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Organic Food Labeling and Consumer Perception: Empirical Evidence
Etiquetado de alimentos ecológicos y percepción del consumidor: Evidencia empírica

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ABSTRACT

The article proposes an impact analysis of consumer perceptions about organic food, using a cuasi-experimental design in a Colombian region, where participants tasted four aliments, with two types of labels: organic and conventional. A structural equation model was used to analyze the data, showing that organic labeling promotes healthier food perceptions, but not with better taste, verifying the halo effect by labeling organic products that are in fact conventional, for the following foods: brownie, oatmeal, natural yogurt and cookies, finding that even though all products were conventional, consumers assigned higher ratings to those with organic labels; in especial for oatmeal, and crackers, also, Brownie but not natural yogurt.

KEYWORDS: Emotional, Social, and Cognitive Factors on Decision Making; Field Experiments; Consumer Economics: Empirical Analysis; Organic food; food labeling.

JEL Codes: D91, C93, C53, D12, C26

RESUMEN

El artículo propone un análisis de impacto de las percepciones de los consumidores sobre los alimentos orgánicos, utilizando un diseño cuasi-experimental en una región colombiana, donde los participantes degustaron cuatro alimentos, con dos tipos de etiquetado: orgánico y convencional. Se utilizó un modelo de ecuaciones estructurales para analizar los datos, mostrando con este, que el etiquetado orgánico promueve percepciones de alimentos saludables, no mejor sabor. Se verifica el efecto halo al etiquetar productos orgánicos que en realidad son convencionales, para los siguientes alimentos: brownie, avena, yogurt natural y galletas, encontrando que a pesar de que los productos

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eran convencionales, los consumidores asignaron calificaciones más altas a aquellos con etiquetas orgánicas; en especial la avena, galletas, Brownie, no yogurt natural.

PALABRAS CLAVE: Factores emocionales, sociales y cognitivos en la toma de decisiones; Experimentos de campo; Economía del consumidor: Análisis empírico; Comida orgánica; Etiquetado de los alimentos.

INTRODUCCIÓN

Growing concerns about health, the environment and sustainability, have led to an increase in the demand for and consumption of organic food around the world (Massey, O'Cass, & Otahal, 2018; Fillion & Arazi, 2002; Richetin et al., 2022). The organic food industry has experienced rapid growth over the past two decades, and the labeling of these products has become a key factor in consumer perception and decision-making (Neuhofer et al., 2023; García De Leaniz & Castro-González, 2023; Hughner et al., 2007; Aertsens et al., 2009). However, knowledge gaps remain regarding the impact of organic food labeling on consumer perceptions in different cultural and geographic contexts, also Vasco et al., (2022) studied organic perception in Ecuador and also found that higher educated persons, and with better economic situation, had preferences for ecological products. This study attempts to analyze the impact of organic food labeling on consumer perceptions and consumption of organic products in Medellín city, from Antioquia department, in Colombia. Our overarching goal is to analyze the impact of organic food labeling on perceptions and consumption of organic products in the city of Medellin, department of Antioquia, in Colombia in 2018.

To achieve this goal, we will study the relationship between organic food labeling and consumer perceptions of product health and taste, examine the influence of consumers' environmentally conscious attitudes on their perception and preference for labeled organic products, and assess the prevalence and Impact of Misinformation and Fraud in Organic Food Labeling, and we compare our findings in a Colombian locality to similar research from other countries, for example, in United States, EunHa & SooCheong (2020) found that label content related with nutritional information increases the perceived benefits of a product and purchase intentions, also, in Spain, a halo effect and purchase intention was mediated by increases in sensory ratings and perceived healthiness (Apaolaza et al., 2017). By addressing our specific goals, we hope to contribute to the existing literature and provide valuable information for formulating effective policies and strategies to promote the adoption of

sustainable consumption practices worldwide. We also acknowledge the limitations of our study and suggest possible directions for future research that fill knowledge gaps and explore innovative approaches to promoting sustainable consumption worldwide.

Ultimately, this study aims to enrich theoretical knowledge in the field of organic food labeling and perception, providing a global and comparative perspective relevant and inspiring for future research and policy in different parts of the world. In our study, we aim to contribute to the theoretical knowledge in the field of organic food labeling and perception, focusing on the Colombian context and broadening the global perspective in this research field.

