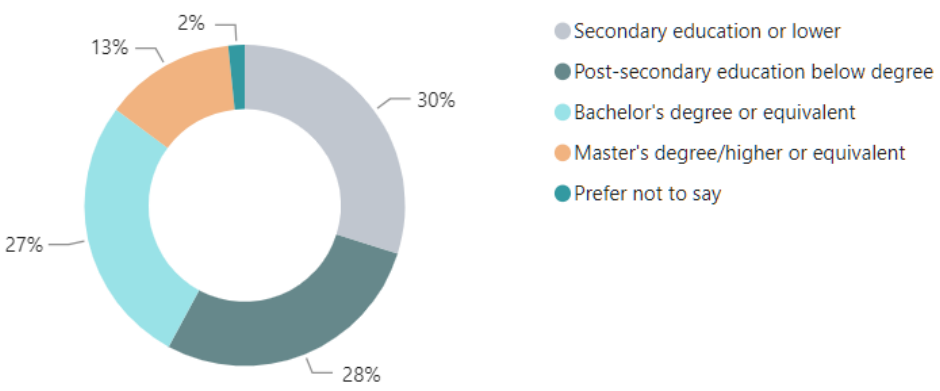

FIGURE 2. DISTRIBUTION OF RESPONDENTS BY EDUCATION LEVEL

- ***Work Status and Household income***

The survey also captured data on employment status. Over 50% of respondents identified as full-time employed or self-employed, while 15% were part-time employed, and about 6.5% were homemaker. The remaining 25% were either students, retirees, or unemployed.

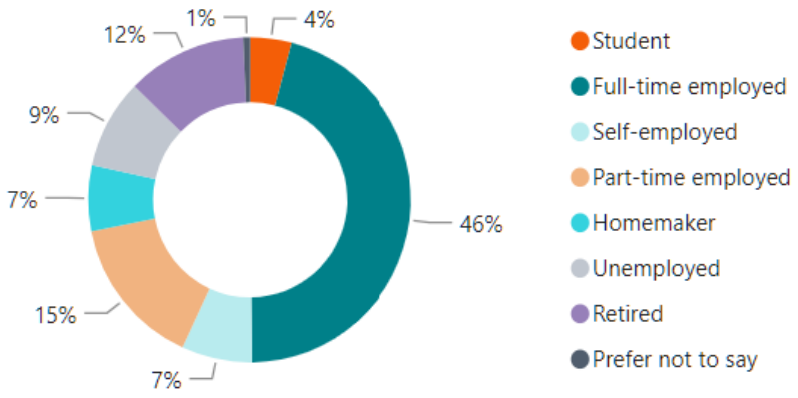

FIGURE 3. DISTRIBUTION OF RESPONDENTS BY WORK STATUS.

Figure 44 further illustrates household income distribution among respondents, with bars segmented by household size:

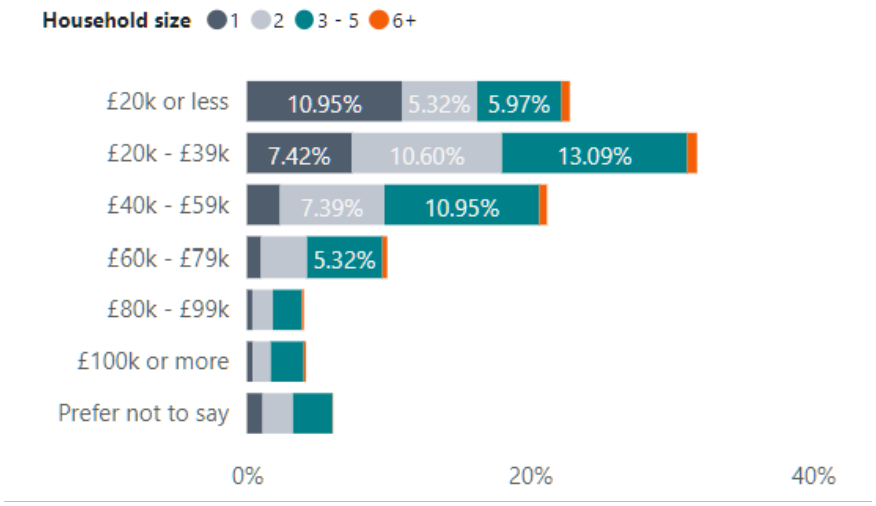

FIGURE 4. DISTRIBUTION OF RESPONDENTS BY HOUSEHOLD COMPOSITION, FURTHER SEGMENTED BY HOUSEHOLD SIZE.

