Visual attention to sustainability messages and self-reported willingness to pay for sustainable takeout and delivery packaging in Honduras

Luis A. Sandoval
Panamerican Agricultural School Zamorano
lsandoval@zamorano.edu

María J. López
Panamerican Agricultural School Zamorano
maria.j.lopez.2023@alumni.zamorano.edu

William A. Mejía
Panamerican Agricultural School Zamorano
william.mejia.2023@alumni.zamorano.edu

Sarahí D. Morales
Panamerican Agricultural School Zamorano
smorales@zamorano.edu

Brenda A. Mamani
Panamerican Agricultural School Zamorano
Texas Tech University
bmamanie@ttu.edu

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Abstract

Recent changes in the consumption habits of the population suggest consumers have increased the number of purchases of take-out and livery food. This trend comes with unintended negative externalities to the environment, as it has resulted in increased plastic pollution due to single-use plastic food containers. Unfortunately, sustainable and eco-friendly alternatives tend to be more expensive than conventional plastic one. The objectives of this study were to measure visual attention to sustainability messages, self-reported criteria for choosing restaurants, and self-reported willingness to pay for sustainable packaging alternatives. Our results suggest consumers do notice sustainability messages in restaurant menus, but do not make an effort to understand them, and about half of consumers do not understand the sustainable packaging alternatives. However, self-reported willingness to pay was positive and greater than zero, suggesting restaurants may transfer some of the cost of implementing sustainable take-out and delivery packaging to consumers.

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One of the biggest environmental challenges of the current century is plastic pollution. It is estimated that 500 billion plastic bags are used every year. In 2025 it is estimated that the ocean will contain one ton of plastic for every three tons of fish and that by 2050 more plastic than fish (Ranniger, 2022). Of all marine debris, plastic is estimated to account for 85%, making it the most harmful and persistent marine debris (UN Environment Programme, 2021). The plastic pollution problem has been accentuated due to the COVID-19 pandemic, as restaurants relied on take-out and delivery to keep on business.

Unfortunately, while takeout and delivery saved restaurants during the pandemic, many of the food containers and packaging used are single-use plastics, which contribute to plastic pollution. There are also sustainable alternatives, which are manufactured responsibly, with a design and material that does not become waste when used. However, sustainable alternatives are usually more expensive, unavailable, or not convenient for all food products.

New consumer trends are pushing companies to change their products and processes, including restaurants. One of the most influential trends is the growing environmental awareness of consumers, which has created a series of expectations and demands for products and services that do not have a negative impact on the environment. Due to this consumer trend, businesses not only have to be sustainable but also must advertise it.

Sustainable takeout and delivery packaging have the potential to be a comparative and competitive advantage for some restaurants, by making the restaurant more appealing to environmentally conscious consumers, who may be willing to pay a premium for sustainable packaging. In some

instances, consumers may not be willing to pay a premium for sustainability, but just favor restaurants that offer it, over those that do not. According to Rivera et al. (2019), sustainability is not the most important decision factor for consumers, it is price.

Due to the knowledge gap regarding the demand for sustainable takeout and delivery packaging in the Latin American context, this study uses the country of Honduras as a case study to understand the potential demand for sustainable takeout and delivery packaging. The specific objectives of this study were: (1) to evaluate visual attention to sustainable takeout and delivery packaging messages in hypothetical restaurant menus, (2) to identify self-reported criteria consumers use when making takeout and delivery food choices, and (3) to estimate self-reported willingness to pay for different sustainable packaging alternatives.

Conceptual framework

Consumers are an important market force in achieving sustainability in the Agrifood Systems. Through their decisions, consumers sent important market signals downstream the value chain, incentivizing or disincentivizing the adoption of sustainable practices by producers, processors, and distributors. However, consumers may face barriers to achieving sustainable consumption. In many instances, a sustainable food product alternative may exist, and the consumer might be aware of it and even have a positive attitude toward sustainability. And yet, the consumer may not choose the sustainable alternative.

According to Grunert (2011), there are six barriers consumers may face in the decision-making process that might be causing consumers not to choose sustainable products and services, or to return to non-sustainable alternatives after trying the sustainable ones (Figure 1). The six barriers are:

Exposure does not lead to perception. The sustainable food product has a label that indicates the type of certification scheme. However, consumers simply do not notice the label. This might be due to time pressure or habit purchases.

Perception only leads to peripheral processing. Consumers notice sustainability labels, but do not make an effort to understand them. Yet, the presence of the labels might affect their choice.