To achieve this, we build on existing theories and examine how our research relates to them, while identifying areas where our study could offer new insights. First, organic food labeling has previously been studied within the framework of labeling theory (Darby and Karni, 1973) and information processing theory (Fiske, 1992), which suggest that labels and the information provided on them change consumer perceptions and purchasing behavior can significantly affect. Our study takes a base in these theories and attempts to examine whether the labeling of organic and non-organic products influences the perceptions of Colombian consumers and how these perceptions compare to those of consumers in other cultural contexts (Hughner et al., 2007 ; Aertsens et al., 2009).

Furthermore, we also sougth to understand the extent to which consumers' pro-environmental attitudes influences their perceptions of organic products, based on the theory of planned behavior (Ajzen, 1991). This theory suggests that attitudes, subjective norms, and perceived control over behavior can affect intention to perform a particular behavior, e.g., buying organic food. By examining this relationship in the Colombian context, we seek to expand existing knowledge on how pro-environmental attitudes may be related to organic food perception and consumption in different cultural contexts.

Our study also challenges the existing literature by examining the incidence of organic food labeling in the market of a developing country like Colombia, with an emerging organic food market, and the regulation and certification of these products may be less stringent than in developed countries (Willer and Lernoud, 2017). In doing so, we provide new perspectives

and insights into how cultural and regulatory differences can impact consumer perceptions and the impact of organic labeling on their purchasing decisions.

1. Literature Review

To expand the scope of consumption and perception of organic food, it is imperative to consider a global perspective. Hughner et al. (2007) provide an overview of consumers of organic food worldwide and examine their motivations and socio-demographic characteristics. Additionally, Padel and Foster (2005) examine the discrepancy between consumer attitudes and behaviors towards organic food and identify barriers and promoters to their consumption in different cultural and economic contexts. On the other hand, Aertsens et al., (2009) present an overview of the personal determinants of organic food consumption and highlight the differences between regions and cultures in terms of values, attitudes and behaviors related to organic food. Willer et al., (2021) provide statistics and emerging trends on organic farming worldwide, including information on organic food consumption, production and trade in different countries and regions. Richetin et al., (2022) applied an experiment to 415 participants, using tests of foods such as cookies, which showed that, despite having more fat and sugar than the conventional one, it had the organic label that influenced in valuing both cookies as equally healthy (Richetin et al., 2022), which may not benefit health, since there is a tendency to choose a cookie with more sugar and fat, despite its possible ecological trusting benefits.

Aertsens et al. (2009) found in Belgium, that consumers perceived organic food as healthier and of higher quality than conventional food. In addition, Hughner et al. (2007) found in their review that consumers of organic food worldwide share similar health and environmental concerns, suggesting that attitudes and perceptions may be consistent across the globe.

In the other hand, Obesity is often the focus of many nutrition research projects (e.g. Chandon & Wansink, 2007; Wansink & Chandon, 2006). Food intake patterns have a significant impact on an individual's health (Gerbens-Leenes & Nonhebel, 2002; Katz & Meller, 2014), such that they are major contributors to chronic disease and premature death (Harris, Bargh, & Brownell, 2009; Katz, Njike, Rhee, Reingold & Ayoob, 2010). In fact, excessive calorie consumption combined with minimal calorie burning is responsible for overweight and obesity (Cardello, Wolfson, Yufera-Leitch, Warren, & Spitz, 2013; Harris, Bargh, & Brownell, 2009).

Awareness of a healthy lifestyle is growing worldwide. It is common to see products labeled as low-fat or sugar-free that appear to meet consumer health and enjoyment goals (Bublitz, Peracchio, & Block, 2010; Schouteten et al., 2015). Currently, a common practice is to classify foods as healthy or unhealthy depending on factors such as perceived fat content as well as associated stereotypical beliefs about specific names and labels (Provencher et al., 2009). Recently we have seen a growing movement towards more conscious, environmentally conscious consumption, to which the market has also responded either with changes in production or with the use of responsible labels (Hahnel et al., 2015).

The growth of the so-called organic market is partially motivated by consumer beliefs and concerns about pesticides, hormones, and other additives considered present in conventional foods (Lee et al., 2013). The US Department of Agriculture defines organic food as produced without the use of most conventional pesticides; fertilizers made from synthetic ingredients or sewage sludge; bioengineering; or ionizing radiation (2009, cited in Lee et al., 2013: p. 33). Therefore, certain approved production methods are followed that guarantee the protection of natural resources and the preservation of biodiversity (Massey, OCass, & Otahal, 2018). El-Hage Scialabba and Müller-Lindenlauf (2010), referring to the Codex Alimentarius Commission, state that organic farming is a holistic production management system that avoids the use of synthetic fertilizers, pesticides and genetically modified organisms and reduces the pollution of air and Soil minimizes and water and optimizes the health and productivity of interdependent plant, animal, and human communities (p. 159).

