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Unpacking Consumer Preferences: Perceptions and Sustainability of Packaging Material for Orange Juice

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Abstract: Understanding the motivation behind consumers' packaging choices is crucial to providing insights for achieving environmental sustainability outcomes. Here, we examined the influence of product attributes (packaging type, packaging claim, product claim, and price) and consumers factors (e.g., diet type, demographic information) driving orange juice selection. Participants residing in the USA (n = 847) responded to an online survey including: (1) a check-all-that-apply (CATA) to valued beverage characteristics question; (2) a choice-based conjoint task with packaging type, packaging claim, product claim, and price as the attributes; (3) a question tasking respondents to rank packaging material from their perception of the least to most sustainable; and (4) demographic questions. The conjoint analysis revealed that price was the most important attribute, particularly the lowest price. This study revealed that the most ideal orange juice option was packaged in glass, labelled as 100% recyclable, locally produced, and priced at $1.10 per 12 fl. oz. Not only was glass the most preferred packaging type, but it was also incorrectly perceived as the most sustainable. The intention to purchase sustainable packaging was the most important predictor of attribute relative importance (RI) and packaging utilities, followed by effectiveness perception, which only predicted the RI of price. Thus, for consumers to make more sustainable choices, education initiatives need to direct consumers to more sustainable, yet affordable, choices, while considering that purchase intention and effectiveness perception are key attitudinal drivers.

Keywords: conjoint analysis; consumer perception; sustainable packaging; sustainability attitudes; packaging type; packaging claim; product claim; price; orange juice beverage

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1. Introduction

Packaging provides consumers with safe and convenient food products and can preserve food quality. Packaging helps reduce food waste as it facilitates a longer shelf life, which can be further improved by adding protective functions (e.g., resealing capability). Companies also use packaging to convey critical information, such as nutritional content and storage information [1,2], and to describe product claims or potential health benefits [3]. However, certain packaging materials have been scrutinised due to their actual or perceived negative environmental impact [4,5]. According to the United Nations Environment Programme, approximately 36% of plastics produced globally are used in packaging, including single-use plastic products for food and beverage containers, around 85% of which ends up in landfills or as unregulated waste. The US Environmental Protection Agency stated that containers and packaging contributed 28.1% (82.2 million tonnes) of municipal solid waste in 2018 [6]. However, the sustainability of packaging material is not only based on its impact on the environment but also considers additional factors such as cost and effectiveness. Thus, understanding consumers perceptions of the sustainability of packaging materials and the factors driving packaging selection is important to achieving sustainability goals.

One of the primary considerations driving packaging selection for food products is consumer acceptance [7,8]. Certain food products, such as beverages, are available in multiple packaging types (e.g., plastic, aluminium, carton, and glass). Consumers are often faced with choices regarding the packaging material within the same product category, such as the same fruit juice packaged in glass vs. plastic. However, the extent to which packaging or packaging material affects consumers' conscious food choices across different categories is not well understood. This information can be useful in identifying opportunities to shift consumers' choices towards more sustainable packaging. Various factors are at play when it comes to decision-making for competing products: price, perceived product quality, convenience, how attractive the product is, and even perceived environmental sustainability [9,10]. It is clear that collective choices made by individual consumers are a substantial driver of the food system and play a critical role in achieving a sustainable food system [11]. Therefore, understanding the motivation behind consumers' packaging choices is crucial to achieving environmental sustainability outcomes, particularly Sustainable Development Goal 12: responsible consumption and production.

As noted above, sustainability in packaging systems is more complex, incorporating economic, safety, and environmental considerations. For packaging to be sustainable, it must meet constraints of (1) cost, by being produced economically using an optimal amount of resources; (2) community well-being, in that it provides effective protection to food and to consumers and ensures safety for those producing it; and (3) environmental responsibility, through minimising the carbon footprint produced and by being used to full capacity during its lifespan [12]. When applied simultaneously, these factors are key performance measures for determining the sustainability of packaging materials.

Considering the factors that warrant packaging material as being sustainable, as described above, some materials are more sustainable than others. Further, there are multiple factors contributing to the selection of a product based on its packaging, ranging from personal values and attitudes to product features, as previously reported. For values and attitudes, these included demonstrating the effects of: willingness-to-pay; motivation to reduce waste; purchase intention; perceived value of sustainable packaging; environmental concern; perceived importance of sustainable packaging; perception of sustainable packaging functionality, etc. [9,13–15]. Several studies have investigated how packaging features contribute to product acceptance, examining packaging material, packaging design, colour, shape, and label; packaging claims; price; brand; information cues; and product healthiness [9,10,13,16–19]. However, few to no studies have considered the effects of personal values and attitudes, packaging attributes, and cost simultaneously. The effects of price and affordability are fundamental deciding factors for many consumers, especially when sustainability forms part of the trade-off during decision-making [20]. Thus, understanding the factors informing packaging choice using a multidimensional approach that considers both inherent consumer attitudes and realistic product features (including price) would likely be more insightful.