Consumers make erroneous inferences. Consumers notice the sustainability labels and make an effort to understand them, but make the wrong inference about the label. As a result, they might still purchase sustainable food products, but for the wrong reasons.

Ecological information is contrasted with other criteria. Other selection criteria, such as price, convenience, and taste, are valued more by the consumer than the sustainability attributes.

Lack of awareness and/or credibility. Consumers want to make sustainable choices, but it is difficult for them to do so.

Lack of motivation at the time of choice. Consumers may have a positive attitude toward sustainability, but this attitude does not translate into sustainable choices.

In this paper, we aim to provide insights regarding barriers one through four, in the context of take-out and delivery food packaging.

Methodology

Hypothetical menus

To evaluate the visual attention to sustainability messages, a hypothetical menu was designed for a fictional restaurant. While the restaurant is fictional, the menu was designed using as examples the menus of restaurants locally available and familiar to the surveyed population. Two alternative

messages were added to the menu: (1) “This restaurant promotes de use of sustainable packaging, that can be reusable, recyclable, or biodegradable” and (2) “Did you know that in Honduras pollution per person per day is 0.28 kg of plastic? This restaurant promotes the use of sustainable packaging, that can be reusable, recyclable, or biodegradable.” The first message only presents the sustainable practice implemented by the restaurant, while the second presents a problem statement in addition to the sustainable practice implemented by the restaurant. Thus, allowing us to evaluate if consumers had different levels of visual attention to alternative messages and if willingness to pay differed depending on the message presented to consumers. Finally, participants were exposed to only one of three alternatives, control (no message), practice treatment, and problem plus practice treatment (Figure 2). The sustainability messages were located at the bottom of the menu.

Biometrics

The designed menus were introduced into the software iMotions as stimuli and biometrics were recorded using a computer-based eye-tracker AI-X. Once participants were properly calibrated for eye-tracking, a set of instructions appeared on the screen asking them to imagine they were visiting the restaurant to have takeout to eat at home. They are asked to freely explore the menu, as they would at any restaurant, and then to make a choice (the choice was not recorded). The menu was presented for a fixed time of 40 seconds.

Six areas of interest (AOI) were determined in the control menu, while in treatments a seventh is included, the sustainability message. These defined areas of interest were the name of the restaurant (AOI 1), appetizers section (AOI 2), burgers section (AOI 3), burger image (AOI 4), pizza section (AOI 5), pizza image (AOI 6) and the sustainability message (AOI 7). The menus were then analyzed for fixation-based metrics.

For each AOI the reported metrics are (1) respondent ratio, the percentage of participants that fixated on the AOI, (2) revisit count, the average frequency with which respondents looked back after the first fixation, (3) fixation count, the average frequency of fixations inside the AOI, (4) time to first fixation, average time elapsed until de first fixation, and (5) dwell time (%), the average of how long participants fixated on the AOI relative to the time the AOI was active.

Survey instrument

In addition to the exposure to the restaurant menus, all participants were asked to fill out a survey that collected data on demographics, knowledge about sustainability packaging, frequency of purchases of takeout and delivery, and criteria for choosing restaurants (Annex 1). Knowledge about sustainable concepts was asked through three multiple-choice questions, with three answers, asking participants to choose the best definition of biodegradable, reusable, and recycling. Criteria for choosing restaurants were recorded through the question: "Which of the following criteria do you take into consideration when choosing a restaurant?", and by providing four options, of which participants could select more than one. Willingness to pay was recorded through a self-reported value on a scale from 0 to 100 lempiras (Honduras currency) to the question: "When you consume food delivered or taken away, if the restaurant offered you the option of eco-friendly packaging (recyclable, biodegradable, or reusable), what is the most additional amount you would be willing to pay? Please indicate the value for each alternative."

Participants recruitment

For this research study, participants were recruited from two populations: students at the Panamerican Agricultural School Zamorano, and consumers (not students or employees) of the university´s mini-market. As of 2024, the student body represents 17 nationalities, and the mini-market is open to the general public. Students were invited to participate with a flyer that was

distributed through social media groups and chats, and verbally when visiting one of the university´s cafeterias. Consumers of the mini-market were verbally invited to participate while visiting the establishment. All participants were briefed on the purpose of the study, benefits, risks and the time their participation would take. All participants had to verbally consent to participate. Regulation in Honduras does not require IRB approval. However, three of the researchers have had formal human-research ethics training, and fully reviewed the methodology to ensure the protection of the participants. No identifiable personal information was recorded.