Employment status and household income play a crucial role in decision-making regarding sustainable choices, particularly when adopting eco-friendly home care products involves additional costs. The data gathered offers valuable insights into the economic considerations influencing sustainable consumer behaviour.

3. Knowledge and Perception

- ***Limited Knowledge of Chemicals in Home Products***

The survey revealed a general lack of in-depth knowledge among consumers regarding the chemicals used in home products. Respondents were presented with a list of 10 different home products and asked to identify which they believed contained chemicals. The findings were somewhat striking:

FIGURE 5. PERCENTAGE OF RESPONDENTS CORRECTLY IDENTIFYING CHEMICAL CONTENT IN VARIOUS HOUSEHOLD PRODUCTS.

Only 36% of respondents recognised that bin bags contain chemicals, highlighting a significant gap in awareness regarding everyday items.

Discrepancies exist in awareness of chemically similar products. For example, shampoo and conditioner, which are surfactant based, were not strongly associated with chemicals, scoring just 43%. In contrast, washing capsules, also largely surfactant-based score much higher at 59%. This may be partly due to marketing strategies, such as the distinction between “bio” and “non-bio” detergents, which emphasise chemical composition more prominently.

On the other hand, nearly 80% of respondents correctly identified that paints and batteries contain chemicals, suggesting a more established awareness for certain types of home products over others, which could be in part due to the labelling of the product or education on certain home-care product and the potential hazard associated with them.

On average, respondents correctly identified 5.5 out of 10 items, indicating that while chemicals are ubiquitous in household products, their presence is not always immediately apparent to consumers.

- ***Environmental Policy Awareness***

Beyond product knowledge, the survey assessed respondents' familiarity with environmental policies related to household chemicals. Figure 6 highlights limited understanding or familiarity with existing regulations, guidelines, or initiatives that govern the sustainability of home products. The data suggests a potential gap in public engagement with environmental policies, particularly among individuals who are not directly affected by them. Of the three policies presented, only the *Deposit Return Scheme* directly impacts members of the public in their daily lives.

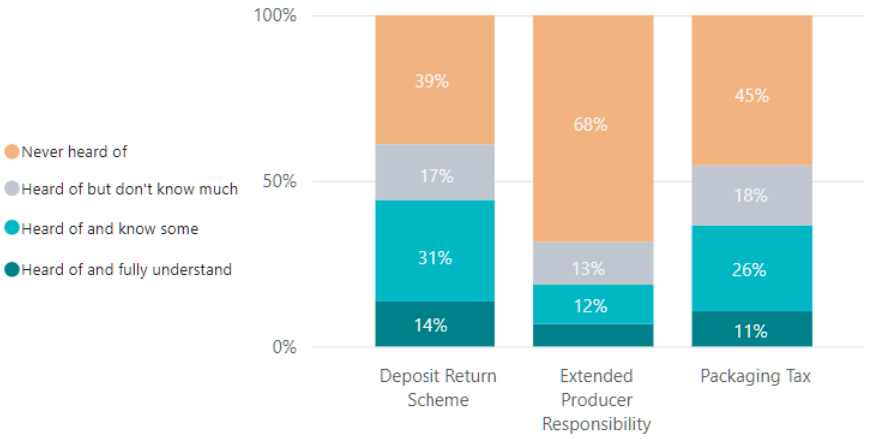

FIGURE 6. CONSUMER FAMILIARITY LEVELS OF KEY ENVIRONMENTAL POLICIES

- ***Positive Attitude Towards Sustainability***

Despite limited knowledge of chemicals and policies, the survey revealed a strong consumer inclination toward sustainability, as reflected in Figures 7-9. A majority of respondents expressed a willingness to transition to more sustainable alternatives if made available, echoing a broad societal trend toward environmental consciousness as discussed earlier.

A key area for improvement is effective and transparent communication about recycled content in consumer products. The data in Figure 7 highlights a significant proportion of respondents who were "undecided" or "needed more information" before purchasing goods made from recycled chemicals: 24% for child's toys, 43% for fizzy

drinks and 46% for washing capsules. This suggests a major opportunity for producers to enhance consumer confidence through clear and reassuring messaging about the safety, quality, and environmental benefits of products containing recycled materials.