The objective of the present study is to determine how different packaging types (glass, carton, aluminium, and plastic), along with various price points and common sustainability claims, play a role in consumers' selection of orange juice using a conjoint analysis approach. Orange juice was selected as a model product as it is commercially available in the four different packaging types under investigation. Additionally, individual selections were examined, along with consumer sustainability attitudes, diet preferences, and demographic characteristics, to identify traits associated with the selection of different packaging materials. Briefly, to achieve this objective, an online study was conducted, with the main task of asking respondents to select their preferred orange juice from a set of four options, each carrying the selected product attributes: packaging type, packaging claim, product claim, and price. This task provides insights about how each of these product attributes influences product selection. This information was further examined as it relates to respondents values (e.g., sustainability) and other person-related factors (i.e., demographic factors). In summary, insights about consumers' food packaging choices

and attitudes will guide the development of sustainable products that meet consumer needs. These insights highlight specific areas to focus consumer education regarding food packaging and materials to empower consumers to make more sustainable choices where possible.

2. Materials and Methods

2.1. Recruitment

Interested individuals were recruited through an online nationwide (USA) database of people who voluntarily signed up to complete paid surveys (Prolific). Individuals were screened for USA residency, age (>18 years), and orange juice consumption frequency (at least once per month). Qualifying respondents were directed to the study information and provided consent before proceeding to the questionnaire, which was designed and administered through Sawtooth Software Lighthouse Studio (Version 9.15.3).

2.2. Protocol: Conjoint Task and Questionnaire

The respondents completed several activities in the online survey. First, respondents were shown a list of beverage attributes and asked to select all those they valued (e.g., health benefits, packaging durability, taste, recyclable packaging, etc.). Next, they completed the choice-based conjoint (CBC) task. Respondents were shown four products at a time that varied in four attributes (packaging type, packaging claim, product claim, and price); described in Table 1. An example of a set of products shown to a respondent is provided in Figure 1. The four price points were selected in line with the retail price of orange juice (12 fl. oz) at the time of the study. Respondents selected their preferred option or chose none. This task was repeated for a total of 14 sets (Figure 1). Then respondents completed questionnaires, including factors affecting green consumerism scales (referred to as sustainability attitudes) by Lan and Phuong [21] and six additional statements corresponding to sustainability that were of interest to the researchers (Supplementary Table S1). Ratings were made on a seven-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Respondents were then asked to rank the four packaging types (glass, carton, aluminium, and plastic) from their perception of the most to least sustainable. Lastly, respondents provided demographic information about their age (year of birth), gender, race, education level, US state of residence, annual household income, and diet type. The respondents' demographic distribution is reported in Table 2. An attention-check question was also included in the questionnaire. Individuals who did not complete the attention check were excluded from the study.

Table 1. Attributes and levels of attributes used in the CBC task.

Attributes	Levels
Packaging type	Glass; carton; aluminium; plastic
Packaging claim	Biodegradable/compostable; made with recycled material; 100% recyclable
Product claim	Locally produced; organic; not from concentrate/100% juice
Price (per 12 fl Oz)	$1.10; $1.72; $2.08; $2.36

Table 2. Participants' demographic distribution.

N = 847		
Age (years)		35 ± 11
Gender		%
	Woman	46.4
	Man	52.7

Table 2. *Cont.*

N = 847	
Prefer not to answer	0.1
Other	0.8
Education	
No formal education	0.8
High school	31.5
Associates degree	12.4
Bachelor's degree	39.2
Graduate degree	16.1
Employment	
Employed	71.1
Unemployed	13.5
Student	8.9
Other	6.6
Income	
$0–$30,000	18.4
$30,001–$60,000	23.6
$60,001–$90,000	22.7
$90,001–$120,000	14.8
$120,001–$200,000	14.3
More than $200,000	4.1
I do not know	2.1
Race	
American Indian or Alaska Native	0.7
Asian	9.0
Black or African American	13.0
Middle Eastern	0.8
Native Hawaiian or Other Pacific Islander	0.9
White	68.0
Other	6.4
Prefer not to answer	1.2
Diet type	
Omnivore	68.5
Meat reducer/flexitarian	14.6
Vegetarian	4.7
Vegan	1.7
Other	10.5