The current conceptual association between organic and healthy (Schuldt & Hannahan, 2013; Richetin et al., 2022) shows what has also happened to what is considered low-fat and healthy, leading consumers to believe or biasedly estimate that foods are labeled as organic , contain fewer calories than conventional foods, although this is not consistent with the labeling (Provencher et al., 2009; Schuldt & Schwarz, 2010). According to Wiedmann, Hennigs, Behrens and Klarmann (2014), the organic seal ultimately only secures one production method. However, for the majority of people, this label also seems to represent positive ethical, environmental, health, and nutritional aspects, in contrast to conventional foods (Prada, Garrido, & Rodrigues 2017). Other assessments are divergent depending on the place where the tests are conducted; this is the case of Vasco et al., (2022), where it is

shown that the choice of organic products is taken more frequently by people with good economic status, and high educational level in Ecuador, despite the price is also relevant. We also consider the education level as one of the possible covariables related to the perceptions of organic food in this study.

Thereafter, the consumer could become a victim of the halo effect, which refers to the influence that the evaluation of one of the distinguishable properties or features of one of the objects has on the other properties of the same object (Lee et al., 2013). As Srqvist et al. (2015) argue that the halo effect in the food context involves a form of glorification of the product in question, aided by the establishment of expectations that lead to changes in perception (Piqueras-Fiszman & Spence, 2015) without reflecting a cognitive bias the person testing the product (see Litt & Shiv, 2012). For example, referring to Apaolaza et al. (2017), the different labels for the same wine, indicating different production methods or places of origin, resulted in each group of participants reporting significantly different sensory experiences. The first of these studies even showed that the evaluation of accompanying foods and the amounts consumed were influenced.

Using the Lee et al. (2013) as a basis, this research project invited different people from the city of Medellin, Colombia to taste and evaluate different aspects of a diversity of food; Processes that could be affected by the organic seal. In contrast to Lee et al. (2013) experiments were conducted with only two (not three) types of products (per study), one was liquid and the other solid.

However, as Lee et al. (2013) presented two pairs of identical foods, differing only by the visible organic and regular labels (see also Srqvist et al., 2013). Unlike other studies, participants in this research project were not asked to estimate the number of calories or the amount of money they would be willing to pay per product (or whether they would simply be willing to pay for it), moreover, like Bernard and Liu (2017) did, to strengthen external validity, this project was carried out in different parts of the city. This study, in agreement with Massey et al. (2018), taste (as an attribute of experience), and health benefits and nutritional value (as an attribute of credibility).

The hypothesis that different recorded values would also occur for every otherwise identical but differently labeled product leads to the following research question: Can the subjective assessments of the properties of each food used differ depending on whether it is labeled as organic or regular?

The following hypotheses are proposed to guide the analysis and provide a clear structure for the presentation and discussion of the results:

H1: The presence of organic labels on food influences consumers' positive perceptions of quality and health of these products.

H2: Consumers with a pro-organic attitude are more likely to perceive products labeled "organic" as healthier and of higher quality than those labeled "conventional" or "regular".

2. METHODS

2.1. Participants and Design-Study 1

In the first quasi-experimental study, we used brownie and natural yogurt (Kumis), both processed and packaged foods. This research project and its analysis, the first study experimenting with brownies and kumis and the second using the sweet whole meal crackers and Avena, provide a reference point to be able to make comparisons with similar studies using similar products, and represent a wide range of foods used in the field of labeling and its implications. In general, the two studies presented here are important research contributions to what has already been demonstrated in various developed countries in relation to organic labeling. In response to the need for further comparative studies suggested by Srqvist et al. (2015), these two studies provide valuable insights from a developing country.

The sample size in other studies as in Spain, Apaolaza et al., (2017), with 90 consumers, used a two taste experiment, organic vs control with two different labels, but it was the same wine, this is a small sample size, but really 180 data was employed in statistical modelling. Also, Sörqvist et al. (2015) used a small sample size, with fourty eigth participants in similar experiments.

A small sample size is also considered in this study, but each person measures two types of response, that of the organic labeled product effect and that of the regular label. Our research includes 81 Colombians (27 females, 54 males) and uses a random stratified sample taken in four different parts of the city of Medellín (Ciudad del Ro Park, Adventist University and the neighborhoods of Belen las Mercedes and Laureles) on April 21, to May 2, 2018; people tasted two type of products, it means that in total the sample is 162 measures, for the statistical models.

