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Switching to Reuse: The Impact of Information on Consumers' Choices for Reusable Food Packaging

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Abstract: In recent years, there has been a shift toward sustainability in several aspects of our lives, including food packaging. In line with a circular economy model, several organizations are adopting industrial reusable solutions for food packaging, which are designed to be used multiple times throughout their life cycle. Despite an overall positive impression, many consumers lack clarity on reusable food packaging, with concerns regarding safety and cost, for example, that affect the actual adoption of reusable packaging. This study aimed to assess the impact of information regarding specific characteristics of reuse that could encourage consumers to choose reusable packaging over other sustainable (compostable and recyclable) alternatives when purchasing agrifoods. Through an online survey involving 104 participants, the study compared preferences and willingness to pay for reusable packaging while delivering (or not delivering) information as to the safety and production costs of reusable packaging. Information concerning the safety of reusable packaging, but not that regarding production costs, increased consumers' preferences for reusable packaging. At the same time, willingness to pay was not affected by either type of information. These results highlight the crucial role that delivering appropriate information plays in addressing consumers' psychological concerns and in fostering the acceptance of reusable packaging when purchasing agrifoods.

Keywords: sustainability; food packaging; reusable materials; consumer preferences; willingness to pay; psychology

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1. Introduction

Global environmental challenges such as pollution, climate change, deforestation, and loss of biodiversity require sustainable strategies and actions to protect the health of both humans and the planet. The food system, which includes food production, processing, packaging, transportation, and disposal, is responsible for the generation of around one-quarter of the world's greenhouse gas emissions [1]. At a policy level, the need to make food consumption more "sustainable" is at the center of the United Nations Agenda 2030 for Sustainable Development, with a specific goal aimed at ensuring sustainable consumption to sustain the livelihoods of current and future generations [2]. At the individual level, encouraging customers to change their habits toward more sustainable food consumption behaviors is becoming increasingly urgent [3,4].

In recent years, packaging has been identified as a critical element in increasing the sustainability of the food system [5,6]. Packaging serves multiple functions, including the facilitation of distribution, protection from chemical and bacteriological agents, and the preservation of food quality, and is therefore essential to both the producer and the customer [7]. In addition to its technical functions, packaging serves an additional function as a means of communication (e.g., regarding the environmental standards of the packaging itself and/or the content) and of contact between the producer and the consumer, potentially influencing the customer's attention and actions [8]. Several types of packaging have been developed with specific characteristics in terms of their production and/or their life cycle

that are aimed at decreasing the environmental footprint of packaging while maintaining its functional requirements. Three common examples of sustainable packaging are recyclable packaging, compostable packaging, and reusable packaging. Recyclable packaging is made of materials that, at the end of their life cycle, can be recycled and converted into something else, e.g., other plastic, paper, or glass products. Compostable packaging is made of materials that, after they have been used, can be treated in bio-waste treatment facilities and/or home compost bins or systems. Importantly, recyclable and compostable packaging systems are meant to be used once (single-use packaging), and therefore, there are relevant costs in terms of the storage and treatment (recycling or composting) of the used packaging. On the other hand, reusable packaging is designed to be used multiple times throughout its life cycle and is defined as "packaging or packaging components that have been designed to accomplish a minimum number of trips or rotations in a system for reuse" by the International Organization for Standardization (ISO:18,603 [9]). Reusable packaging includes both packaging that is cleaned and refilled by consumers (refillable packaging systems) and packaging that is returned to the organization or company to be sanitized and reused (returnable packaging systems) [10,11]. Recently, several organizations have highlighted that reuse systems should be at the heart of the transition to a circular economy model that ensures sustainable growth over time. To this end, reusable packaging systems can be seen as a way to provide environmental and potential economic benefits over single-use packaging systems from the point of view of both the producer and the consumer. Albeit a promising solution to reduce production emissions and the amount of waste generated, the impact of reusable packaging depends on consumers' acceptance.

How do consumers perceive reusable food packaging and include it in their daily actions? Recent research shows that consumers are aware of the environmental value of reusable packaging in the contest of food products [12] and have positive attitudes toward reducing domestic packaging waste through reusable packaging [11]. Likewise, consumers rated reusable packaging more positively than single-use alternatives [13]. However, despite consumers recognizing reusable packaging as an effective option to reduce the environmental impact of food consumption, they have a limited understanding of reusable packaging, making it difficult for them to make an informed choice [12]. In addition to limited understanding, it has been shown that psychological barriers or misconceptions limit the adoption of reusable food packaging [14,15].

Recent research has indicated that cost and safety are two psychological barriers that may negatively influence consumers' acceptance of reusable packaging. In terms of cost, consumers perceive reusable containers in the food industry as more costly and less accessible when compared to other packaging types [16]. Indeed, studies focusing on consumer purchase behavior have shown that the high price of green products and sustainable packaging can represent an issue for consumers [17–19], even when they are motivated to purchase sustainable items [20]. Moreover, packaging safety represents a serious concern that affects its adoption. Safety refers to how consumers perceive the hygienic standards of reusable packaging in terms of ensuring food conservation. The non-observance of satisfactory hygienic standards may introduce risks of contamination or the loss of product freshness. As food products are directly related to human health, concerns regarding cleanliness and safety seem to be particularly critical in the acceptance of reusable packaging [11,12,15]. Providing reliable information and knowledge concerning product safety, with some indication that the reusable packaging has been correctly sanitized, appears to be particularly relevant in encouraging the acceptance of reusable packaging when purchasing foods [11].