Statistical analyses

Data was cleaned using Microsoft Excel and all analyses were done using the statistical software JASP. The metrics of the menus AOIs were obtained directly from iMotions. To evaluate if there were differences between the willingness to pay between populations (students and the general public) and the type of sustainable packaging (biodegradable, recyclable, and reusable) we used a 2x3 factorial ANOVA. A Q-Q plot and Levene´s test were used to test for the normality and homogeneity assumptions. Since the self-reported WTP is bounded between 0 and 100, we used a one-sample Wilcoxon signed-rank test to test the null hypothesis that the median of the WTP was greater than zero.

Results

The results of the student population are presented separately from the results of the general public population when appropriate.

Descriptive statistics

Seventy-nine individuals participated in this research study. Most of the individuals, 57%, corresponded to the general public population. The student population was characterized for being

mainly males (58.8%), with some level of university (97.1%) and with no income (97.1%). The general public population was characterized by mainly males (51.1%), with complete university (46.7%), and by 66.7% with income in the range ~USD 490 to USD 2041. Finally, while all individuals were asked if they consumed food for take-out or delivery to enter the study, the frequency of consumption is relatively low. Most of the participants, 59%, consume food for take-out and delivery less than once a week (Table 1).

Visual attention of the student population

In the control menu, with no sustainability message, the AOI the participants looked at first, on average, was the burgers section, at 1092.5 ms. In the menu with the sustainable practice message the AOIs participants looked at first were appetizers, burgers section, and burgers image, ranging from 1622.01 to 1912.71 ms. In the menu with the problem plus sustainable practice message the AOI participants looked at first was the burgers image, ranging from 596.81 to 1802.02 ms. The AOIs participants looked at last, on average, were the pizza section in the control menu and the sustainability messages in the treatment menus. Additionally, not all participants looked at the sustainability messages. Only 75% of participants looked at the sustainable practice message and only 63.63% looked at the problem plus sustainable practice message (Table 2 and Figure 3).

The sustainability messages were the least revisited areas of interest, with an average of 1.11 and 0.57 revisits. The sustainability messages were also the AOI with lower fixation counts and dwell time, with 5.44 and 4.57 revisits, and 3.58 and 2.88%, for the sustainable practice and problem plus sustainable practice messages, respectively. Only the name of the restaurant had lower revisits, fixation count and dwell time, than the sustainability messages.

Visual attention of the general public

In the three menus, the AOI participants looked at first was the burgers image, ranging from 306.34 to 541.64 ms, on average. The AOIs participants looked, at last, were the pizza section and both sustainability messages. Not all participants looked at the sustainability messages, with only 60 and 46.67% of them fixating at some point in the sustainable practice and problem plus sustainable practice messages, respectively. Both menus were the least revisited, with 0.78 and 0.57 average revisits, and had a lower frequency of fixations than all other AOIs, except for the name of the restaurant, which had the lowest average frequency of revisits. In the sustainable practice message menu, the message was the second AOI were participants spent the least time, with only 4.57% of the time the looked at the menu. In the of the problem plus sustainable practice message menu, the participants spend more time on the sustainability message than the name of the restaurant, burgers image and pizza image AOIs, with 9.13% of their time devoted to the message (Table 3 and Figure 3).

Knowledge about sustainable packaging and factors affecting the choice of restaurant

Around half the participants did not correctly identify the definition of recyclable and reusable concepts. However, in both instances, the share of participants incorrectly selecting the definition of recyclable, and reusable was higher in the general public population. In the case of the biodegradable concept, most of the participants correctly identified the definition, 88.23 and 80% for the student and general public populations, respectively (Table 4).

Regarding the decision criteria for selecting a restaurant, the quality of the restaurant was the most popular choice, with 88.22 and 62.22 of participants selecting that alternative in the student and general public populations. Eco-friendly practices were the least popular criteria in both populations, with 23.5 and 22.2% of participants reporting it as a restaurant selection criterion. For the general public population, convenience was as popular as eco-friendly practices (Table 4).

Self-reported willingness to pay

The mean WTP for sustainable take-out and delivery packaging was HNL 35.45 (~USD 1.45). Due to the exploratory nature of this study, we do not present a table with the conditional WTP means but show the distribution of the WTP by type of sustainable packaging and population (Figure 4). The 2x3 factorial ANOVA suggests there are no statistically significant differences found between populations ($F = 1.88$, $p = 0.1716$), type of sustainable packaging ($F = 1.39$, $p = 0.2519$), or their combinations ($F = 1.87$, $p = 0.1561$). Since no differences in the mean WTP were found in the 2X3 ANOVA, a one-sample Wilcoxon signed-rank test was used to confirm the median WTP was statistically different from zero ($W = 23871$, $p < 0.001$, one-tail).