Participants gave informed consent, no one received an incentive to participate in the study, age groups considered ranged from 18 to 45, (mean = 25.74, SD = 5.28; three participants did not give their age), and their body mass indices (BMI) ranged from 16.85 to 33.15 (mean = 23.10, SD = 2.63). Like Skaczkowski, Durkin, Kashima, and Wakefield (2016), we applied an intrasubjective design, distinct from an intersubjective design, which provides stronger evidence when assessing the influence of labels by having the same person experiment with the same product under conditions with different information , and not different people with different expectations and previous experiences for each condition.

In this study, consumers tasted and rated two food samples, also, the presentation order of products was balanced to avoid biased results that Wiedmann et al. (2014) did not do this in their study using wine, in particular the effects of order may have become an issue as the study always presented the first wine as the conventional one.

2.2. Procedures and materials-Study 1

In the neighborhoods chosen for the study, we randomly recruited participants. They were told that the experiment involved tasting and rating two types of food, which were presented to each participant on a tray. There were two pairs of products on each tray: two cups of kumis and two servings of brownie, both made by Colombian brands but not labeled as such. The liquids and solids were paired horizontally, and behind each liquid and solid pair was a label stating it was regular (conventional) while the other was labeled organic (both in printed white type on two different green backgrounds), but in fact, all the products were conventional.

So, the study used only one brand name for kumis and another brand name for the brownies, and both were conventional, participants were not given any of this information. In the first phase, participants were asked to fill out a socio-demographic survey before trying out each product. After the experiment was explained to the participants, the experimenters asked for their informed consent to participate and permission to publish the results; those who accepted signed their names at the bottom of the survey.

In the second phase, the experimenters asked each participant to taste and rate each food item in a specific order. As a counterweight, eight different orderings of presentation of the products were used for evaluation (always try either both liquids or both solids first).

The participants received a piece of paper with the possible answers to the questions of the survey. After already consuming one of the food products, each participant answered five oral questions posed by the experimenters about the first product and then moved on to the next.

2.3. Measures-study 1

Participant ratings of the taste and nutritional value of each of the foods tasted were based on a five-item response scale ranging from TD (strongly disagree) to TA (strongly agree). Specifically, they were asked about the taste: whether it tasted artificial, whether it increased appetite, whether they found it nutritious, and whether it was high in fat.

For phase 3, the response scale for the 10 questions had also five options, varying from never to always for the first six questions and from nothing to too much for the last four questions. Following the order of presentation, participants were asked about the following: (1) frequency of dieting; (2) feelings of guilt after overuse; (3) tendency to reduce consumption before others; (4) time spent thinking about food; (5) reading the nutritional information on food; (6) buying organic food; (7) conscientious food intake; (8) effects of a three kilogram variation in body weight; (9) enthusiasm for recycling; and (10) enjoyment of spending time in natural settings.

2.4. Participants and Design- Study 2

In the second partially experimental study, the sweet whole grain crackers are used as solid foods and the Avena as liquid foods (both processed and packaged foods). We sampled 133

Colombian people (76 females, 57 males) randomly assigned to five different locations in the Aburrá Valley (Viva Commercial Center, Envigado; Comfama, Vásquez Building; Center of Science and Technology; Ciudad del Río Park; and American School Way in Premium Plaza) in October 2018.

Participants gave informed consent, received no incentive to participate in the study, ranged in age from 18 to 63 (mean = 29.80, SD = 6 .85). We applied an intrasubjective design, where participants were asked to taste and rate two food samples. The food presentation order has been balanced to avoid skewed results.

2.5. Procedure and materials-Study 2

We designed the experiment with three to five participants at a time, after telling them that it involved tasting and evaluating two types of food presented to each group of participants at a table. A liquid product was followed by a solid product, but different from the previous ones; In this case, the two pairs of products were: two cups of Avena (Finesse, made by Alpina) and two servings of sweet whole grain crackers (whole grain with oats and honey, made by Taeq).

As in the first study, the liquids and solids were paired horizontally, and behind each liquid-solid pair we displayed the labels, one saying the product was normal and the other saying it was organic (both labels were handwritten in black letters on white background for neutrality purposes). Really, all the products were conventional, as the firsts study, only one brand of Avena and one brand of cracker were used in this study, neither of which were exposed by the experimenters. As in Study 1, each participant completed a general information survey prior to tasting and evaluating the products.