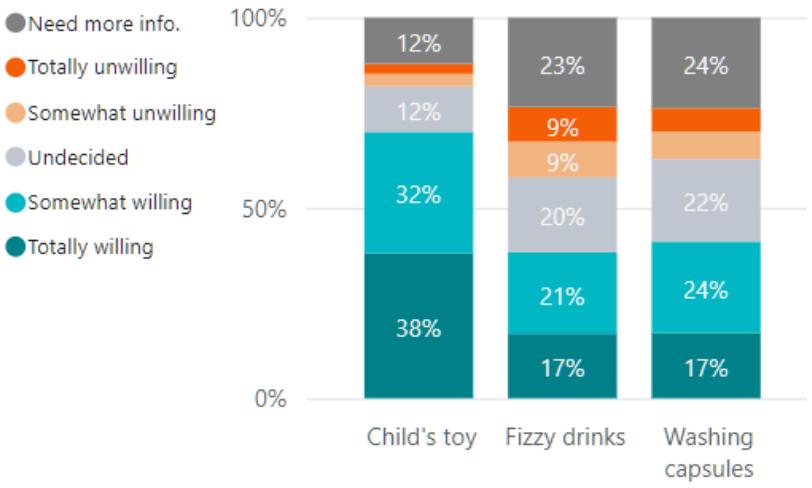

FIGURE 7. CONSUMER WILLINGNESS TO PURCHASE GOODS MADE FROM RECYCLED CHEMICALS.

In Figure 8, consumers displayed general optimism about sustainable products and their increased availability in stores. Many respondents also felt empowered when making sustainable purchasing decisions. However, there is a notable contradiction that while consumers recognise their role in making sustainable choices, they also believe that sustainable products cost more and express reluctance to pay a premium for environmentally friendly options. This highlights a critical barrier to sustainable production adoption: consumers do not believe the financial burden of sustainability should fall on them. Addressing this perception—whether through pricing strategies, incentives, or policy interventions—will be key to ensuring sustainable products become the default choice in the market.

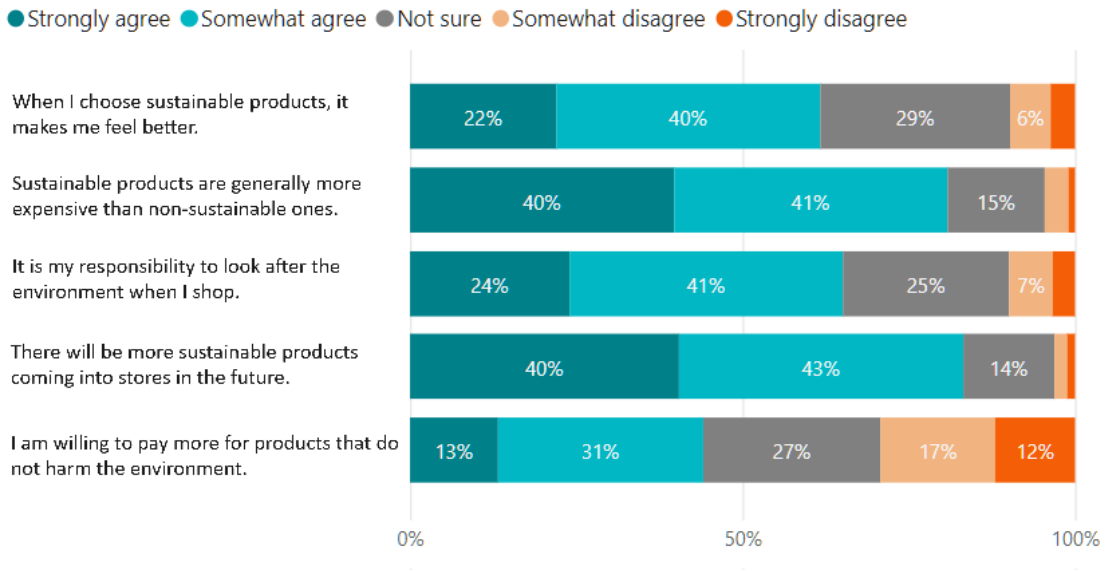

FIGURE 8. RESPONDENT AGREEMENT LEVELS FOR STATEMENTS ON SUSTAINABILITY AND CHEMICAL HOME PRODUCTS.

The findings in Figure 9 reinforce positive consumer perceptions of products made from recycled materials. A majority of respondents believe they are more environmentally friendly and efficient, and safer to use. However, one persistent concern is the assumption that recycled materials incur additional cost, as seen with recycled chemical products, may discourage adoption.