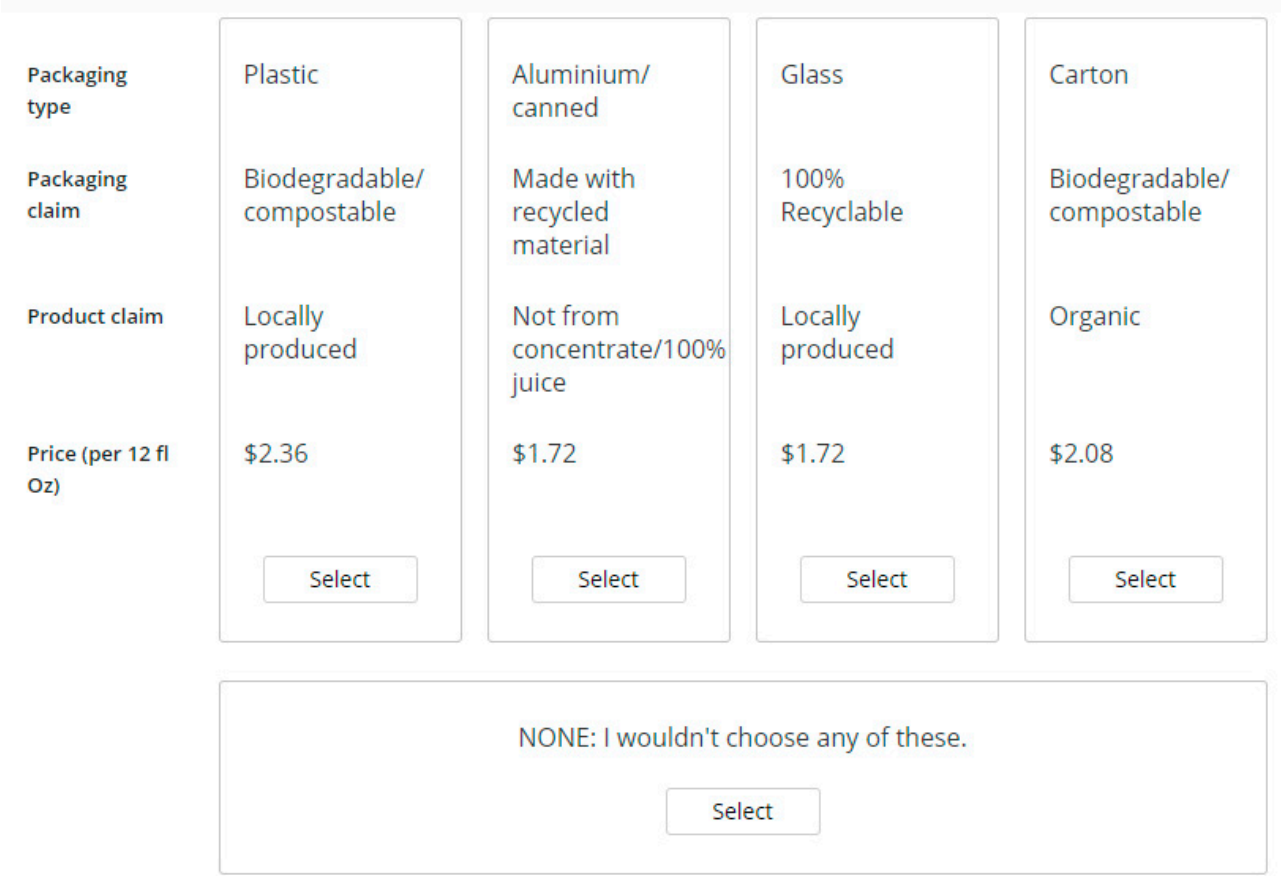

Figure 1. Example of a choice-based conjoint task presented to respondents, where the prompt was: "Imagine you're in a grocery store trying to get yourself a single serving of orange juice and these are your only options, which would you choose?".

2.3. Statistical Analysis

The statements of the sustainability attitudes that were worded negative to their factor (R) were reverse coded before determining the mean factor scores. The appropriateness of the General Sustainability Statements as a single factor was verified by exploratory factor analysis (EFA) using maximum likelihood extraction.

After evaluating the data for multicollinearity by assessing the variance inflation factor (VIF) values, multiple linear regression (MLR) was conducted. MLR was used to determine the effect of the independent variables, sustainability attitudes and demographic traits, on the relative importance (RI) of each attribute (packaging type, packaging claim, product claim, and price) and the packaging type (glass, carton, plastic, and aluminium) utilities. However, the effect of the demographic traits was accounted for first, and only those with a significant contribution were included in the final regression models. The significant effects were visualised on scatterplot matrices.

The RI of each attribute and the packaging utility scores were calculated by the Lighthouse Studio (Sawtooth Software, Inc., Provo, UT, USA). RI conveys the contribution of each attribute to overall preference, and utilities are values indicating the relative preference or worth of each attribute level [22]. The Friedman test, with Wilcoxon signed-rank post hoc analysis, was conducted with a Bonferoni correction to analyse the ranking data of the packaging types according to perceived sustainability.

One-way analysis-of-variance (ANOVA) was used to compare the attribute RI, packaging type utilities, and sustainability attitude mean scores of omnivores versus non-omnivores ($\alpha = 0.05$). All the above analyses were conducted using SPSS version 29.01 (IBM Corporation, Armonk, NY, USA).

3. Results

A total of 847 respondents met the inclusion criteria, passed the attention check question, and completed the entire questionnaire.

3.1. Valued Beverage Characteristics

Taste and price were attributes valued by the majority of the respondents (>80%), followed by health benefits, sugar content, and availability, which were valued by 46 to 55% of the respondents. Packaging-related attributes such as durability, recyclability, compostability, and reusability were among the least valued characteristics, as they were selected by <20% of the respondents. Results are reported in Table 3.

Table 3. Beverage characteristics valued by respondents [1] (N = 847).

Beverage Characteristic	Frequency	%
Taste	802	94.7
Price	716	84.5
Health benefits	472	55.7
Sugar content	409	48.3
Easily available	389	45.9
Familiar	303	35.8
Resealable	271	32.0
Easy to open	193	22.8
Recyclable packaging	169	20.0
Packaging durability	96	11.3
Reusable packaging	67	7.9
Compostable packaging	47	5.5
Trending or viral product	23	2.7
Other *	12	1.4

* Other characteristics mentioned included caffeine, pulp, how natural it is, and whether it liked by most people in households. [1] There was no restriction on the number of attributes that could be selected.