Eight presentation commands were used; additionally, before the experiment was completed, participants were asked to report their hunger, but this time all questions and answer choices were seen by each participant as they filled out the printed form. After eating one of the foods, each participant answered a few questions and then tasted and rated the next food product. For this study, a health-related question was added to the five questions already asked in Study 1.

2.6. Measures-Study 2

As in the previous study, participants rated the food products for their taste and nutritional value using the same five questions with a five-possibility scale ranging from TD (strongly disagree) to TA (strongly agree). For the second study, the following question was added: Could this food be part of a healthy diet?

2.7. Data analysis

For both studies, the dimensions of the analysis were defined as latent variables since the variables such as product taste or health perception could be defined as a factor built on the basis of some observed variables. Structural equation models to analyze label influence on endogenous dimensions:

Endogenous: Product flavor ($\eta 1$), Health perception ($\eta 2$)

Exogenous: Regular or organic label ($\xi 1$), Personal care ($\xi 2$), Pro-environment attitude ($\xi 3$), Anthropometric and socio-demographic measures ($\xi 4$).

Within the estimation process, the SEM considers the fit validation analysis, the significance of the model, and the quality of the explained variance. Also, these models can be used to estimate factors corresponding to latent or unobservable variables that actually depend on other observable variables, and their significance can be measured to estimate them. After this analysis, the regression relationships are analyzed based on hypothetical constructs about the possible causal relationships between the latent areas. In the end, the structure confirms the existence of significant associations, which facilitates the estimation of latent areas and assesses their positive or negative associations. In this sense, the SEM techniques are useful for the study of social sciences, education or finance (Escobedo Portillo et al., 2016; Nez & Rodriguez, 2015; Rosseel, 2012; Silva, 2010). As a fit indicator, for the error level in Root Mean Square Error of Approximation (RMSEA), clasiffied as razonable in a range 0.05 and 0.098, for authors as Miranda-Zapata et al. (2021), with a convenient internal consistency in CFI over 0.8, both provide trustability for the estimations (Véliz, 2012).

The form of association between primarily endogenous latent variables (dimensions labeled j) and exogenous latent variables (dimensions labeled 1) is shown in equation (1).

$$\eta_j = \beta_{ji}\,\xi_i + \zeta_j \quad (1)$$

In terms of the regression model estimated in the SEM structure, one of the dimensions tested uses the response variable taste of product (1) as an endogenous latent variable that can be related to the following variables: 1) Does this product, in your view, have a good taste?, 2) H Another important dimension is the healthy cognition response variable (2) (specifically related to health benefits and nutritional value) as an endogenous latent variable that is constructed based on the following questions: 1) Could this food be part of a healthy diet?, 2) Do you consider this product to be high in fat?, 3) Do you consider this product nutritious?

Among the exogenous latent covariates used, the most important one, labeling, has two categories: organic and conventional aliment. And two exogenous co-variables are analyzed using SEM:

a) Grooming (2), based on the following variables: 1) Do you spend a lot of time thinking about food?, 2) Do you read the nutritional information on foods?

b) Eco-friendly attitude (3), based on the following questions: 1) How much do you enjoy recycling? , 2) How much do you like spending time in nature?

However, the only models that produce consistency are the ones based on how much fun they enjoy recycling. In general, for the Kumis and Brownie products used in this first study, measuring the impact of significant covariables allows analyzing the behavior of labeling in relation to the response variable considered.

In addition, one of the consistency tests for SEM is the KMO (i.e. Kaiser-Meyer-Olkin test), which is based on the degree of association between the variables considered in the factor analysis, in agreement with the correlation matrix for each set of variables. According to Garmendia (2007), any value above 50% is considered acceptable for estimating an SEM; this can be observed in the databases used for each product with ranges from 58.3% to 69%.as tasting increased your appetite?, 3) Does the flavor taste artificial?

3. RESULTS

3.1. Results of Structural Equation Models –Study 1

The adjustment for the brownie was significant (chi-square vp = 0.028 < 0.05) but not for the kumis (chi-square vp = 0.119 > 0.05) (table 1). The Comparative Fit Index (CFI) of 87% was higher for the Brownie and the Root Mean Square Error of Approximation (RMSEA) was lower for the Brownie (0.066). When estimating these models, the latent dimensions are considered, as well as other variables related to the anthropological, social and environmental conditions.