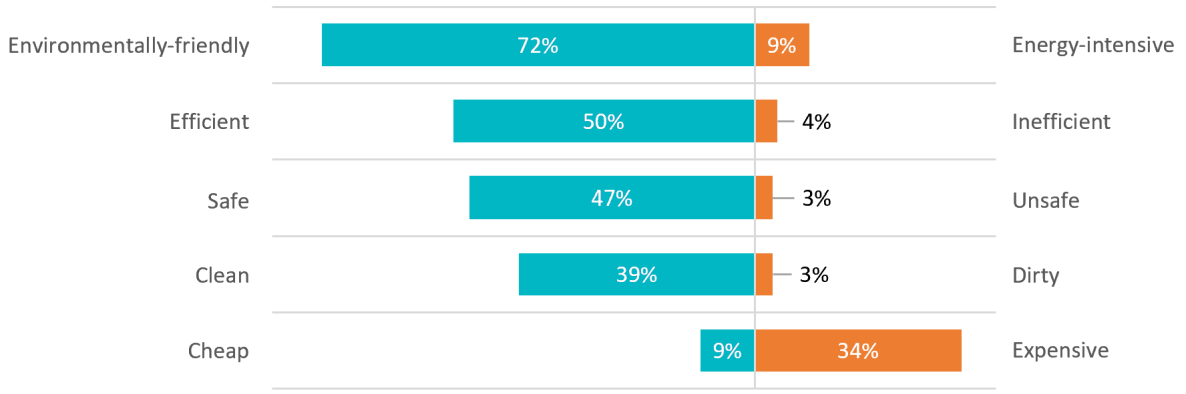

FIGURE 9. CONSUMER PERCEPTIONS OF PRODUCTS MADE FROM RECYCLED MATERIALS.

- ***Implications***

The findings in this section underscore the complex relationship between consumer awareness, perception, and behaviour in the context of circular chemical home products. The mixed results—limited knowledge yet positive attitudes—pose both challenges and opportunities.

One of the key challenges is bridging the knowledge gap through comprehensive education campaigns and clearer product labelling. Improving consumer understanding, building trust, and increasing confidence in sustainable products are essential steps toward wider adoption. At the same time, there is a significant opportunity to leverage the existing consumer enthusiasm for sustainability and encourage behavioural shifts towards sustainable choices. Industry and policy-driven solutions can play a critical role in making sustainable options more accessible and affordable.

While consumers demonstrate a willingness to adopt sustainable alternatives, greater public education is needed to clarify what these alternatives are and why they matter. By aligning consumer knowledge with their existing positive attitudes, stakeholders have a significant opportunity to drive meaningful change in the market for circular chemical home products.

4. Consumer Behaviour

The survey examined consumer behaviour in three key stages: the *purchase stage*, the *use stage*, and the *disposal stage*.

- ***Purchase Stage***

More than half of the respondents indicated that they actively look for sustainable options when shopping for home and personal care products, supporting the previously discussed positive attitude toward sustainability.

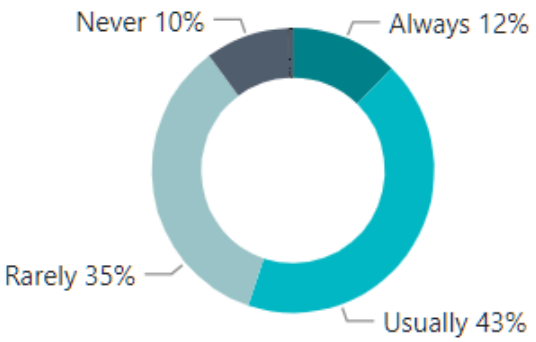

FIGURE 10. PERCENTAGE OF SEEKING SUSTAINABLE OPTIONS AMONG CONSUMERS FOR CHEMICAL PRODUCTS AT HOME

To assess how self-reported behaviours translate into real-life decision-making, the survey included hypothetical shopping scenarios. Respondents were asked to rank four items of the same type—specifically, toilet cleaner (Figure 11) and washing detergent (Figure 12)—from most likely to buy (1) to least likely to buy (4). The items varied in aspects like price, brand, and environmental impact.

Brand/Price	Package	Product	Avg. rank	% of top rank
 **Domestos** £1 / 750ml	Plastic bottle	Causes severe skin burns and eye damage Very toxic to aquatic life	2.12	45%
 **Bio-D** £1.8 / 750ml	100% recycled & recyclable bottle Refillable	Plant based, biodegradable ingredients Certified zero waste factory Cruelty-free	2.54	28%
 **Duck** £1.2 / 750ml	Plastic bottle Refillable	None	2.23	20%
 **Bloo power tabs** £3 / 12×25g	Recyclable cardboard box	Cause skin and eye irritation Harmful to aquatic life with long lasting effects	3.11	7%

FIGURE 11. CONSUMER PREFERENCES IN HYPOTHETICAL SHOPPING SCENARIOS: RANKING OF TOILET CLEANER.