Discussion

As expected, participants explored the menu left-right and up-down. Despite the menu being hypothetical, and having a name with which the participants were not familiar, the participants did not look at first at the name of the restaurant, even though it was located first in the upper section of the menu. Since the sustainability messages were located at the bottom of the menu, it was expected that consumer would look at it last. However, it was not expected that more than 25% of participants would not fixate at all on the AOI corresponding to the message. This lack of attention to the sustainability message suggests a proportion of consumers may only peripherally process information not relevant to them. In other words, when handling a menu, consumers will devote their attention to only the AOIs that will help them complete the task, when the task is the choice of what to eat and those AOI are the section of the menu with the options, their description, and prices. Other information, such as the name of the restaurant, images and the sustainability message, may not get attention at all. If the sustainability messages do get noticed, they do not get as much attention as other AOIs, since they are not contributing information to the task, which is exemplified by the AOI

of the message having the lowest number of revisits, lower fixation counts, and dwell times. These results are consistent with Grunert´s (2011) first and second barrier to sustainable consumption: “Exposure does not lead to perception” and “perception leads only to peripheral processing”. Basically, not all consumers notice the sustainability messages, and those that do, may not be making an effort to fully understand it, even though some might use it in their decision-making.

Consistent with Grunert´s (2011) third barrier to sustainable consumption “consumers make the wrong inference”, about half of the participants did not correctly identify the concept of recyclable and reusable. This suggests that consumers who note and central process the sustainability messages, may not fully understand the alternative sustainable packaging options offered to them, at least when those options are recyclable and reusable. On other hand, only 20% or less of the participants did not correctly identify the concept of biodegradable, suggesting that when presented as a packaging option, at least four in five consumers would select this alternative for the right reason.

When asked about the factors they take into consideration for selecting a restaurant, sustainability was the least selected option, with only about one in five participants considering any eco-friendly practice as a restaurant selection criteria. This result is consistent with Grunert´s (2011) fourth barrier to sustainable consumption “eco-information is traded off against other criteria”. Out of the four criteria presented to participants (convenience, price, restaurant quality and eco-friendly practices), restaurant quality was the most popular, with 62.2 and 88.2% of participants indicating this as a selection criteria. All other criteria were selected by less than one-third of the participants. This suggests that Honduran consumers will most likely choose a restaurant to order take-out and delivery based on their personal preferences and tastes, deeming other criteria as secondary, including sustainable practices. In the case of the student population, price was selected by 61.8%

of the participants, suggesting that sustainability is likely to be traded off against preferences and price.

Overall, self-reported WTP for sustainable take-out and delivery packaging was positive, and roughly the same disregarding population and type of packaging. Since the average WTP did not differ between populations, this suggests a generalized positive attitude towards sustainability by the Honduran consumers. While there were consumers that reported zero WTP, the fact that, on average, the value of the WTP is positive, offers a possibility for the adoption of sustainable take-out and delivery packaging, especially when those alternatives are more expensive to adopt than the existing pollutant alternatives.

Conclusions

The objectives of this research project were to evaluate visual attention to sustainability messages in a hypothetical restaurant menu, to identify self-reported criteria for choosing restaurants, and the self-reported willingness to pay for sustainable take-out and delivery packaging. Most consumers who participated in this study did notice the sustainability message in the hypothetical menu, but also paid little attention to it, and possibly made no effort to understand it. Biodegradable and reusable were concepts not understood by around half the participants, suggesting that when presented with these alternatives for sustainable packaging, may opt to choose them, or not, for the wrong reasons. Restaurant quality, and restaurant quality and price, were the most selected restaurant selection criteria by the general public and the student populations. This suggests that these two criteria are more important for consumers than sustainable business practices and that it is unlikely consumers would trade restaurants just because of sustainable practices. Self-reported WTP for sustainable take-out and delivery packaging was found to be greater than zero, and about USD 1.45, regardless of type of population and type of packaging.

The adoption of sustainable take-out and delivery packaging will not likely be consumer-driven, due to fact that consumers, in the majority, select restaurants based on their preferences and tastes. In the case of university students, price is also an important restaurant selection criteria. Therefore, it is not likely consumers would trade restaurants, and favor those that offer sustainable packaging alternatives. The adoption of sustainable take-out and delivery packaging must be driven by the restaurant industry, through taking the lead and substituting current polluting packaging for sustainable alternatives. In the cases where those alternatives lead to higher costs, our data suggests some of those additional costs could be transfer to consumers. Finally, consumer education is a must. Consumers must understand the environmental impact of their take-out and delivery habits and how they can offset that negative environmental impact through demanding sustainable take-out and delivery food packaging.