Table 1.
Fitting measures

Indicator	Brownie	Kumis
Optimization method	NLMINB	NLMINB
Number of free parameters	34	23
Number of observations	162	162
Estimator	ML	ML
Model Fit Test Statistic	35.092	19.137
Degrees of freedom	21	13
P-value (Chi-square)	0.028	0.119
Model test baseline model:		
Minimum Function Test Statistic	152.347	58.066
Degrees of freedom	45	28
P-value	0	0.001
User model versus baseline model:		
Comparative Fit Index (CFI)	0.869	0.8
Tucker-Lewis Index (TLI)	0.719	0.56
Akaike (AIC)	2759.287	2694.199
Bayesian (BIC)	2862.982	2764.346
Sample-size adjusted Bayesian (BIC)	2755.361	2691.544
Root Mean Square Error of Approximation:		
RMSEA	0.066	0.055
90 Percent Confidence Interval	0.022 -0.103	0-0.104

Source: authors.

Table 1 fits Brownie and Kumis estimation model, by optimization method NLMINB. The root of Error Cuadratic Mean (RMSEA) is low and also the confidence interval with 90%, lower than 11%, also CFI is over 80%, which means that there is a good percentage explained for data.

Although the overall significance of the considered observable variables had a 95% confidence level, the latent variables had a significance level between 90% and 95% in explaining the taste dimension. Even then, the type of label is more meaningful than the rating of brownie taste (label effect: .076 with vp=.044, less than .05), but the normal label could positively influence characteristics such as good taste, artificial taste or increased appetite. In addition, there was no direct proportional relationship between health and taste, but vice versa (-0.398, with vp = .011). This was due to the negative effects on health perceptions (2), meaning that those who found the effects of the brownie product to be less healthy rated the taste as pleasant, artificial.

In the case of kumis, the type of label produced no variation in the taste and health perception dimensions. Significant, albeit weak, was the relationship between a better environmental attitude, in which recycling predominated, and a poorer perception of health (-.358, vp = ~.00). This suggests that as pro-environmental attitude ratings increased given the negative impacts identified, health perception ratings became lower.

In general, there were no well-structured significant relationships in the model for the kumis. When evaluating other structural equation models for the brownie, an association between the label and the health perception of the product was observed, although it was less significant than what was presented in this study, with the regular label showing a lower health perception than the organic label.

3.2. Estimates from Structural Equation Models - Study 2

The fit of the SEMs was significant for both products evaluated, Cracker and Oatmeal (Avena). In this regard, the model had a Comparative Fit Index (CFI) of 85% for the Cracker and 84% for the Avena. The RMSEA for the crackers was equal to 0.094, although the fit for the estimated model was better for the Avena, whose RMSEA was 0.089.

Table 2.
SEM models fitting measures for Crackers and Oatmeal (Avena)

Indicators	Crackers	Avena
Optimization method	NLMINB	NLMINB
Number of free parameters	28	30
Number of observations	266	266
Estimator	ML	ML
Model Fit Test Statistic	26.878	46.792
Degrees of freedom	8	15
P-value (Chi-square)	0.001	0
Model test baseline model:		
Minimum Function Test Statistic	150,296	232,908
Degrees of freedom	28	36
P-value	0	0
User model versus baseline model:		
Comparative Fit Index (CFI)	0.846	0.839
Tucker-Lewis Index (TLI)	0.46	0.613
Akaike (AIC)	4508.62	4863.029
Bayesian (BIC)	4608.958	4970.534
Sample-size adjusted Bayesian (BIC)	4520.182	4875.417
Root Mean Square Error of Approximation:		
RMSEA	0.094	0.089
90 Percent Confidence Interval	0.056-0.135	0.061-0.119
P-value RMSEA <= 0.05	0.029	0.013

Source: authors.

For the crackers, the nutritional value score with the regular label was low (-1.018, vp=.023), while the organic label generated a higher nutritional value score. According to the covariance results, the label can be associated with taste (0.017, vp=0.048); Consumers rated the product with the regular label as better in taste and appetite-enhancing. For the Avena, the regular label did not favor a nutritious rating of the product and its effect was negative (-.481, vp=.001), indicating that the organic labeled product was perceived as more nutritious than the regular. In addition, the Avena was considered more nutritious in that participants rated the quality of taste (1.692, vp~0) and appetite as higher. A slight effect of artificial flavors on nutritional perception was also noted (p39, 0.2, vp=0.07).

PROSPECTIVE

This research should provide metodology in order to apply to other cities, to conclude for a higher range of products, and generalizing the results. Second, although we have examined the perceptions of organic food by giving samples with a labels despite the food was conventional, we found a better perception in terms of nutrition for “organic's“, we also analyse the impacts of pro-environmental attitudes, but it is also possible that other psychological and region factors influence consumer perceptions as prices.