The aim of the present study was to assess how preferences for or against adopting sustainable packaging are modulated by information regarding either its safety or production costs. To this end, consumers' preferences and willingness to pay (WTP) were used as proxy measures of actual consumers' actual choices when purchasing agrifoods [21]. An online survey was therefore designed to compare preferences and WTP for reusable packaging over single-use sustainable (compostable and recyclable) alternatives while delivering (ex-

perimental condition) or not delivering (control condition) information regarding either the safety or the production costs of reusable packaging. Information acquisition was assessed by means of questions presented before, during, and after delivering (or not delivering) the information.

On the one hand, delivering information that addresses consumers' psychological concerns regarding reuse may boost their acceptance of reusable packaging, showing an increase in preferences and/or WTP for reusable packaging over single-use sustainable alternatives after delivering (versus not delivering) information regarding any characteristics (i.e., about both the safety and production costs) of reusable packaging (information-aspecific scenario). On the other hand, it is possible that information on safety may be more effective than information on costs. In this respect, being informed about safety issues might mitigate the perception of health threats [11,22,23]. If this is the case, then the delivery (versus non-delivery) of information on safety, as opposed to that on costs, may increase consumers' preferences and/or WTP for reusable packaging rather than for single-use sustainable alternatives (safety-specific scenario).

2. Materials and Methods

2.1. Participants

The survey was available for six months, from July 2023 to January 2024, and was conducted online using the Qualtrics survey platform (Qualtrics, Provo, UT, USA). A total of 187 respondents living in Italy accessed the survey through a link posted on social networks (i.e., LinkedIn, Facebook, WhatsApp, and SurveyCircle), disseminated among university students during classes, and through direct contact from the authors. Incomplete surveys were eliminated, and the final sample consisted of 104 participants (age M = 35.52 years, SD = 12.50; see Table 1 for sample description). Participants were not paid for taking part in the study and completed the anonymous survey on a voluntary basis. All participants provided consent before taking part in the study. This study conforms to the Declaration of Helsinki and was approved by the Ethical Committee of the University of Bologna.

Table 1. Description of sample.

		Frequency (%)
Gender	Male	39 (37.5)
	Female	62 (59.6)
	Other	3 (2.9)
Age	20 to 29	42 (40.4)
	30 to 39	30 (28.8)
	40 years or older	32 (30.8)
Education	Middle school	2 (2.9)
	High school	26 (25)
	University	46 (44.2)
	Post-university	30 (28.8)
Employment status	Business worker	9 (8.7)
	Consultant	4 (3.8)
	Designer	3 (2.9)
	Engineer	3 (2.9)
	Health staff	15 (14.4)
	Office worker	14 (13.5)
	PhD Student	4 (3.8)
	Researcher	9 (8.7)

Table 1. *Cont.*

		Frequency (%)
	Student	26 (25)
	Teacher	8 (7.7)
	Pensioner	4 (3.8)
	Unemployed	5 (4.8)
Nationality	Italian	104 (100)
Residence	North	74 (71.2)
	Center	12 (11.5)
	South	18 (17.3)

2.2. Stimuli

The experimental task involved the visualization of agrifoods and of packaging that might contain them. The pictures of agrifoods were 12 color images depicting vegetables (i.e., arugula, radishes, onions, chickpeas, carrots) and fruits (i.e., grapes, prunes, cherry tomatoes, kiwis, strawberries, cherries, apricot) with a resolution of 400 (width) × 320 (height) pixels (see Figure 1A). In addition, three color images depicting reusable, compostable, or recyclable packaging with a resolution of 200 × 200 pixels were included (see Figure 1B). All images were selected from public-domain pictures available on the Internet and standardized for background color (white).

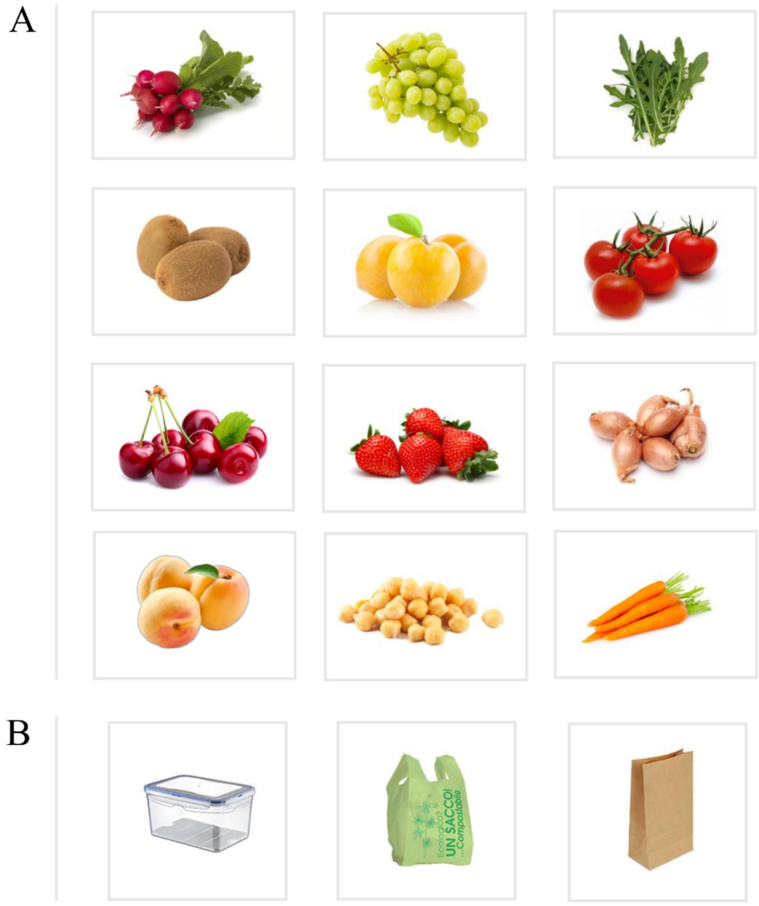

Figure 1. Visual stimuli included in the survey. (**A**) Twelve color images of agrifoods including vegetables and fruits. (**B**) Color images depicting exemplifications of three sustainable packaging alternatives: reusable, compostable, and recyclable (from **left** to **right**).