Author contributions

Conceptualization: LS, SM; Data curation: ML, WM, BM; Formal analysis: ML, WM, BM, LS; Investigation: LS, SM, ML, WM; Methodology: LS, SM; Project administration: LS, BM; Resources: LS, BM; Supervision: LS, BM; Validation: LS; Visualization: ML, WM; Writing – original draft: ML, WM; Writing – review & editing: LS, SM.

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Table 1. Descriptive statistics of the student and general public populations.

	General public		Students	
	N	**%**	**n**	**%**
Gender				
Female	22	48.89	14	41.18
Male	23	51.11	20	58.82
Academic degree				
Some high school	1	2.22	0	0.00
Baccalaureate	6	13.33	0	0.00
Some university	6	13.33	33	97.06
University	21	46.68	0	0.00
Postgraduate	11	24.44	1	2.94
Monthly income				
Less than L. 7,500	1	2.22	0	0.00
L.7,501 – L.12,000	4	8.89	0	0.00
L. 12,001 – L. 24,000	15	33.33	0	0.00
L. 24,001 – L. 50,000	15	33.33	0	0.00
More than L. 50,000	7	15.56	1	2.94
Does not apply	3	6.67	33	97.06
Frequency of consumption				
Less than once a week	30	66.66	17	50.00
One to two times a week	10	22.22	14	41.17
Three to four times a week	5	11.11	2	5.88
More than four times a week	0	0	1	2.95

Table 2. Areas of Interest metrics for the student population.

Fixation based metrics	Name of the restaurant	Appetizers	Burgers	Burgers Image	Pizzas	Pizza Image	Sustainability message
Control							
Respondent ratio (%)	70	100	100	100	100	100	-
Revisit count	1.14	3.73	5.27	2.7	2.91	2.73	-
Fixation count	6.71	28.73	30.64	7.4	20.91	10.09	-
TTFF AOI (ms)	5419.11	1813.97	1092.5	3374.27	11695.43	7738.43	-
Dwell time (%)	3.36	22.21	27.32	7.27	16.54	6.85	-
Treatment 1: sustainable practice							
Respondent ratio (%)	66.67	100	100	100	100	83.33	75
Revisit count	1	4.83	6.17	4.17	2.75	3.6	1.11
Fixation count	4.62	31.58	32.42	9.33	19.08	9.6	5.44
TTFF AOI (ms)	5392.64	1622.01	1912.71	1865.31	9645.8	8044.17	15186.72
Dwell time (%)	2.89	24.93	25.96	6.08	14.39	5.75	3.58
Treatment 2: problem plus sustainable practice							
Respondent ratio (%)	63.64	100	100	90.91	100	90.91	63.64
Revisit count	0	2.73	4.45	2.5	2.45	2.4	0.57
Fixation count	2.14	28.73	45.27	4.8	15.27	5.8	4.57
TTFF AOI (ms)	1802.02	1581.12	5421.21	596.81	8217.8	10074.4	13813.72
Dwell time (%)	1.03	20.89	38.1	4.3	12.55	4.29	2.88

Table 3. Areas of interest metrics for the general public population.