Brand/Price		Package	Product	Avg. rank	% of top rank
	**Ecover** ~~Was £9~~ Now £6.8 / 1.5L (16p/wash)	Bottle made from 100% recycled plastic and fully recyclable	Plant based, biodegradable ingredients **Vegan** and cruelty-free	2.62	19%
	**Persil** £7 / 1.5L (12p/wash)	Bottle contains recycled plastic	Plant-based, biodegradable stain removers	2.12	35%
	**Tesco** £3.6 / 1.8L (6p/wash)	Plastic bottle	None	2.47	31%
	**Ecover refill** £20 / 5L (14p/wash)	Refill package saves 27% the plastic Bottle made from 100% recycled plastic and fully recyclable	Renewable plant-based and mineral ingredients UNEP award **Vegan** and cruelty-free	2.79	15%

FIGURE 12. CONSUMER PREFERENCES IN HYPOTHETICAL SHOPPING SCENARIOS: RANKING OF WASHING DETERGENT.

Although consumers expressed a preference for sustainable options, the results reveal that when faced with choices, consumers often prioritize other factors. Price sensitivity emerged as a key driver, with many respondents opting for cheaper alternatives even when a more sustainable alternative was available. For example, Domestos was favoured over the other toilet cleaner options due to its price advantage. Furthermore, brand loyalty and perceived product performance significantly influence choices, as consumers tended to prefer well-known brands over lesser-known alternatives. For instance, more respondents chose Persil over Tesco washing detergent, despite Persil being the more expensive option. In addition, purchasing preferences may vary by product type—consumers might be more discerning about items that come into contact with their clothes than those used for toilet cleaning [13].

The observed divergence between stated intentions and actual purchasing decisions reflects the “say-do gap” phenomenon, where consumers express a willingness to make sustainable choices to often revert to traditional habits when making actual purchases. This gap highlights the need for a deeper understanding of the factors that drive consumer behaviour and how to encourage the adoption of sustainable products.

- ***Use Stage***

The survey also explored sustainable usage patterns for common household products – see Figure 13. Nearly half of respondents (49%) expressed a willingness to adopt circular and sustainable behaviours, such as using products more efficiently by squeezing hard till nothing comes out. Additionally, 16% of respondents are amenable to adopting a more frugal lifestyle—for example, cutting the tube to finish all the product. However, it is crucial to note that nearly a third of respondents are unwilling to adopt sustainable usage patterns. This suggests that product design improvements—such as packaging that ensures minimal product waste—could have a significant impact on sustainability efforts at the use stage.

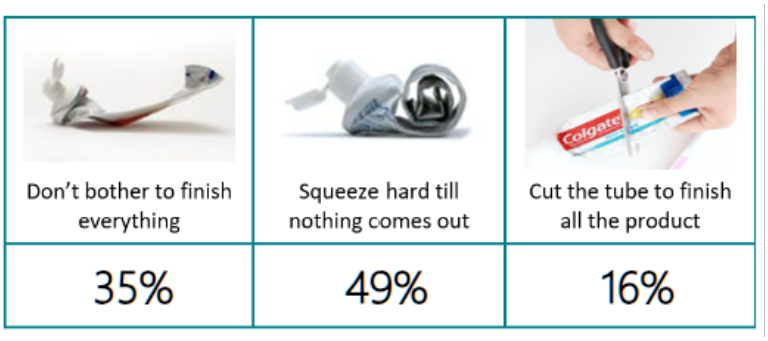

FIGURE 13. SUSTAINABLE USAGE PATTERNS FOR COMMON CHEMICAL HOME PRODUCT

- ***Dispose Stage***

Consumer behaviour at the disposal stage varied widely, highlighting both responsible and problematic disposal practices. Table 3 shows that while 26% of respondents sought instructions on proper disposal methods, 33% took waste products to local recycling centres to ensure correct recycling. However, a concerning proportion exhibited incorrect or environmentally harmful behaviours. For example, 11% indiscriminately placed all waste in the recycling bin without considering its recyclability, and 25% discarded everything in the general waste bin. Additionally, while some respondents conscientiously categorise paint packaging for recyclability, 8% disposing of unused paint via sink or toilet is identified as incorrect behaviours.

TABLE 3. PEOPLE'S BEHAVIOUR ABOUT DISPOSAL OF A PAINT CONTAINER THAT STILL HAD UNUSED PRODUCT LEFT.