2.3. Online Survey Design and Procedure

Before taking part in the survey, participants were presented with a brief explanation of the aims of the study, which informed them what they would be asked in the survey. The survey design is shown in Figure 2 and is based on the between-participants manipulation of Condition (two levels: experimental and control) and Information (two levels: safety and costs). Participants were randomly assigned to one of the four information conditions: information on safety, information on costs, no information on safety, and no information on costs. The first part of the survey contained questions on demographics, i.e., sex, age, education, employment status, nationality, and province of residence. Then, participants were asked to provide preferences, willingness to pay (WTP), and motivation for paying for three different sustainable packaging alternatives (phase 1).

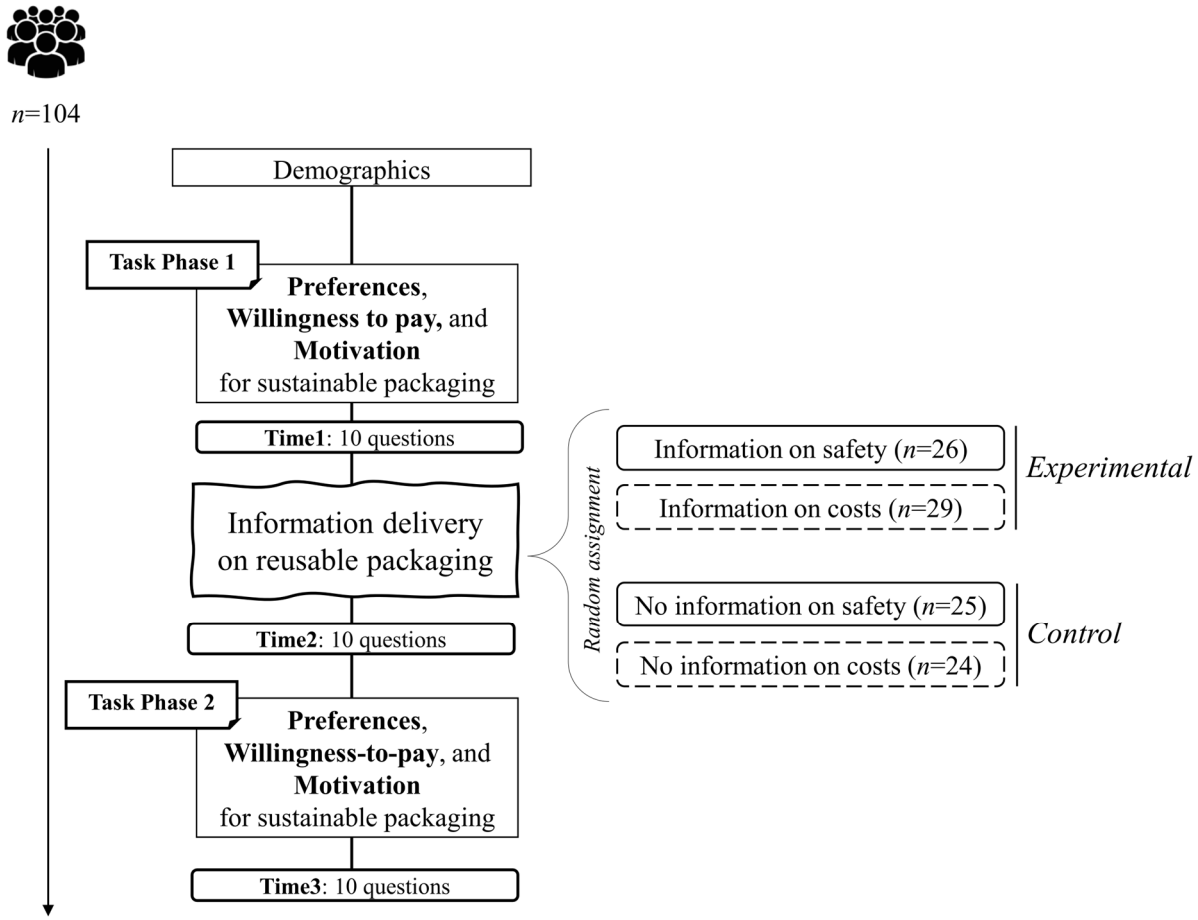

Figure 2. Schematic overview of the online survey.

During phase 1, a task was administered in which packaging preferences for agrifoods were collected, followed by judgments of willingness to pay. Concerning packaging preferences, one image of agrifood was displayed at a time, and participants were asked to rank their order of preference for three sustainable packaging alternatives (i.e., reusable, compostable, and recyclable) that could be used for the purchase of agrifoods (see Figure 3, left). Therefore, the question on packaging preference was repeated twelve times, one for each of the agrifoods. Then, participants were asked to provide WTP estimations for each packaging alternative using a slider tool (EUR 0–0.20 scale), which was set to zero as a default, and to type a short answer to explain the motivation behind their estimates (see Figure 3, right). Willingness to pay and motivation were evaluated once for each type of packaging; the order of packaging presentation during the request for estimates was randomized across participants.