Based on the suggestion of Wichchukit and OMahony (2015), participants enjoyed each product at different times during the assessment, to remember and sought the scores appropriate to their perception. Water or a neutral product can change, to clean the participants' palates as they progressed from one food to the next in their evaluations.

Future research could examine these factors in more detail and how they interact with organic food labels and pro-environmental attitudes. It would be interesting to explore innovative approaches to promote sustainable consumption worldwide. For example, formulation of hypothesis related to awareness in campaigns and educational activities can influence consumer attitudes towards organic food and how collaborative initiatives between producers, retailers and consumers can increase confidence in organic products and promote sustainable practices in the food industry.

It would also be valuable to explore questions like: what other variables influence organic consumption in Colombian culture? How many of these organic foods are on the market? Are companies misleading consumers with false labels? How we can describe the sustainable production? What other information in labels influence populaiton perception?

Thus, other hypothesis involves how education level in Colombia, gender and socioeconomic status could possibly influence consumer perceptions and behaviors towards organic food. In addition, comparative studies could be conducted in different countries and cultural contexts to get a broader view of how organic food labels affect consumer perceptions and purchasing decisions around the world. In the same line, we could appreciate that organic food consumption has increased globally over the past two decades, and we found documentation evidence and also, some knowledge of this in Latinoamerican culture (Richetin et al., 2022;

Vasco et al., 2022). The market has opened up to include not only developed countries but also other countries, as it was also found in Ecuador (Vasco et al., 2022), were also studied the label effect of organic products and also, education and economic situation.

This study provides a view related to organic food in Colombian culture and society, considering beneficial to continue with this kind of research, regarding the question of the influence of labeling on the evaluation of food, we validated the results in a developing country like Colombia, since most of experiments performed so far were mainly from European countries and the United States.

In the results observed in our research studies, after estimating the structural equation model for the quasi-experimental designs with some agreement in the products evaluated, we can confirm our hypothesis that for a product labeled differently (Organic or Regular), then those for the perception/evaluation of the participants registered values differently, despite all the products were conventional. The type of label used on the products evaluated led to changes in the perception of properties associated with health or taste of the product (except for kumis). We were able to prove that the organic mark is associated to a greater extent with the nutritional value of the products used and, in contrast to the regular, it does not lead to more favorable ratings. In addition, the results show that people with a pro-ecological attitude, value product with an organic seal as nutritious. So, marketing efforts should also highlight ecological information of this products, improving not only health, but also, helping to environmental care as it also was posted by García de Leaniz, and Castro-González (2023).

The research contributes to theoretical knowledge in the field of organic food labeling and perception by providing a clear context to existing theories, examining how our research relates to it, and broadening the global perspective in this research area. By identifying areas where our study could provide new insights and challenge existing theories, we hope to encourage future research and policies that promote sustainable consumption worldwide. We showed that consumer choices are influenced by the label, even more so when the label is reminiscent of organic food. With these studies we highlight the possible impact of this type of research and its results on the Colombian public order, which we consider persuasive to provide adequate consumer education. Finally, we propose evaluating the labeling practices

of companies to promote offers that account for consumers' vulnerability to make biased choices about their diet.

CONCLUSSIONS

Study 1

The structural equations revealed that the type of label produced changes in the perception and evaluation of the brownie's health and flavor attributes. Despite all products were really conventional and one of each was organic labeled, the results show that the organic label reinforces the perception that the brownie is nutritious; however, there were no changes regarding the kumis, suggesting a possible lack of perceptual differences for this product. These results were similar to those of Lee et al. (2013) where every food item was labeled with an organic label and was rated significantly more nutritious than the conventional label, with the exception of yoghurt, as this product is considered more of a healthy food.

Something similar happened in the third experiment by Srqvist et al. (2015) for which they used water (organic and normal) with its almost non-existent taste dimension as the product to be evaluated by the participants. In SEM model, a better taste of the brownie was estimated, for conventional. This approaches that of Lee et al. (2013), a common idea that most foods labeled as organic or healthy tend to be rated by consumers as having poorer taste than the taste of products labeled as normal (not organic or healthy).

Recently, Apaolaza et al. (2017) showed that most of the previous research on consumers and trained staff did not find any significant sensory differences between organic foods and non-organic foods such as fruits, vegetables and others such as yoghurt. The differences in taste perception of different foods could simply become a product invented by consumers (Srqvist et al., 2015); Furthermore, the sensational experience could be skewed in accordance with certain individual preferences and under the influence of factors related to labeling without biased consumer self-reporting (Srqvist et al., 2013).