Threw everything in the recycling bin	11%
Threw everything in the general waste bin	25%
Dumped the unused paint down the sink/toilet and then disposed the package in the recycling bin	5%
Dumped the unused paint down the sink/toilet and then disposed the package in the general waste bin	3%
Looked for instruction on local tips	26%
Give it away (local charities, friends, etc.)	4%
Took to local recycling centre	33%
Other (cannot remember, keep it, etc.)	3%

- ***Willingness to pay***

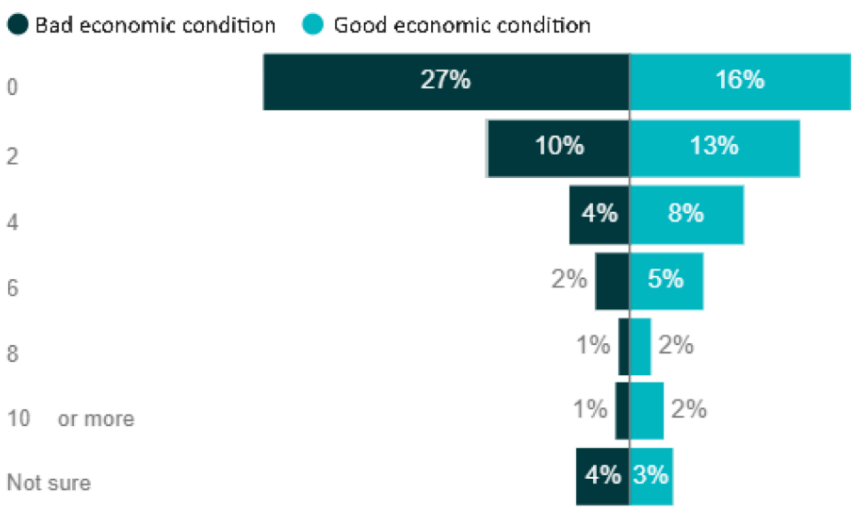

FIGURE 14. WILLINGNESS TO PAY EXTRA FOR SUSTAINABLE PRODUCTS UNDER VARYING ECONOMIC CONDITIONS[1].

We analysed respondents' willingness to pay (WTP) for sustainable products under different economic conditions. Results show that in favourable economic conditions, respondents are more inclined to allocate greater financial resources towards sustainable choices. For instance, when the economy is good, 5% of respondents are willing to expend 6% of their capital on such activities. However, during economic downturns, this willingness drops significantly, with only 2% respondents prepared to pay the same premium. Consequently, the economic condition emerges as a

[1] The left vertical axis represents the monetary amount (£). The original question is 'Assume you currently pay £20 a month for your household and personal care products, are you willing to pay more for eco-friendlier options? If so, by how much more are you willing to pay under good economic conditions, and by how much more are you willing to pay under difficult economic conditions?'.

significant factor in gauging sustainable behaviours amongst consumers. While consumers may support sustainability in principle, financial constraints can hinder their ability to make environmentally responsible choices.

5. Message to Government and Businesses

- ***Insight for Government***

The survey findings indicate a divided public perception regarding the effectiveness of government policies on the circular economy. As shown in Figure 15, there is an equal proportion of respondents who agree and disagree with the effectiveness of these policies. Another third of respondents were uninformed about the situation. These findings suggest that existing policies may have made an impact on some, a significant portion of the public remains either unconvinced or unaware of their benefits. To address this, the government could take two key actions: refining and strengthening existing circular sustainability policies to enhance their effectiveness and improving communication efforts to raise awareness and understanding of these policies.

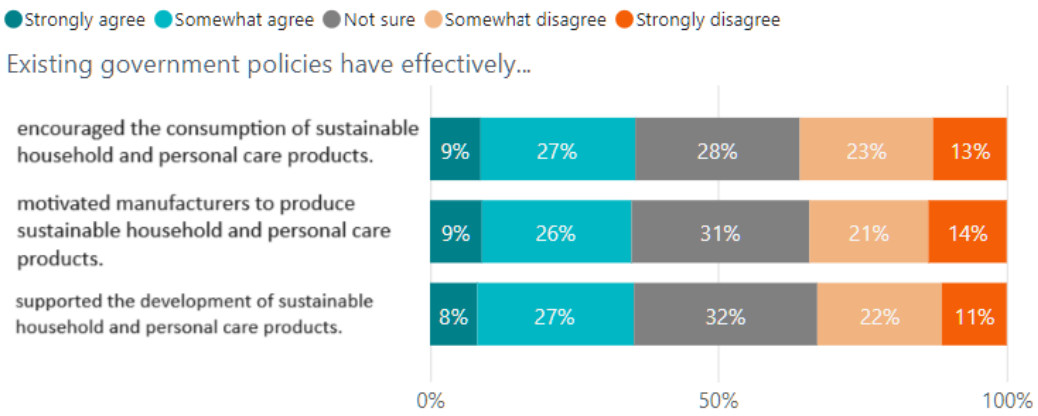

FIGURE 15. SOCIAL TRUST IN GOVERNMENT POLICIES.