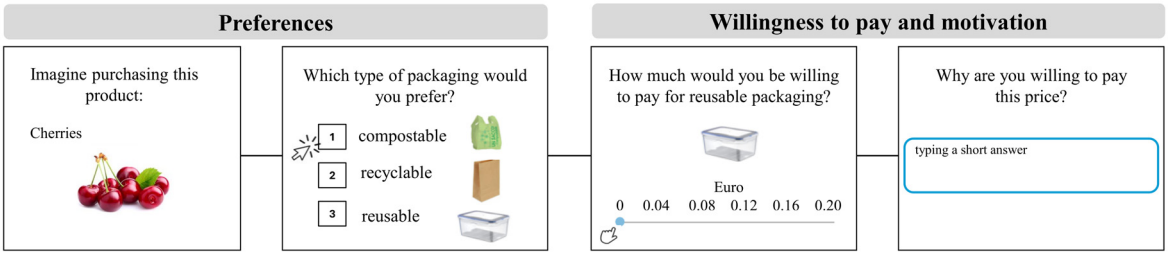

Figure 3. The collection of preferences and willingness to pay for agrifoods. **Left**: For the purchase of each agrifood product (see cherries as one sample picture), participants were required to rank packaging alternatives according to their first, second, and third preferences. Participants were then required to provide their willingness to pay (**right**) for each type of packaging (see reusable packaging as one sample picture), along with a brief explanation as to the motivation behind their estimate.

After preferences and willingness to pay were collected, knowledge regarding reusable packaging was tested (time 1). Participants were asked to answer a total of 10 yes/no questions on the specific information content (safety or costs of reusable packaging).

During the intervention phase, participants could receive (experimental condition) or not receive (control condition) information about either the cleaning and security (safety) or production costs (costs) of reusable packaging. Information on safety concerned the requirements in terms of materials and the hygiene practices adopted by organizations to ensure the correct conservation and maintenance of food, whereas information on costs focused on the reasons, in terms of production and materials employed, that justify the higher costs of reusable packaging compared to single-use packaging. Each piece of information was provided with concise sentences (see Supplementary Materials) and accompanying pictures to increase the readability and ease of understanding of the material. Concerning sustainability knowledge during the intervention (time 2), in the experimental condition, a yes/no question concerning the notion that had just been presented was asked after each item of information. In the control condition, a total of 10 yes/no questions on sustainable packaging were asked.

After this intervention, preferences, WTP, and motivation for paying for sustainable packaging were collected again (phase 2), as in phase 1. After the collection of preferences and WTP, knowledge about sustainability was probed again (time 3), as in time 1. The order of question presentation within and across times (time 1–time 3) was pseudo-randomized across participants.

2.4. Data Analysis

All statistical analyses were performed using SPSS 23.0 (IBM, New York, NY, USA).

To assess the effectiveness of information manipulation, we conducted a repeated-measures analysis of variance (ANOVA) on mean accuracy when answering questions about the specific information content, with Time (three levels: time 1, time 2, and time 3) as a within-subject factor and with two between-subject factors: Condition (two levels: experimental and control) and Information (two levels: safety and costs).

To analyze individual preferences, the number of times each type of sustainable packaging was chosen as first preference was counted and divided by the total number of preferences indicated, obtaining an average preference ratio varying from 0 (never chosen as first preference) to 1 (always chosen as first preference). Separate ANOVAs on the mean preference ratio were conducted for reusable, compostable, and recyclable packaging, with Phase (two levels: phase 1 and phase 2) as a within-subject factor and Condition (two levels: experimental and control) and Information (two levels: safety and costs) as between-subject factors.

Finally, consumers' mean WTP for the three sustainable packaging alternatives was compared by conducting an ANOVA with Packaging (three levels: reusable, compostable, and recyclable) and Phase (two levels: phase 1 and phase 2) as within-subject factors and

Condition (two levels: experimental and control) and Information (two levels: safety, costs) as between-subject factors. For each ANOVA test, Huynh–Feldt corrections were applied where relevant, and the partial eta squared statistic (η^2_p), indicating the proportion between the variance explained by one experimental factor and the total variance, was reported. If a superordinate main effect or interaction was significant, ANOVAs on subordinate conditions or post hoc comparisons were carried out.

3. Results

3.1. Manipulation Check: Information Acquisition

The ANOVA performed on mean accuracy when answering questions revealed significant main effects of Time ($F(2, 200) = 17.04$, $p < 0.001$, $\eta^2_p = 0.146$), indicating greater accuracy at time 2 (M = 80.96%, SD = 20.21%) and time 3 (M = 79.81%, SD = 18.79%) than at time 1 (M = 69.90%, SD = 19.68%, ps $\leq$ 0.001), with no difference between time 2 and time 3 ($p = 0.602$), and Condition ($F(1, 100) = 9.46$, $p = 0.003$, $\eta^2_p = 0.086$), showing greater accuracy in the experimental condition (M = 81.09%, SD = 13.95%) compared to the control condition (M = 72.17%, SD = 15.20%). In addition, a significant main effect of Information was observed ($F(1, 100) = 4.02$, $p = 0.048$, $\eta^2_p = 0.039$), with more accuracy when information on costs was delivered (M = 79.81%, SD = 12.21%) than when information on safety was given (M = 73.85%, SD = 17.31%). There was no significant interaction effect between Condition and Information ($F(1, 100) = 0.11$, $p = 0.741$, $\eta^2_p = 0.001$), but significant interactions of Time $\times$ Condition ($F(2, 200) = 7.29$, $p = 0.001$, $\eta^2_p = 0.068$) and Time $\times$ Condition $\times$ Information ($F(2, 200) = 3.29$, $p = 0.039$, $\eta^2_p = 0.032$) were observed.