3.2. Conjoint Analysis and Perceived Sustainability Ranking

When comparing the four attributes in the CBC task, price had the highest relative importance (RI) at 39%. The lowest price ($1.10) had the highest average utility score (67.50), and the highest price ($2.36) had the lowest utility (−70.27). Packaging type was the second most important attribute (RI of 33%). Glass had the highest utility score (36.27), followed by carton (19.33), plastic (−8.82), and then aluminium (−46.78). Product claims were the third most important attribute (RI of 21%), of which "locally produced" was the most valued claim with the highest utility score (13.52). Finally, the packaging claim was the least important attribute (RI of 7%); however, "100% recyclable" was the packaging claim with the highest utility score (7.78) compared to "compostable" (0.58) and "made with recycled material" (−8.46). Average utilities and RI are reported in Table 4.

Regarding the perceived sustainability of each packaging type, glass was ranked the most sustainable, followed by cartons, aluminium, and then plastic, $\chi^2(3) = 1051$, $p < 0.001$.

Table 4. Average utilities of attribute levels and relative importance of packaging attributes.

Attributes and Their Levels	Average Utilities	Relative Importance (RI) (%)
Packaging type		33.17
Glass	36.27	
Carton	19.33	
Plastic	−8.82	
Aluminium/canned	−46.78	
Packaging claim		7.29
100% Recyclable	7.87	
Biodegradable/compostable	0.58	
Made with recycled material	−8.46	
Product claim		20.88
Locally produced	13.52	
Organic	6.64	
Not from concentrate/100% juice	−20.16	
Price (per 12 fl Oz)		38.67
$1.10	67.50	
$1.72	26.69	
$2.08	−23.92	
$2.36	−70.27	

3.3. Effect of Sustainability Attitudes and Demographics on Packaging Attribute Importance and Packaging Type Utilities (Analysed Using MLR)

The General Sustainability Factor Statements (Table 2) were eligible for EFA as all statements loaded into a single factor (loadings between 0.55 and 0.90), and a significant Bartlett's Test of Sphericity ($p < 0.05$) and a Kaiser-Meyer-Olkin's measure of sampling adequacy of 0.847 were achieved. Furthermore, the data met the assumption of collinearity, as the VIF values of the independent variables were all below 2.5 [23].

The intention to purchase sustainable packaging was the most important predictor of attribute RI and packaging utilities, followed by effectiveness perception, which only predicted the RI of price. As reported in Table 5, people with a positive perception of the effectiveness of sustainable packaging scored lower on the RI of price. Those who had the intention to purchase sustainable packaging valued packaging and product claims more, whereas people who had low intentions placed more value on price. People with the intention of purchasing sustainable packaging placed less value on plastic and more on aluminium packaging material. There were no significant associations for cartons or glass (see Table 5). The significant relationships between sustainability attitudes and RI and packaging-type utilities reported in Table 5 are visualised in Figures 2 and 3. Figure 2 shows a decrease in the relative importance of price as the perception of the effectiveness of sustainable packaging increases. In Figure 3a, there is a general increase in the RI of packaging and product claims as the intention to purchase sustainable packaging increases. The opposite effect was observed for the RI of the price. Furthermore, the intention to purchase sustainable packaging in general increased with the increasing utility of aluminium, but plastic utility scores decreased as sustainable packaging purchase intention increased (Figure 3b).

Table 5. Standardised beta coefficients of sustainability attitudes and demographic traits predicting relative importance and packaging utilities.

	Purchase Behaviour	Image Concern	Packaging Quality	Social Influence	Effectiveness Perception	General Sustainability	Purchase Intention	Age	Gender	Education	Income	R-Square [1]	Model Significance
Relative importance													
Packaging type	−0.063	0.072	−0.059	0.002	0.042	0.094	0.022	0.093 *	−0.128 *	−0.133 *	-	0.052	<0.001
Packaging claim	−0.011	0.016	−0.087	−0.006	0.096	−0.078	0.192 *	-	-	-	-	0.034	<0.001
Product claim	0.026	−0.036	−0.118	0.001	0.057	−0.014	0.162 *	0.084 *	-	-	0.098 *	0.043	<0.001
Price	0.022	−0.023	0.148	0.017	−0.113 *	−0.042	−0.126 *	−0.135 *	0.101 *	-	−0.056	0.073	<0.001
Packaging utilities													
Plastic	0.060	−0.007	−0.022	−0.065	0.025	−0.004	−0.205 *	-	-	-	-	0.049	<0.001
Carton	0.051	−0.07	0.051	0.272	−0.035	0.035	0.027	-	-	-	-	0.014	0.132
Aluminium	−0.038	−0.018	−0.003	0.041	−0.003	−0.039	0.203 *	-	0.157 *	0.154 *	-	0.080	<0.001
Glass	−0.048	0.061	−0.011	−0.001	0.018	0.012	−0.027	-	−0.094 *	−0.056	-	0.015	0.22

* Significant at $p < 0.05$. Variables that had no contribution to the model are denoted by a dash (-). [1] Reported as unstandardized R-square

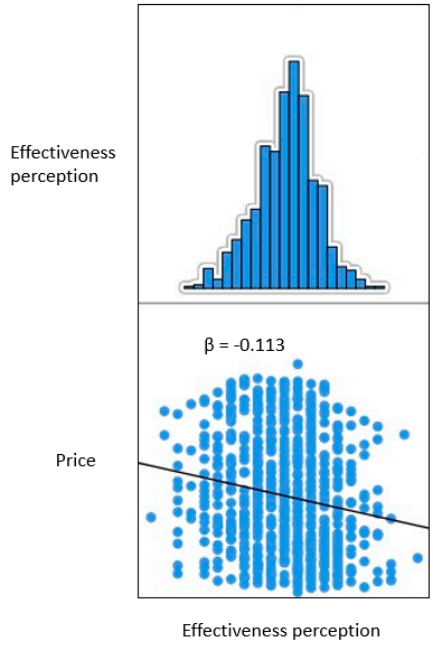

Figure 2. Scatter plot matrix of the influence of the effectiveness perception of sustainable packaging on the relative importance of price.