Another critical issue highlighted in Figure 16 is the financial burden of sustainable products. Many respondents believe that government (35%) or a shared effort between businesses, consumers, and the government (34%) should bear the additional costs, rather than placing the burden solely on consumers (6%). This reflects broader affordability concerns, reinforcing the need for policy interventions that

support sustainable business practices while ensuring that environmentally friendly products remain financially accessible to all consumers.

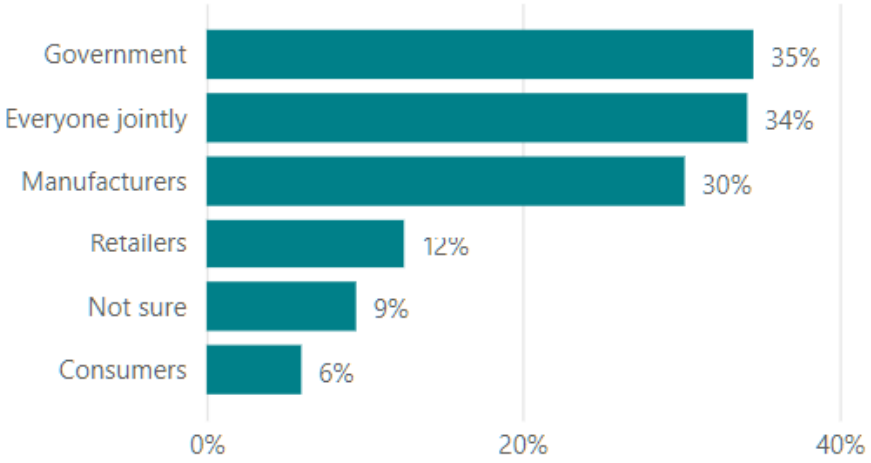

FIGURE 16. PUBLIC OPINION ON RESPONSIBILITY FOR EXTRA COSTS ASSOCIATED WITH SUSTAINABLE PRODUCTS.

- ***Insights for Businesses***

Consumer trust in businesses' sustainability efforts remains mixed. As illustrated in Figure 17, only one-third of respondents believe that retailers are sufficiently promoting a sustainable transition. Additionally, 36% of respondents fail to recognise green claims on company products.

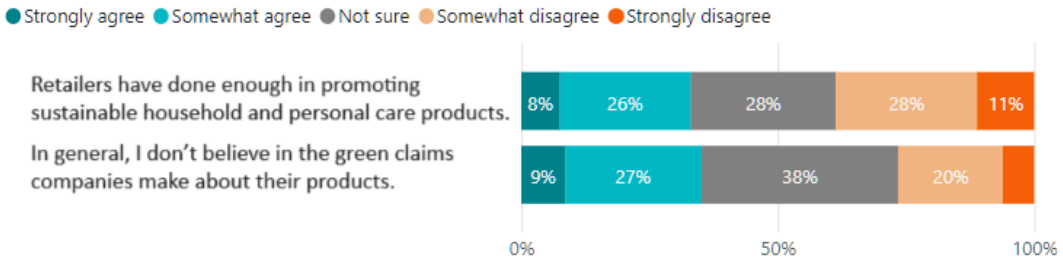

FIGURE 17. SOCIAL TRUST IN RETAILERS AND MANUFACTURERS.

Despite these concerns, Figure 18 presents a more positive outlook. A majority (57%) of respondents report that sustainable products are easy to find in local shops, and 45% believe information about recycled ingredients in products is readily accessible. This suggests that while accessibility has improved, businesses still need to ensure their sustainability claims are clear and credible to build stronger consumer trust.

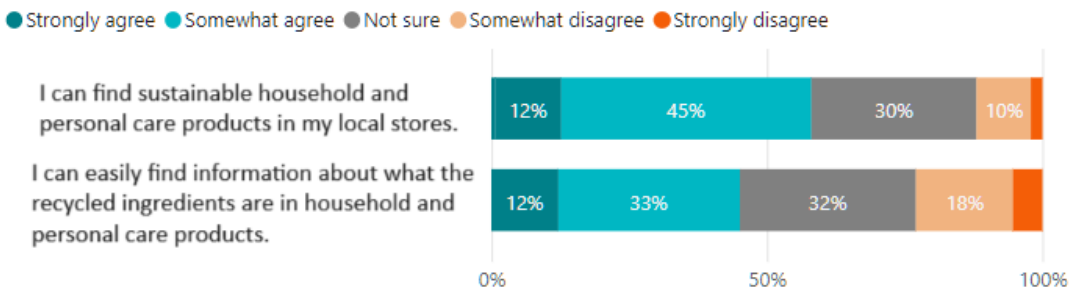

FIGURE 18. CONSUMER PERCEPTIONS ON THE ACCESSIBILITY OF SUSTAINABLE PRODUCTS IN THE MARKET.