Study 2

The structural equation models revealed that the organic label increased perceptions/ratings of the food products as nutritious for the participants, in this case oatmeal (Avena) and

Crackers. Furthermore, the taste perception did not improve with the organic label, since for the case of the Avena (like the kumis in the previous study) there were no significant changes and for the crackers a better taste rating was found for those with a regular label.

For crakers, the nutritious perception found is similar to the findings of other works, as Schuldt and Schwarz (2010), with Oreo cookies demonstrated the conception of the word organic, the characterization of certain ingredients, the generalization of the evaluation (halo effect) of the calorie count and the adjustment to regular consumption in favor of the supposed organic cookies in the compared to the conventional ones. Also, for oatmeal raisin cookies, which instead of labels use descriptions of the product and highlight the health of the ingredients for one of the conditions, Provencher, Polivy, and Herman (2009) found that participants consumed more cookies (35% more), as they were perceived as healthier when described as healthy. They were more palatable and less prone to weight gain, confirming the effectiveness of categorization manipulation.

Our results agreed with those of other authors such as Lee et al. (2013) and Schuldt and Hannahan (2013) who conclude that organic foods are generally perceived as being more nutritious or healthier, which is reflected in our two studies of brownie, oatmeal and crackers. There was also agreement on perceived better taste for the normally labeled foods, in our case brownie and crackers, both solid (not liquid) products used in this study. These is aligned to Laureati et al. (2013), where subjects' preferences based on being oriented towards sustainable behavior were influenced by information about organic production, in contrast to those who were not oriented towards this behavior.

In general, we tested also the tendency for the taste of products labeled as organic, ecological or healthy not to be perceived as appealing for some products; if a label represents the concept of “health” in a certain quality to the consumer, it can promote general health expectations (Schuldt and Hannahan, 2013). Other side, variable weight was significant for cracker and kumis products: bigger values of weigths, increased perceptions of the nutritional value of these products, as well as perceptions that brownie and kumis tasted better. With age, older people found brownie and kumis to be more nutritious, but not Avena. Older adults did not find the Avena to be better tasting but did find the brownie to be high in fat. In addition, those with higher incomes tended to consider Avena and crackers to be better tasting, but the latter

not healthier; No significant effects on income levels were found.

Possible explanations for the impact of labeling on consumer perceptions/ratings of food could be related to consumers' objective knowledge, whether high or low, about certain food categories (Wiedmann et al., 2014); also, to people's stereotypical beliefs about the differences in the production processes of organic and conventional food (Srqvist et al., 2013) and finally to consumer attitudes and habits, for example in relation to the protection of the environment.

The results of our study have important implications for theory, practice and future research in the field of organic food labeling and perception. Our results suggest that policies and regulations related to organic food certification and labeling are crucial to ensure consumer confidence and encourage the adoption of sustainable practices in the food industry.

To increase consumer confidence in organic products and encourage the adoption of sustainable practices in the food industry worldwide, the following strategies and recommendations can be considered: to harmonize international standards and regulations around the certification and labeling of organic food, considering CEC guidelines and best practices from regions such as the EU and the US (Dimitri, 2002; Council Regulation [EC] No. 834/2007). Also, promoting transparency and traceability in the organic food supply chain by using technologies such as blockchain, Artificial Intelligence or geographic information systems (GIS) to ensure authenticity and compliance with organic food standards and ensure its production (Tian, 2016).

It is also important to develop education and awareness campaigns about the benefits of organic products and how to identify properly certified and labeled products, to provide incentives and support for producers who adopt organic and sustainable practices; to promote cooperation between governments, international organizations and the private sector; also, to encourage research and development in organic farming techniques and technologies to improve the productivity, sustainability and quality of organic products. Besides, It is important, the establishment of independent and accredited national and international certification and auditing systems that ensure the integrity and credibility of organic products (Janssen & Hamm, 2012).

The results of the study provided interesting insights in relation to the hypotheses set out and the goals of the study:

H1: Our results show that the presence of organic seals on food significantly influences the positive consumer perception of the quality and health of these products. This supports the H1 hypothesis and suggests that organic food labels play a crucial role in forming consumer opinions about the quality and health benefits of products.

H2: Consistent with the H2 hypothesis, environmentally conscious consumers showed a greater propensity to perceive products labeled as organic as being healthier and of better quality than those labeled as conventional or regular. This finding underscores the importance of personal attitudes and values in shaping perceptions and purchasing decisions related to organic food.

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