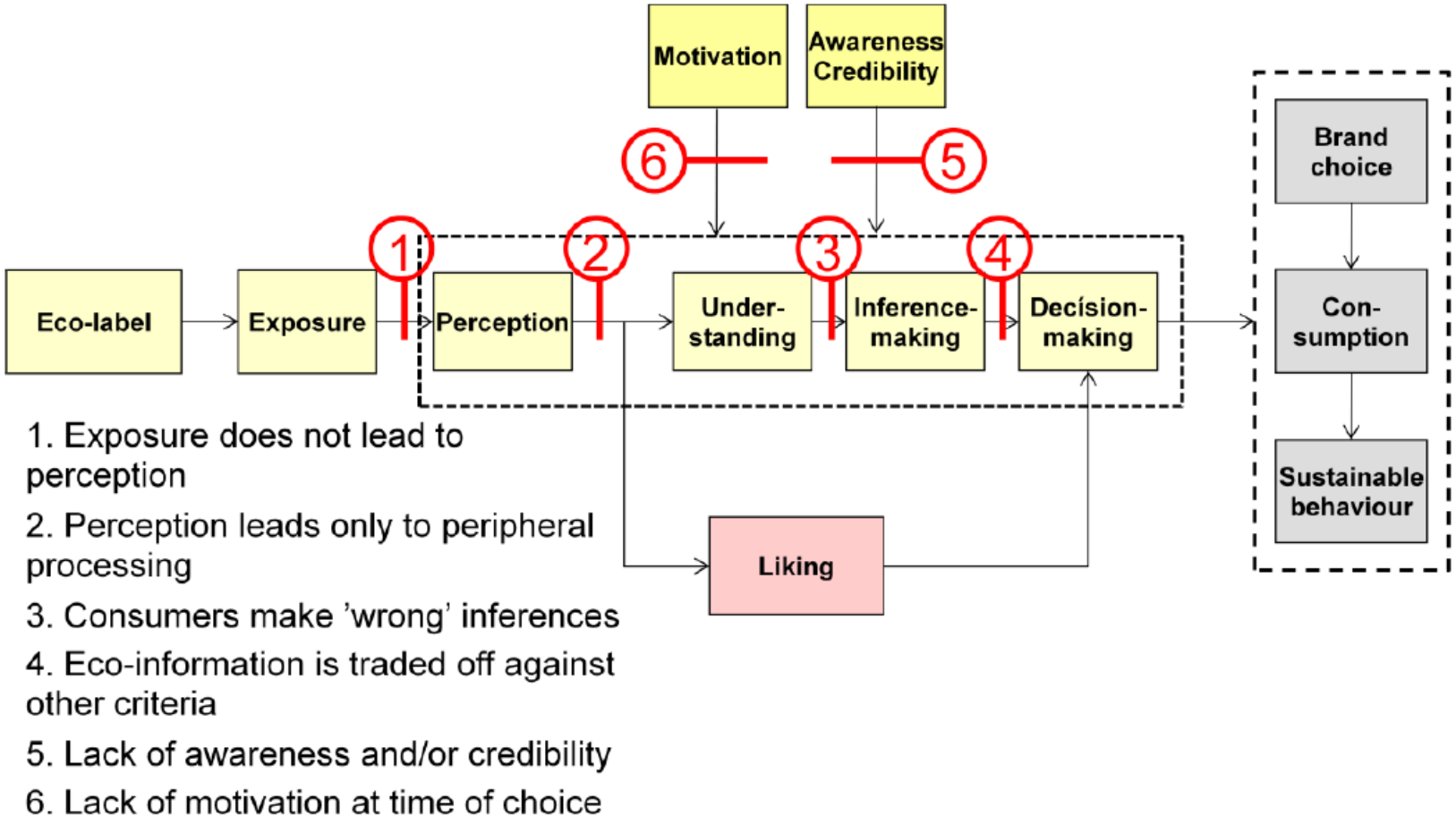
Fixation based metrics	Name of the restaurant	Appetizers	Burgers	Burgers Image	Pizzas	Pizza Image	Sustainability message
Control							
Respondent ratio (%)	73.33	100	100	93.33	100	86.67	
Revisit count	0.64	3.2	4.47	6.14	3.07	5.46	
Fixation count	4.64	23	33.2	13.29	25.8	14.62	
TTFF AOI (ms)	1862.6	2478.09	3399.04	306.34	15098.2	9146.29	
Dwell time (%)	2.72	15.51	24	9.57	17.99	11.54	
Treatment 1: sustainable practice							
Respondent ratio (%)	73.33	100	100	100	100	100	60
Revisit count	0.82	4.33	4.93	4.87	3.13	3.8	0.78
Fixation count	3.09	24.8	32.93	11.53	25.13	7.8	5.22
TTFF AOI (ms)	5224.93	2130	1840.79	541.64	10417.6	5957.39	24724.5
Dwell time (%)	1.81	18.01	22.7	7.66	16.91	5.11	4.57
Treatment 2: problem plus sustainable practice							
Respondent ratio (%)	60	100	100	93.33	100	100	46.67
Revisit count	0.78	2.73	4.07	3.57	3.93	3.47	0.57
Fixation count	5	21.2	28.2	9.57	29.4	10.93	10.14
TTFF AOI (ms)	8745.5	2501.82	3074.37	450.64	8923.04	10413.54	28092.44
Dwell time (%)	2.78	14.44	20.2	7.43	22.56	7.08	9.13

Table 4. Frequency of correct and incorrect answers to sustainable packaging concepts and criteria for choosing a restaurant.