Figure 19 further underscores the importance of sustainability messaging is presented. While 67% of respondents find it useful for sustainable household products to be displayed in their own section, 38% express disinterest in companies' sustainability activities.

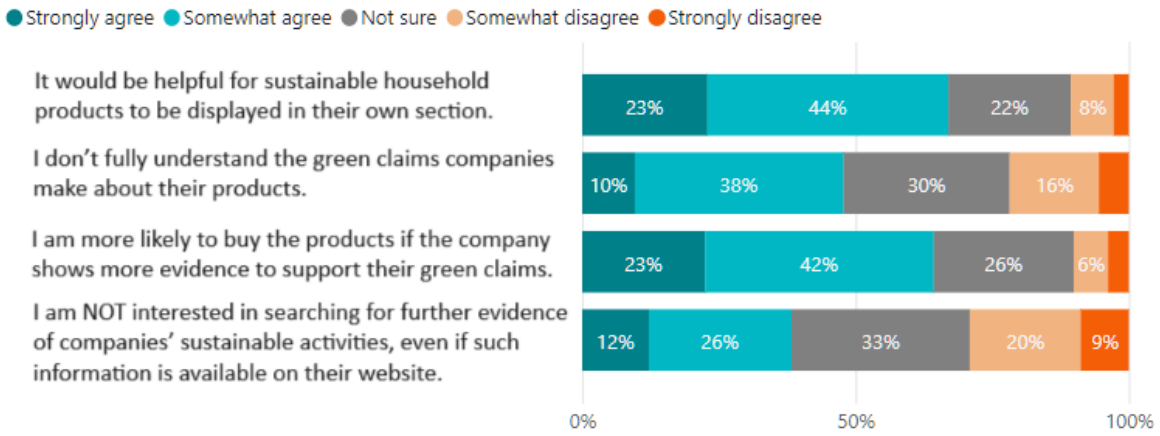

FIGURE 19. CONSUMER PERCEPTIONS ON SUSTAINABLE MESSAGING FROM COMPANIES.

In summary, to build consumer trust and drive wider adoption of sustainable products, businesses should prioritise: 1) improving transparency through clear, verified labelling and certification for sustainability; 2) better communication; and 3) ensuring affordability of these products.

6. Conclusion

This study provides valuable insights into consumer perceptions of sustainable/circular chemicals and materials in home products. It also sheds light on society's transition to a circular economy, insights which can guide the design and implementation of policies and regulations with several considerations in mind.

First, policies should incentivise consumers towards purchasing sustainable products, such as through financial subsidies that reduce costs and bolstering consumers' purchasing propensity. It is clear that whilst consumers generally believed that recycled chemicals and materials are beneficial to the environment, the perceived additional cost of sustainable choices remains a key barrier. Environmental education can be leveraged to highlight the importance of the circular economy, thereby enhancing consumers' willingness to pay [14].

Second, companies should enhance the appeal of sustainable products by improving performance, design and user experience. Concurrently, marketing strategies should emphasize the environmental and social value of sustainable products, integrating clear circular economy messaging to attract consumers. Moreover, companies might offer product recycling services, promoting the recycling of depreciated products to incentivise purchases of circular economy products.

Third, social organisations, including environmental NGOs, might orchestrate educational activities on the circular economy to elevate public awareness and acceptance of such products and recycling practices. Fourth, consumers can cultivate stronger environmental awareness regarding the significance of purchasing and utilising recycled, sustainable products for both the environment and society. By choosing such products, they can diminish their environmental footprint and inspire others to do likewise. In addition, consumers can help reduce environmental impact and encourage widespread adoption of sustainable practices by adopting effective recycling habits and engaging in product recycling and reuse.

The findings of this study highlight the need for a balanced approach that fosters sustainable marketing while avoiding greenwashing. A key challenge lies in determining how the financial burden of sustainable products should be distributed across the supply chain, ensuring that circular products become a viable alternative to

linear ones. Strong leadership from governments, businesses, and social organizations will help to not only change the way sustainable products are perceived, but provide the education required to transit business and society to a more circular model through sustainable design, consumption, and effective end-of life treatment of products.

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