Following the three-way interaction (see Figure 4), each type of information was first analyzed separately. For information regarding safety, significant main effects of Time ($F(2, 98) = 6.67$, $p = 0.002$, $\eta^2_p = 0.120$) and Condition ($F(1, 49) = 4.22$, $p = 0.045$, $\eta^2_p = 0.179$) were observed, along with a significant interaction between Time and Condition ($F(2, 98) = 8.14$, $p = 0.001$, $\eta^2_p = 0.142$). Following this interaction, in the experimental condition, a significant effect of Time was observed ($F(2, 50) = 14.95$, $p < 0.001$, $\eta^2_p = 0.374$), showing that participants' accuracy at time 2 (M = 85.00%, SD = 20.05%) and time 3 (M = 85.77%, SD = 18.58%) was greater than at time 1 (M = 65.00%, SD = 23.03%, ps < 0.001), with no change in accuracy between time 2 and time 3 ($p = 0.826$). In contrast, no effect of Time was observed in the control condition ($F(2, 48) = 0.03$, $p = 0.961$, $\eta^2_p = 0.002$). Moreover, to further investigate the Time $\times$ Condition interaction when information on safety was presented, each time interval was analyzed separately. Whereas at time 1, no effect of Condition was observed ($F(1, 49) = 0.56$, $p = 0.455$, $\eta^2_p = 0.011$), both at time 2 and at time 3, a significant effect of Condition emerged (Fs > 6.74, ps < 0.012, η^2_ps > 0.121), indicating greater accuracy in the experimental condition (during: M = 85.00%, SD = 20.05%; after: M = 85.77%, SD = 18.58%) compared to the control condition (during: M = 68.80%, SD = 24.37%; after: M = 68.40%, SD = 18.05%, ps < 0.012).

For information regarding costs, a significant main effect of Time ($F(2, 102) = 11.07$, $p < 0.001$, $\eta^2_p = 0.178$) was observed, indicating more accuracy at time 2 (M = 84.72%, SD = 15.76%) and time 3 (M = 82.26%, SD = 16.83%) than at time 1 (M = 72.45%, SD = 17.31%, ps $\leq$ 0.001), with no change in accuracy between time 2 and time 3 ($p = 0.377$). Moreover, a significant main effect of Condition emerged ($F(1, 51) = 5.81$, $p = 0.020$, $\eta^2_p = 0.102$), revealing greater accuracy in the experimental condition (M = 83.33%, SD = 11.30%) than in the control condition (M = 75.55%, SD = 12.14%). On the other hand, no significant interaction between Time and Condition ($F(2, 102) = 1.54$, $p = 0.218$, $\eta^2_p = 0.029$) was observed. In order to assess the differences in knowledge over time, accuracy in the experimental condition vs. the control condition was compared at all three time intervals. The results showed that at time 1 and time 3, no effect of Condition emerged (Fs < 1.50, ps > 0.226, η^2_ps < 0.029), but at time 2, a significant effect of Condition emerged ($F(1, 51) = 10.95$, $p = 0.002$, $\eta^2_p = 0.177$, Bonferroni-corrected p-value = 0.006), revealing greater accuracy in the experimental condition (M = 90.69%, SD = 13.07%) compared to the control condition (M = 77.50%, SD = 15.94%, $p = 0.002$).

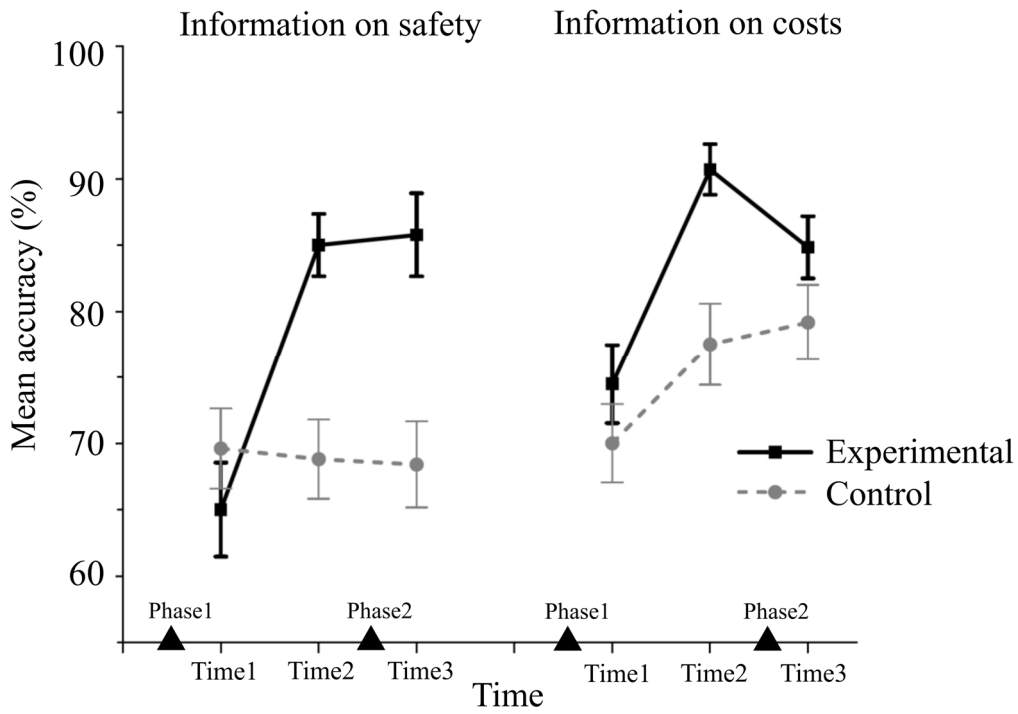

Figure 4. Mean accuracy (%) when answering questions across time (time 1, time 2, time 3) in the experimental and control conditions for each type of information content (safety and costs). Error bars represent the within-participant standard error of the mean [24]. On the x-axis, solid triangles indicate the assessment of preferences, WTP, and motivations in phase 1 and phase 2.