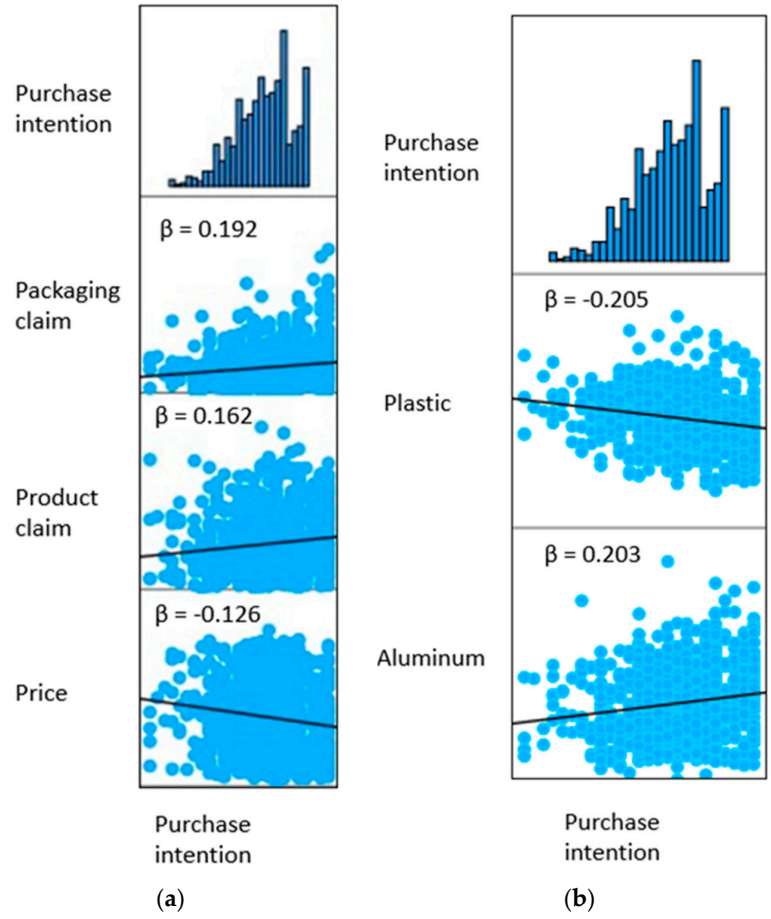

Figure 3. Scatter plot matrix of the influence of (**a**) the intention to purchase sustainable packaging on the relative importance of price, product, and packaging claim and (**b**) the intention to purchase sustainable packaging on the value placed on aluminium and plastic as packaging types.

Purchase behaviour, image concern, social influence, and general sustainability attitudes were not significant predictors of the RI of all attributes or utilities for all packaging types (Table 5).

In terms of the effects of demographic traits (Supplementary Figures S1–S6), the MLR revealed that age was directly associated with the RI of packaging type and packaging claim; however, it was negatively associated with the RI of price. The RI of packaging type was higher for women, and the RI of price was higher for men ($p < 0.05$). Women valued glass more than men, and men valued aluminium more than women ($p < 0.05$). The RI of packaging type varied by education level, with those with a high school diploma finding it more important than those with a bachelor's degree ($p < 0.05$). Although the value placed on aluminium increased with education level ($p < 0.05$). People with an annual income of at least $61,000 found product claims to be more important than those who earned less ($p < 0.05$).

With regard to diet type (Table 6), the RI of packaging claim and price was more important to omnivores than to all other diet types, whereas all other diet types found packaging type more important than omnivores. Plastic as a packaging type was less valued by all other diet types than it was by omnivores. Those who are not omnivores scored higher for all sustainability attitudes than omnivores.

Table 6. Effect of diet type on relative importance, packaging type, utilities, and sustainability attitudes compared by ANOVA.

	Omnivore (N = 558)	**All other Diet Types * (N = 256)**	***p*-Value ****
Relative importance			
Packaging type	0.32 ± 0.16	0.35 ± 0.16	**0.046**
Packaging claim	0.70 ± 0.05	0.08 ± 0.06	**0.009**
Product claim	0.21 ± 0.14	0.22 ± 0.14	0.371
Price	0.40 ± 0.22	0.36 ± 0.21	**0.006**
Packaging type utilities			
Plastic	−5.99 ± 45.80	−14.49 ± 50.91	**0.018**
Glass	35.09 ± 52.94	40.31 ± 54.88	0.117
Aluminium	−46.24 ± 47.21	−47.74 ± 49.15	0.678
Carton	17.13 ± 40.04	21.92 ± 41.29	0.198
Sustainability attitudes			
Purchase behaviour	5.7 ± 0.9	6.0 ± 0.9	**<0.001**
Social influence	4.7 ± 1.1	5.1 ± 1.0	**<0.001**
Effectiveness perception	4.4 ± 0.8	4.8 ± 0.7	**<0.001**
Image concern	3.7 ± 1.1	4.1 ± 1.2	**<0.001**
Packaging quality	5.6 ± 1.0	5.9 ± 0.9	**<0.001**
General sustainability	4.8 ± 0.9	5.1 ± 0.8	**<0.001**
Purchase intention	4.9 ± 1.3	5.6 ± 1.2	**<0.001**

* All other diet types include meat-reducer/flexitarian, vegetarian, vegan, and others. ** *p*-values in bold are significant at $p < 0.05$.