	General public		Students	
	N	%	*n*	%
Recyclable concept				
Correct	20	44.44	19	55.88
Incorrect	25	55.56	15	44.11
Biodegradable concept				
Correct	36	80	30	88.23
Incorrect	9	20	4	11.76
Reusable concept				
Correct	20	44.44	18	52.94
Incorrect	25	55.56	16	47.05
Restaurant selection criteria				
Convenience	10	22.22	11	32.35
Price	14	31.11	21	61.76
Restaurant quality	28	62.22	30	88.22
Eco-friendly practices	10	22.22	8	23.52

Note. Restaurant selection criteria do not add up to 100%, as participants were allowed to select multiple alternatives.

Figure 1. Grunert´s barriers to sustainable consumption.



Source: Grunert (2011).

Figure 2. Restaurant menus with sustainability messages.

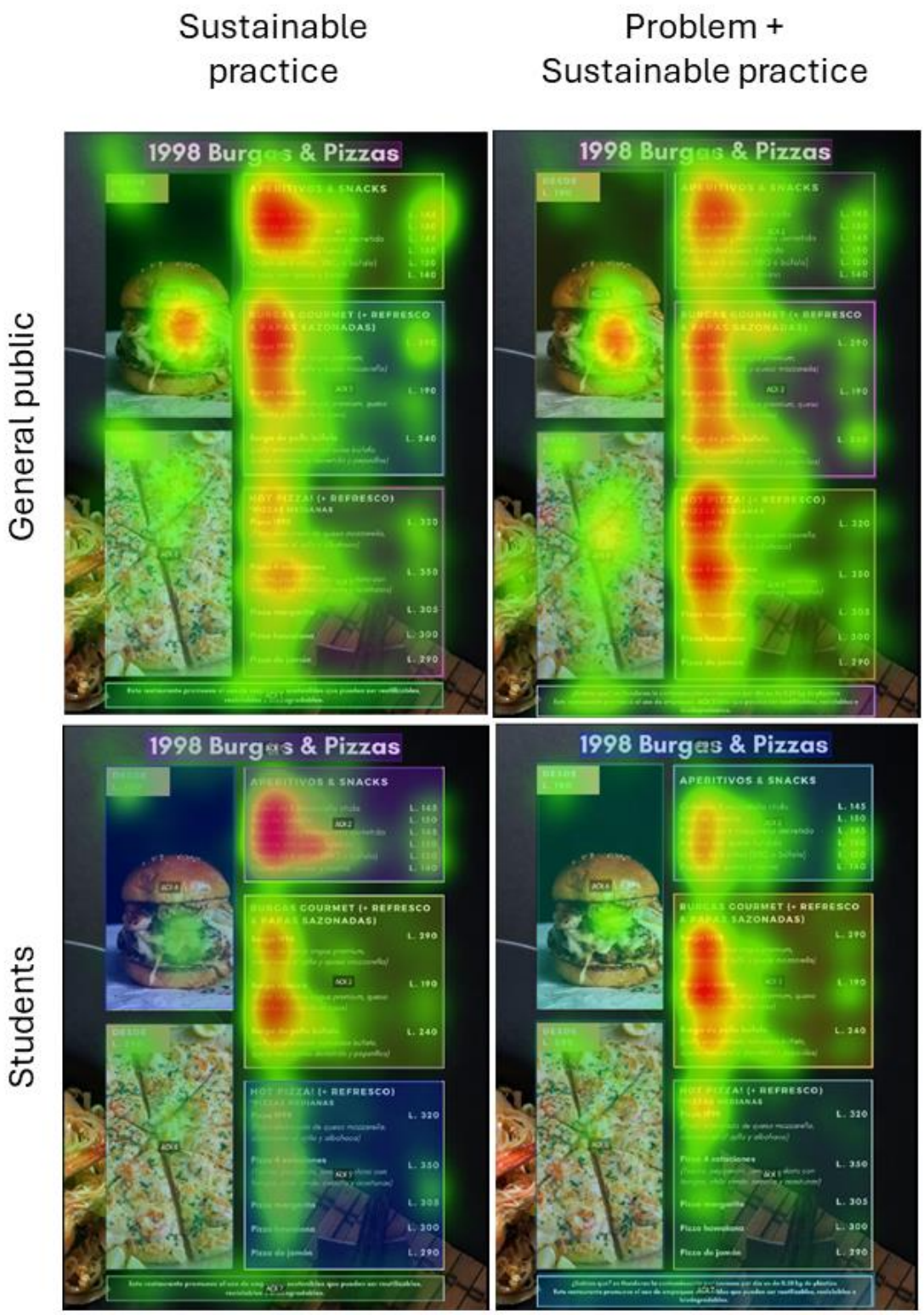
Control (no message)