3.2. Main Task

3.2.1. Preferences toward Sustainable Packaging

Reusable packaging. The ANOVA performed on the mean preference ratio toward reusable packaging revealed a significant main effect of Phase ($F(1, 100) = 30.48$, $p < 0.001$, $\eta^2_p = 0.234$), indicating an overall higher preference for reusable packaging during phase 2 ($M = 0.65$, $SD = 0.41$) compared to phase 1 ($M = 0.46$, $SD = 0.41$), with no significant main effects of Condition ($F(1, 100) = 1.12$, $p = 0.291$, $\eta^2_p = 0.011$) or Information ($F(1, 100) = 0.07$, $p = 0.791$, $\eta^2_p = 0.001$). The interactions of Condition × Information, Phase × Information, and Phase × Condition were not significant (Fs < 3.12, ps > 0.08, η^2_ps < 0.030); however, the three-way Phase × Condition × Information interaction ($F(1, 100) = 3.55$, $p = 0.062$, $\eta^2_p = 0.034$) approached significance (see Figure 5). Based on this three-way interaction and on the hypotheses of the study, each type of information was analyzed separately. For information regarding safety, no main effect of Condition was observed ($F(1, 49) = 0.54$, $p = 0.466$, $\eta^2_p = 0.011$), but a significant main effect of Phase emerged ($F(1, 49) = 19.97$, $p < 0.001$, $\eta^2_p = 0.290$), which was qualified by a significant interaction between Phase and Condition ($F(1, 49) = 5.72$, $p = 0.021$, $\eta^2_p = 0.105$). Following this interaction, in the experimental condition, a significant effect of Phase ($F(1, 25) = 18.27$, $p < 0.001$, $\eta^2_p = 0.422$) indicated that preferences for reusable packaging increased during phase 2 ($M = 0.78$, $SD = 0.35$) compared to phase 1 ($M = 0.43$, $SD = 0.41$). In the control condition, however, no significant effect of Phase was observed ($F(1, 24) = 3.14$, $p = 0.089$, $\eta^2_p = 0.116$). For information on costs, only a significant main effect of Phase was observed ($F(1, 51) = 10.53$, $p = 0.002$, $\eta^2_p = 0.171$), indicating that preferences for reusable packaging increased during phase 2 ($M = 0.62$, $SD = 0.40$) compared to phase 1 ($M = 0.48$, $SD = 0.39$), with no significant interaction between Phase and Condition ($F(1, 51) = 0.008$, $p = 0.928$, $\eta^2_p < 0.001$).

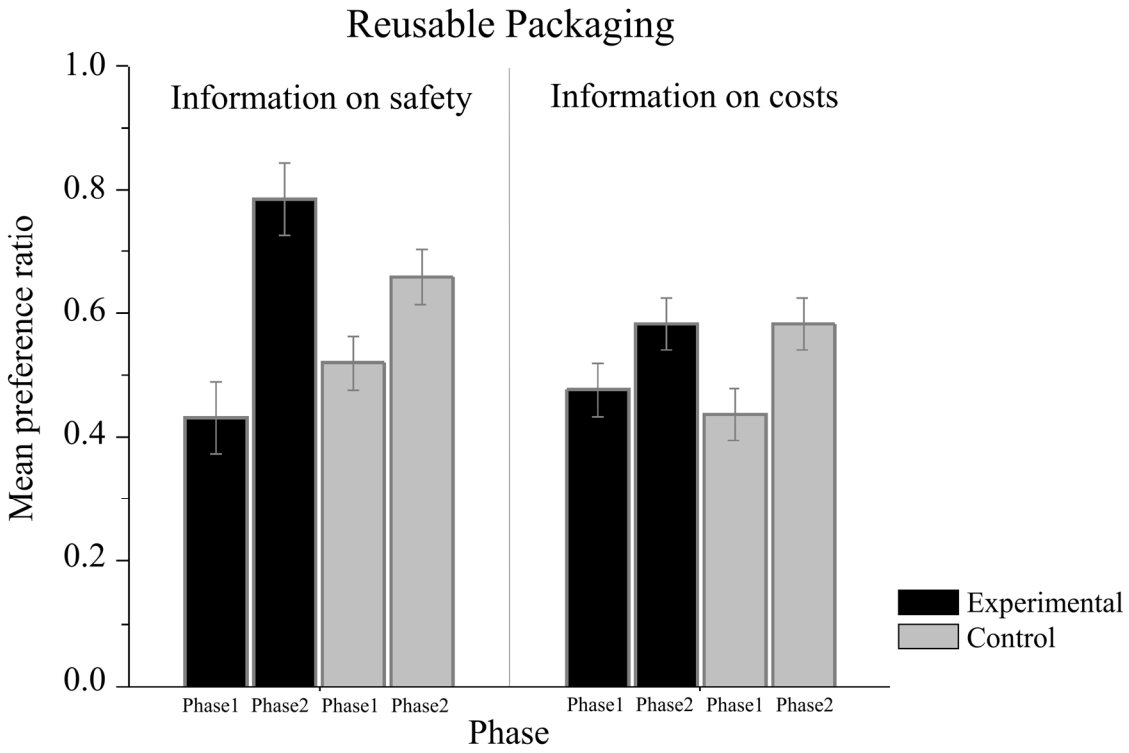

Figure 5. The mean preference ratio (number of times reusable packaging was selected as first preference/total number of preferences provided) across phases (phase 1 and phase 2) in the experimental and control conditions for each type of information content (safety and costs). Error bars represent the within-participant standard error of the mean [24].