4. Discussion

The purpose of this study was to determine the extent to which packaging attributes (packaging type, packaging claim, product claim, and price), sustainability attitudes, demographic information, and diet type drive the choice to purchase orange juice. Considering that the overall aim was to generate insights towards sustainable packaging production, special emphasis was placed on packaging type in the analysis.

Similar to what was reported by Isa and Yao [18], the conjoint analysis revealed that price (particularly the lowest) was the most important attribute. This was especially true for younger respondents, as was found by Jain and Hudnurkar [12]. Furthermore, according to the attribute levels with the highest utility scores, this study revealed that the ideal orange juice option was packaged in glass, labelled as 100% recyclable, locally produced, and priced at $1.10 per 12 fl. oz. Not only was glass the most preferred packaging type, but it was also perceived as the most sustainable. This idealisation of glass was not unique to this study [13,24]. Bou-Mitri and Abdessater [13] reported that participants perceived juice packaged in glass to be the safest, healthiest, and of the highest quality compared to other packaging materials in their study, which examined the effects of packaging design on the perceptions of Lebanese consumers (n = 547). Similar to the present study, Bou-Mitri and Abdessater [13] reported that when examining the participants who were willing to pay more for glass, they were more likely to be women. Women tend to be more open to purchasing sustainable packaging as they value environmental benefits more than men [14].

Despite individuals' self-reported preference for low price and glass, in real life, beverages sold in single-use glass packaging often come at a more premium price than other packaging types [25]. This may be an indication that, although price was the most important consideration, consumers continue to aspire to glass packaging. This could be explained by the strong association of glass with sustainability in the present study. Neill and Williams [26] reported that their study population was willing to pay slightly more for a returnable glass bottle of milk due to the belief that this was more sustainable than plastic packaging. Thus, a returnable glass bottle system for juices could be a viable option that would meet the consumer's desire for glass packaging at an affordable price. However, for increased chances of success, the return process should be easy, straightforward, and accessible to consumers [27]. Nevertheless, the idea of recyclable packaging also appealed to consumers. Consumers have been educated about the value of recycling, and many view recycling as central to achieving a sustainable packaging system. In other words, recycling produces feelings of contributing to sustainability, with the perception that these materials can be repurposed [28].

Overall, effectiveness perception and purchase intention for sustainable packaging were the only attitudes that affected attribute RI and packaging utilities. The finding that the importance of price decreased with an increasing purchase intention of sustainable packaging and the perception that it is effective coincides with that of Petkowicz and Pelegrini [15]. This study reported that the willingness to purchase products increases when consumers understand the environmental benefits of a product. This is similar to Duarte et al. (2024), who reported a positive relationship between purchase intention and the perceived value of sustainable packaging [14].

Interestingly, the present study identified that respondents who reported following a non-omnivore diet scored significantly higher than omnivores for all sustainability attitudes. The finding that non-omnivores valued plastic significantly less than omnivores is in support of their self-reported sustainability attitudes, considering that plastic was ranked as the least sustainable packaging type. Findings suggest that non-omnivores are willing to pay more for what is perceived to be sustainable packaging, as price is less important to this group and packaging type and claim informed their choice for orange juice more than omnivores. Studies have shown that consumers who follow diets as alternatives to omnivorous diets have more mindful personalities [29] and are more concerned about animal welfare and sustainability [30].

Nevertheless, while glass is a highly esteemed packaging material, its estimated impact is reported to be among the most harmful to the environment compared to other packaging types when looking at the entire product life cycle [24]. This was demonstrated with baby food [31], fruit juice beverages [32], and healthcare supplies [33]. Plastic packaging contributes 28–31% less to global warming than glass in baby food [31], and it has 46% less greenhouse gas emissions when used in healthcare [33]. When it came to fruit juice beverages, glass packaging was reported to have the most negative impact on the envi-

ronment when considering factors such as climate change, depletion of abiotic resources, freshwater, and marine aquatic ecotoxicity, compared to cardboard tetra packs, which had the least impact [32]. The production and end-of-life impacts of plastic are less than those of glass; plastic is lighter and thus requires less energy to transport; furthermore, the aseptic sealing process of plastic containers using steam is less energy-demanding than the retort system used for glass [33]. Overall, while packaging choices contribute to environmental outcomes, the most impactful and practical way consumers can contribute to sustainability efforts is to reduce or avoid food waste [1,5].

Some limitations of this study were noted. Conjoint analysis is a powerful tool that simulates a real-life situation where a consumer needs to make trade-offs between various options in purchasing decisions [34]. However, survey-based responses are made consciously; therefore, the way in which individuals respond may not be what they do in reality or under various circumstances. Thus, future research is needed to determine if the present findings translate to actual consumer behaviour. Furthermore, orange juice was the model product in this study, and the results may not be extrapolatable to other products.