Sustainable practice message

Problem + Sustainable practice

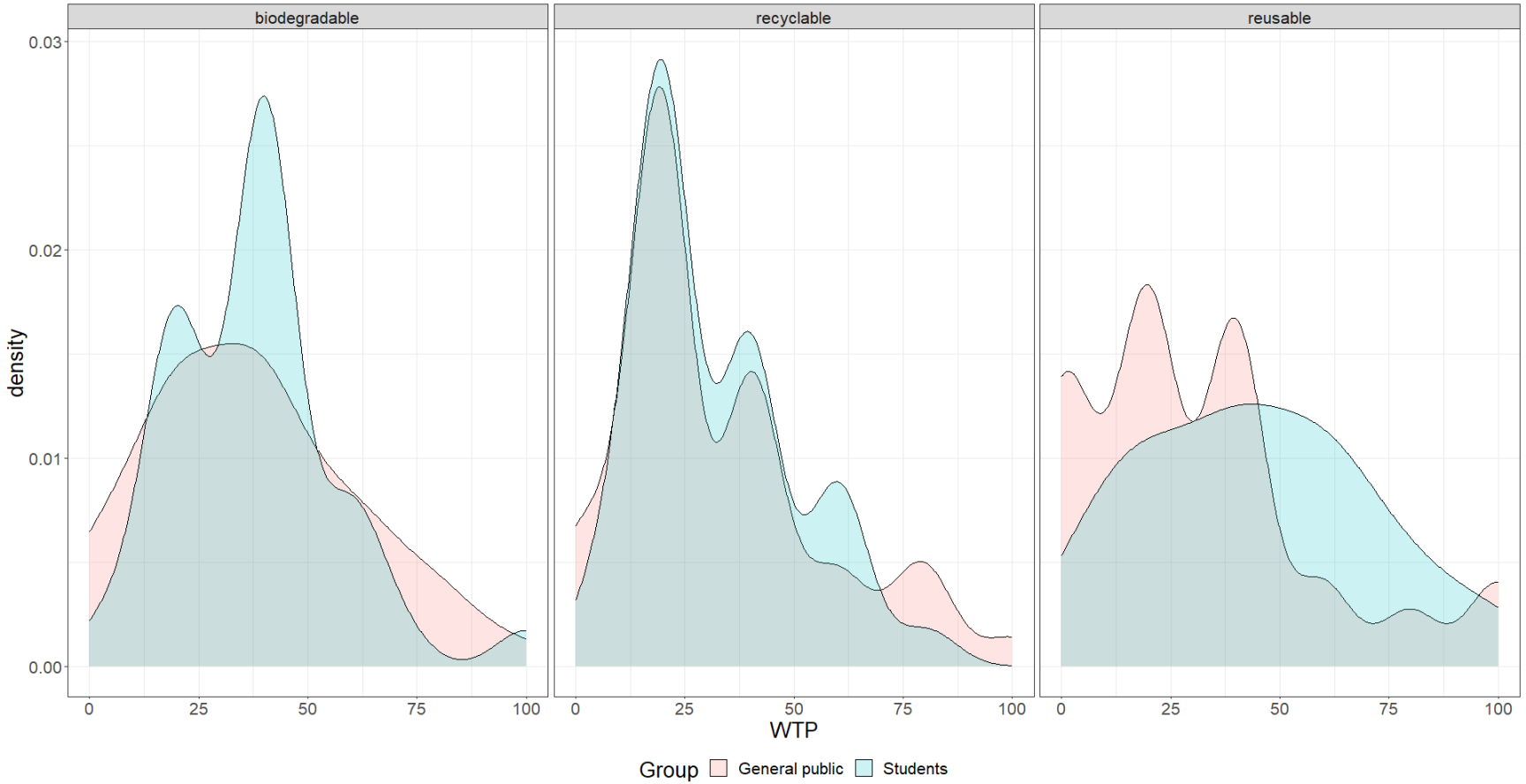
*Sustainability messages are located at the bottom of the menus.

Figure 3. Heat map of visual attention.



Note: Green to red = Less to more visual attention.

Figure 4. Self-reported willingness to pay distribution by type of eco-friendly packaging.



WTP in Honduran lempiras. USD 1 ~ HNL 24.5.