Compostable packaging. The ANOVA performed on the mean preference ratio toward compostable packaging revealed a significant main effect of Phase only ($F(1, 100) = 17.09$, $p < 0.001$, $\eta^2_p = 0.146$), indicating that preferences for compostable packaging decreased from phase 1 (M = 0.24, SD = 0.36) to phase 2 (M = 0.13, SD = 0.28), with no other significant main or interaction effects (Fs < 2.68, ps > 0.104, η^2_ps < 0.026).

Recyclable packaging. The ANOVA performed on the mean preference ratio toward recyclable packaging revealed a significant main effect of Phase ($F(1, 100) = 7.82$, $p = 0.006$, $\eta^2_p = 0.073$), which was qualified by a significant two-way interaction between Phase and Condition ($F(1, 100) = 4.70$, $p = 0.033$, $\eta^2_p = 0.045$). Based on this interaction, in the experimental condition, a significant effect of Phase emerged ($F(1, 54) = 9.56$, $p = 0.003$, $\eta^2_p = 0.150$), indicating that preferences for recyclable packaging decreased from phase 1 (M = 0.32, SD = 0.36) to phase 2 (M = 0.18, SD = 0.33), whereas no effect of phase was observed in the control condition ($F(1, 48) = 0.26$, $p = 0.608$, $\eta^2_p = 0.006$). There were no other significant main or interaction effects (Fs < 2.16, ps > 0.145, η^2_ps < 0.021).

3.2.2. Willingness to Pay

The ANOVA on mean WTP performed on the whole statistical design (Packaging × Phase × Condition × Information) revealed a significant main effect of Packaging ($F(2, 200) = 220.05$, $p < 0.001$, $\eta^2_p = 0.688$), indicating that participants were willing to pay more for reusable packaging (M = EUR 0.16, SD = EUR 0.05) than for both compostable (M = EUR 0.06, SD = EUR 0.05, $p < 0.001$) and recyclable (M = EUR 0.06, SD = EUR 0.05, $p < 0.001$) packaging alternatives; the latter two solutions did not significantly differ from each other ($p = 0.330$). A three-way interaction of Packaging × Phase × Information was also observed ($F(2, 200) = 4.41$, $p = 0.017$, $\eta^2_p = 0.042$). Following this interaction, each type of packaging was analyzed separately. For both compostable and reusable packaging alternatives, no significant main effects or interactions emerged (Fs < 2.85, ps > 0.094,

η^2_ps < 0.028), whereas when considering consumers' WTP for recyclable packaging, only a significant interaction between Phase and Information was observed (F(1, 100) = 4.77, p = 0.031, η^2_p = 0.046). Based on this interaction, even though no main effect of Phase emerged for the safety information (F(1, 50) = 0.59, p = 0.444, η^2_p = 0.012), for information on costs, a significant main effect of Phase was evident (F(1, 52) = 5.43, p = 0.024, η^2_p = 0.095), indicating that WTP for recyclable packaging slightly decreased from phase 1 (M = EUR 0.07, SD = EUR 0.04) to phase 2 (M = EUR 0.06, SD = EUR 0.03). No other significant main or interaction effects for recyclable packaging emerged (Fs < 3.02, ps > 0.08, η^2_ps < 0.02). The mean WTP for each kind of sustainable packaging as a function of information (safety, costs) and condition (experimental, control) during phase 1 and phase 2 is reported in Table 2.

Table 2. Mean consumer willingness to pay (in Euros) and standard deviation (in brackets) for each type of sustainable packaging.

		Information on Safety		**Information on Costs**	
Packaging	**Phase**	**Experimental**	**Control**	**Experimental**	**Control**
Reusable	phase 1	0.16 (0.06)	0.18 (0.03)	0.15 (0.06)	0.16 (0.06)
	phase 2	0.15 (0.06)	0.17 (0.05)	0.16 (0.05)	0.16 (0.06)
Compostable	phase 1	0.06 (0.05)	0.06 (0.05)	0.07 (0.05)	0.06 (0.04)
	phase 2	0.06 (0.05)	0.07 (0.06)	0.06 (0.06)	0.06 (0.04)
Recyclable	phase 1	0.07 (0.05)	0.07 (0.05)	0.06 (0.03)	0.08 (0.04)
	phase 2	0.06 (0.05)	0.08 (0.06)	0.05 (0.03)	0.07 (0.04)

3.2.3. Motivation for Paying for Sustainable Packaging

In terms of motivation, the reasons given by participants for their WTP ratings were qualitatively explored. However, due to the scarcity of textual material, a systematic qualitative data analysis as a function of the experimental conditions could not be carried out. Examples of responses to the question concerning reasons underlying the WTP for reusable packaging include: "The production cost of reusable packaging justifies a higher price since it will be used many times"; "I think the price should be coherent with the number of times the packaging can be reused"; and "I can reuse it and thus I do not produce waste; also, reusable packaging amortize the cost compared to single use packaging".

4. Discussion

The present study investigated what type of information regarding reuse might encourage consumers to choose reusable packaging over single-use sustainable (compostable and recyclable) alternatives when purchasing agrifoods. Specifically, it compared preferences and willingness to pay for reusable packaging while delivering (or not delivering) information on either the safety or production costs of reusable solutions, which are among the major psychological concerns affecting the adoption of reusable food packaging [12,18].