5. Conclusions

This study highlights that consumers aspire to purchase orange juice in glass packaging, but at the lowest possible price. Consumers intention to purchase sustainable packaging was the most important predictor of packaging selection. Whereas, the perceived effectiveness of packaging materials was important for willingness to pay. Despite glass being idealised as being the most sustainable, other packaging types may be more sustainable. These results suggest that, in terms of sustainability, consumers perceptions do not reflect current assessments of sustainable materials. It is recommended to consider education initiatives to direct consumers to more sustainable choices, while considering that purchase intention and effectiveness perception are key attitudinal drivers. Additionally, it is important to note that the study was conducted for orange juice, as it is currently commercially available in the four packaging materials tested in the present study; however, it is anticipated that preferences may differ across product types. Further studies are needed to understand how education and product labels can increase consumers' motivation and adoption of sustainable packaging for food and beverages. A greater understanding of consumer perceptions and factors driving product selection is critical for informing the use of packaging materials in products and for achieving sustainability goals.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su16146202/s1. Table S1: Attitudes towards sustainable packaging, factors (sustainability attitudes), and their statements [21]; Figure S1: Scatter plot matrix of the influence of age on the relative importance of packaging type, product claim, and price; Figure S2: Effect of gender on the relative importance of packaging type and price; Figure S3: Effect of gender on the value placed on glass and aluminium as packaging; Figure S4: Effect of education level on the relative importance of packaging type; Figure S5: Effect of education level on the value placed on aluminium as a packaging type; and Figure S6: Effect of income level on the relative importance of product claims.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of the University of Massachusetts Amherst (protocol # 5031 approved on 12/2023).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in the study are included in the article, and further inquiries can be directed to the corresponding author.

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References

1. Heller, M.C.; Selke, S.E.M.; Keoleian, G.A. Mapping the Influence of Food Waste in Food Packaging Environmental Performance Assessments. *J. Ind. Ecol.* **2019**, *23*, 480–495. [CrossRef]
2. Wikström, F.; Williams, H.; Trischler, J.; Rowe, Z. The Importance of Packaging Functions for Food Waste of Different Products in Households. *Sustainability* **2019**, *11*, 2641. [CrossRef]
3. Schifferstein, H.N.J.; de Boer, A.; Lemke, M. Conveying information through food packaging: A literature review comparing legislation with consumer perception. *J. Funct. Foods* **2021**, *86*, 104734. [CrossRef]
4. White, A.; Lockyer, S. Removing plastic packaging from fresh produce—What's the impact? *Nutr. Bull.* **2020**, *45*, 35–50. [CrossRef]
5. Kakadellis, S.; Harris, Z.M. Don't scrap the waste: The need for broader system boundaries in bioplastic food packaging life-cycle assessment—A critical review. *J. Clean. Prod.* **2020**, *274*, 122831. [CrossRef]
6. EPA. Containers and Packaging: Product-Specific Data. Available online: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific#:~:text=Containers%20and%20packaging%20make%20up,28.1%20percent%20of%20total%20generation (accessed on 17 November 2023).
7. Just, D.R.; Goddard, J.M. Behavioral framing and consumer acceptance of new food technologies: Factors influencing consumer demand for active packaging. *Agribusiness* **2023**, *39*, 3–27. [CrossRef]
8. Lindh, H.; Olsson, A.; Williams, H. Consumer perceptions of food packaging: Contributing to or counteracting environmentally sustainable development? *Packag. Technol. Sci.* **2016**, *29*, 3–23. [CrossRef]
9. Brennan, L.; Francis, C.; Jenkins, E.L.; Schivinski, B.; Jackson, M.; Florence, E.; Parker, L.; Langley, S.; Lockrey, S.; Verghese, K. Consumer Perceptions of Food Packaging in Its Role in Fighting Food Waste. *Sustainability* **2023**, *15*, 1917. [CrossRef]
10. Wang, F.; Wang, H.; Cho, J.H. Consumer Preference for Yogurt Packaging Design Using Conjoint Analysis. *Sustainability* **2022**, *14*, 3463. [CrossRef]
11. Noort, M.W.; Renzetti, S.; Linderhof, V.; du Rand, G.E.; Marx-Pienaar, N.J.; de Kock, H.L.; Magano, N.; Taylor, J. Towards Sustainable Shifts to Healthy Diets and Food Security in Sub-Saharan Africa with Climate-Resilient Crops in Bread-Type Products: A Food System Analysis. *Foods* **2022**, *11*, 135. [CrossRef]
12. Jain, P.; Hudnurkar, D.M. Sustainable packaging in the FMCG industry. *Clean. Responsible Consum.* **2022**, *7*, 100075. [CrossRef]
13. Bou-Mitri, C.; Abdessater, M.; Zgheib, H.; Akiki, Z. Food packaging design and consumer perception of the product quality, safety, healthiness and preference. *Nutr. Food Sci.* **2021**, *51*, 71–86. [CrossRef]
14. Duarte, P.; Silva, S.C.; Roza, A.S.; Dias, J.C. Enhancing consumer purchase intentions for sustainable packaging products: An in-depth analysis of key determinants and strategic insights. *Sustain. Futures* **2024**, *7*, 100193. [CrossRef]
15. Petkowicz, A.C.; Pelegrini, T.; Bodah, B.W.; Rotini, C.D.; Moro, L.D.; Neckel, A.; Spanhol, C.P.; Araújo, E.G.; Pauli, J.; Mores, G.D.V. Purchasing Intention of Products with Sustainable Packaging. *Sustainability* **2024**, *16*, 2914. [CrossRef]
16. Bou-Mitri, C.; Khnaisser, L.; Ghanem, M.B.; Merhi, S.; Fares, J.E.-H.; Doumit, J.; Farhat, A.G. Consumers' exposure to claims on pre-packed bread: The case of a developing country, Lebanon. *Nutr. Food Sci.* **2020**, *50*, 1033–1051. [CrossRef]
17. De Temmerman, J.; Vermeir, I.; Slabbinck, H. Eating out of paper versus plastic: The effect of packaging material on consumption. *Food Qual. Prefer.* **2023**, *112*, 105023. [CrossRef]
18. Isa, S.M.; Yao, P.X. Investigating the preference for green packaging in consumer product choices: A choice-based conjoint approach. *Bus. Manag. Dyn.* **2013**, *3*, 84–96.
19. Al-Samarraie, H.; Eldenfria, A.; Dodoo, J.E.; Alzahrani, A.I.; Alalwan, N. Packaging design elements and consumers' decision to buy from the Web: A cause and effect decision-making model. *Color Res. Appl.* **2019**, *44*, 993–1005. [CrossRef]
20. Chen, P.-J.; Antonelli, M. Conceptual Models of Food Choice: Influential Factors Related to Foods, Individual Differences, and Society. *Foods* **2020**, *9*, 1898. [CrossRef]
21. Lan, B.T.H.; Phuong, T.T.L.; Dat, T.T.; Truong, D.D. Factors Affecting the Purchase Intention of Products with Environmentally Friendly Packaging of Urban Residents in Ho Chi Minh City, Vietnam. *Sustainability* **2023**, *15*, 7726. [CrossRef]
22. Gonzalez, J.M. A Guide to Measuring and Interpreting Attribute Importance. *Patient—Patient-Centered Outcomes Res.* **2019**, *12*, 287–295. [CrossRef]
23. Senaviratna, N.A.M.R.; Cooray, T.M.J.A. Diagnosing Multicollinearity of Logistic Regression Model. *Asian J. Probab. Stat.* **2019**, *5*, 1–9. [CrossRef]
24. De Feo, G.; Ferrara, C.; Minichini, F. Comparison between the perceived and actual environmental sustainability of beverage packagings in glass, plastic, and aluminium. *J. Clean. Prod.* **2022**, *333*, 130158. [CrossRef]