Providing (versus not providing) indications that the reusable packaging is correctly sanitized, and that this guarantees food conservation and maintenance as much as its single-use alternatives do, was more effective in favoring the acceptance of reusable packaging than explaining the reasons behind the costs of reusable packaging. This is in line with a safety-specific scenario. Since ensuring the protection of the product is one of the key functions of food packaging, the lack of acceptable cleaning and hygienic standards of industrial packaging may raise concerns about contamination, with potential implications for personal health [11,15]. Prior research has shown that consumers evaluate a product negatively when perceptions of contamination are activated due, for instance, to superficial damage to the product's packaging [25,26] or when the packaging has been touched by other individuals [27], leading to health and safety concerns. The choice of whether to implement a recommended behavior or not (such as healthy behavior or sustainable living) may be based on the motivation to protect oneself from external threats (protection moti-

vation theory [22,23,28–31]). Unsafe packaging may lead customers to protect themselves from stimuli that have the potential to cause physical harm or illness [32]. On the other hand, knowing that the reusable packaging is correctly sanitized may reassure people of their protection against health menaces, eventually promoting the acceptance of reusable packaging when purchasing agrifoods.

In terms of the effect magnitude, the results showed that the increase in preference for reusable packaging in the safety information condition was more than double that related to the other conditions. In all conditions, an increase in preference for reusable packaging was observed, which is not surprising given that participants were exposed to a series of questions (experimental and control conditions) or information and questions (experimental condition) that were specific to reusable rather than single-use packaging. Therefore, participants' changes in preferences from phase 1 to 2 in control conditions may reflect the biasing, or demand, effect of the reusable-oriented information and questions. However, the results showed that safety information (versus information on costs) impacted participants' preferences for reusable packaging significantly more than this demand effect, highlighting the importance of safety, but not of cost, information.

When compared with information on safety, information on the reasons behind the higher costs of reusable packaging was not as effective in encouraging consumers to choose reusable packaging for food products over other sustainable alternatives. Consumers reported that they were aware that using this type of container can provide extensive cost savings over time since the initial high price of reusable packages can be amortized over several years [33]. This is demonstrated by the fact that, when assessing WTP and motivation for paying for sustainable packaging, participants were willing to pay more for reusable packages than for other sustainable alternatives. Interestingly, the motivations given for this choice referred both to the higher production costs and to the various environmental benefits of reusable containers.

Prior studies have assessed consumers' WTP or intention to pay an extra price for "green" or "more sustainable" food packaging, such as recycled, recyclable, or biodegradable packaging, and showed that the majority of consumers are willing to pay more for such types of packaging compared to standard packaging [34]. According to the latest Italian CONAI (National Association of Packaging) report, the results of a study carried out in 2020 involving 1000 respondents showed that consumers are willing to pay more for products with sustainable packaging (versus ordinary containers). Additionally, even when the price of the sustainable option was increased by 30%, over half of the respondents would choose it anyway. Here, making a direct comparison across three diverse types of sustainable packaging (i.e., compostable, recyclable, and reusable), the results showed that participants are willing to pay even more for the reusable option (on average, EUR 0.16) compared to other sustainable alternatives (on average, EUR 0.06 for both compostable and recyclable packaging) when purchasing agrifoods. This result is encouraging from a producer's point of view because it suggests that consumers are aware that using a reusable system can be more costly, considering the manufacturing and functioning costs of the system itself. Indeed, consumers are willing to pay more than twice the price for reusable packaging than for other sustainable alternatives (with recycled and compostable materials) for their food products. Finally, the lack of modulation of WTP for reusable packaging by either safety or cost information might be explained by a ceiling effect, as participants had already indicated a high price initially that was hard to exceed in the second phase. Alternatively, it may be that the adoption of reusable packaging concerns more of a safety dimension and less of an economic one, as suggested by the lack of effect of the cost information on packaging preference and the lack of modulation of WTP.

One limitation of this study concerns the acquisition of information in the cost condition. While information regarding safety was both acquired and maintained (time 2 and time 3), for cost information, a difference between the experimental and control conditions was established at time 2, but it declined at time 3. Therefore, the preference and WTP in phase 2 might have reflected either cost information being forgotten or a lack of effect

of cost information on WTP. While future studies could explore these two possibilities by sampling knowledge using a finer time scale, the present result reiterates the greater impact of safety information compared with information on cost.

Adopting communication strategies via labeling that includes key information, like that on the hygienic standards of reusable packaging that ensure food conservation, could be particularly useful to encourage consumers' acceptance of reusable packaging. However, whether companies repeatedly clean and refill the packaging (returnable packaging) or consumers are responsible for the cleaning and refilling of the packaging (refillable packaging) could differently impact consumers' acceptance of reusable food packaging, e.g., because of differences in price (to be paid at each purchase or only once) or in required actions (e.g., returning vs. cleaning the packaging). Indeed, messages on the "ease of use" for consumers to return packaging, as opposed to other messages (e.g., rewards, social modeling, or justification), seem to be particularly relevant for consumers to actively participate in reusable models [35–37]. Future research would particularly benefit from investigating which types of communication strategies via labeling are more effective as a function of diverse models of reuse in food purchasing behavior.

5. Conclusions

This study extends the existing literature that examines the enablers and barriers that influence consumers' adoption of reusable packaging in the context of sustainable food consumption. The results demonstrated that information concerning the safety of reusable packaging, but not production costs, increased consumers' preferences for reusable packaging. At the same time, willingness to pay was not affected by either type of information. The results highlight the key role that delivering appropriate information plays in addressing consumers' psychological concerns and in fostering the acceptance of reusable packaging when purchasing agrifoods. The acceptance of reusable packaging can be effectively influenced by factors related to its life cycle, for example, the washing phase or cleaning and sanitizing in all production and process steps, making this type of packaging comparable to disposable alternatives [38]. This highlights the need for organizations to adopt marketing and communication strategies that emphasize the safety of their reusable packaging. Information regarding cleaning practices and the life cycle of reusable packaging appears to be a key element in building consumer trust toward reuse systems and influencing purchasing choices related to agrifood products.

Supplementary Materials: The following supporting information can be downloaded at https://www.mdpi.com/article/10.3390/su16145937/s1: Table S1: examples of information and questions.

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