25. Afif, K.; Rebolledo, C.; Roy, J. Evaluating the effectiveness of the weight-based packaging tax on the reduction at source of product packaging: The case of food manufacturers and retailers. *Int. J. Prod. Econ.* **2022**, *245*, 108391. [CrossRef]
26. Neill, C.L.; Williams, R.B. Consumer preference for alternative milk packaging: The case of an inferred environmental attribute. *J. Agric. Appl. Econ.* **2016**, *48*, 241–256. [CrossRef]
27. Ratnichkina, P.; Lee, S.H.; Haines, S. Communicating returnable packaging via ease of use labeling. *Int. Rev. Retail. Distrib. Consum. Res.* **2021**, *31*, 481–497. [CrossRef]
28. Park, J.; Ha, S. Understanding Consumer Recycling Behavior: Combining the Theory of Planned Behavior and the Norm Activation Model. *Fam. Consum. Sci. Res. J.* **2014**, *42*, 278–291. [CrossRef]
29. Voll, A.; Jost, L.; Jansen, P. Heartfulness in Vegans, Vegetarians, and Omnivores. *Int. J. Environ. Res. Public Health* **2023**, *20*, 4943. [CrossRef] [PubMed]
30. Noguerol, A.T.; Pagán, M.J.; García-Segovia, P.; Varela, P. Green or clean? Perception of clean label plant-based products by omnivorous, vegan, vegetarian and flexitarian consumers. *Food Res. Int.* **2021**, *149*, 110652. [CrossRef] [PubMed]
31. Humbert, S.; Rossi, V.; Margni, M.; Jolliet, O.; Loerincik, Y. Life cycle assessment of two baby food packaging alternatives: Glass jars vs. plastic pots. *Int. J. Life Cycle Assess.* **2009**, *14*, 95–106. [CrossRef]
32. Brock, A.; Williams, I.D. Life Cycle Assessment of Beverage Packaging. *Detritus* **2020**, *13*, 47–61. [CrossRef]
33. Dhaliwal, H.; Browne, M.; Flanagan, W.; Laurin, L.; Hamilton, M. A life cycle assessment of packaging options for contrast media delivery: Comparing polymer bottle vs. glass bottle. *Int. J. Life Cycle Assess.* **2014**, *19*, 1965–1973. [CrossRef]
34. Sigurdsson, V.; Vishnu Menon, R.G.; Fagerstrøm, A. Online Healthy Food Experiments: Capturing Complexity by Using Choice-Based Conjoint Analysis. *Behav. Anal.* **2017**, *40*, 373–391. [CrossRef]