



Research Article

Eye Tracking-based Analysis of Customer Interest on The Effectiveness of Eco-friendly Product Advertising Content

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ABSTRACT

Amid the escalating environmental crisis that has prompted consumers to adopt eco-friendly lifestyles, the popularity of eco-friendly personal care products is increasing significantly. Nevertheless, marketing these products presents challenges that include inadequate product information, perceived unaffordable prices, and relatively low consumer trust. These challenges present an opportunity for the marketing field to increase consumer interest, particularly through advertising – an important medium for disseminating product information. Recognizing the importance of advertising components in influencing consumer preferences, this study uses eye-tracking to identify critical elements in promoting eco-friendly personal care products. The components examined include information on environmental and personal benefits, the presence or absence of price information, and the presentation of an environmental label (logo and text) in advertising. Each of the 43 participants is confronted with eight carefully crafted advertising stimuli. The results of the study highlight the significant influence of clear benefits and price information on consumer preferences, while indicating that eco-label display does not have a significant impact on consumer preference. This research is intended to serve as a source of actionable marketing strategies and is intended to help promote eco-friendly products and increase consumer interest through targeted and effective advertising.

Key words: consumer interest, eco-friendly product, eye-tracking, advertising content

INTRODUCTION

The adoption of eco-friendly products increased significantly across Asia between 2014 and 2020 (9.7%), indicating a clear preference for eco-friendly products. In particular, natural or organic ingredients, minimal use of chemicals, cruelty-free testing and environmentally friendly packaging are features of environmentally friendly personal care products that are becoming increasingly popular. This preference is driven by the idea that these products offer better value and quality than their traditional counterparts [1]. In Indonesia, changing consumption patterns indicate a growing awareness and interest in environmental issues, marking a transition commonly referred to as green consumerism. This change is particularly reflected in the increasing preference for environmentally friendly products in various categories such as organic food, household appliances and personal care items [2]. The demand for eco-friendly personal care products has witnessed a remarkable increase of 60% in the last decade especially in the personal care products industry, which includes skin care, hair care, body care, oral care, makeup and fragrances. Notably, the Asia-Pacific region holds a significant 40% share of the global personal care products market [3].

Numerous surveys conducted in Indonesia have revealed consumers' interest in environmentally friendly products. According to a 2020 survey by the Indonesia Business Council and WWF Indonesia, out of 916 respondents, 63% said they would be willing to pay more for environmentally friendly products than conventional ones. Similar results were found in a Boston Consulting Group survey conducted in 2022, which revealed that 50% of Indonesian

consumers have adopted eco-friendly lifestyles and that 30% are willing to pay more for such products [4]. Nonetheless, an additional survey revealed that 37.1% of respondents had not purchased environmentally friendly goods, and 50.8% of them cited limited product availability. By contrast, 44% of respondents blamed inadequate product information [5].

These survey results present opportunities and challenges for marketers of environmentally friendly products, particularly in promoting these products and increasing consumer interest. A promising strategy is to leverage the power of social media as a platform for information dissemination and product promotion. Additionally, marketers can explore innovative marketing techniques such as neuromarketing to gain insights into consumer behavior. Neuromarketing, an interdisciplinary field that includes neurology, cognitive psychology, and marketing, provides valuable tools for understanding consumer preferences and decision making [6]. A widely used neuromarketing method is eye tracking, supported by eye tracking devices.

Eye tracking involves identifying objects observed by people and measuring their eye movements [7]. These eye movements can be divided into two main types: fixations, characterized by a prolonged focus on an object for 50 to 500 ms, indicating information processing and data acquisition, and saccades, which are rapid eye movements lasting around 20 to 35 ms take time and provide minimal information. Key terms in eye tracking are areas of interest (AOI), which represent important stimulus regions in research questions, and heatmaps, which visualize eye tracking data in color. By leveraging social media and integrating neuromarketing techniques into advertising, marketers aim to increase consumer interest and desire to purchase environmentally friendly personal care products. This research provides valuable recommendations for advertising strategies that companies can use to effectively market environmentally friendly products.

The use of eye tracking in market research has increased significantly recently. The advantages of using an eye tracker over traditional questionnaire methods are manifold. First, eye tracking data serves as a precise and complementary complement to questionnaires, providing greater detail and objectivity [8]. Second, the eye tracker captures immediate responses to stimuli, unlike traditional techniques such as interviews and questionnaires, which depend on the individual's subjective ability to convey emotions, potentially leading to bias [9]. Finally, the inclusion of the eye tracker in this study is motivated by its ability to generate more precise and complex results, thus complementing the primary data obtained from a series of questionnaires used in the research [10].

Several previous studies have compared the components of advertising to predict consumer interest and purchase intention for different products. Royne et al. [8] studies a green product advertising to examine the effectiveness of perceived environmental and personal benefits. Their study found that eco-friendly products tend to be more attractive than traditional ones. Ads that highlighted environmental benefits were perceived as higher quality and more valuable than ads that only highlighted personal benefits because environmentally friendly products provide added value. In a study of Bae [9], it was recommended that effective advertising combines visual and textual elements, as this combination influences the viewer's visual attention. As part of this research, an eye tracking study aimed to find out consumers' preferences for different types of advertising. The combination of visual and textual aspects can also increase the consumer's purchase intention.

Yfantidou [11] conducted research on environmentally friendly advertising and found that advertisements with positive messages can evoke positive feelings in consumers, leading to increased interest in the advertised products. Conversely, advertisements with negative messages create discomfort and threats among consumers. Sari and Anggaeni [12] examined product costs in advertising, focusing particularly on fashion items. In their study, advertisements with and without price information were compared using eye tracking. The Instagram app was used to run the ads and the prices were mentioned in the captions. It was found that consumers preferred advertisements that included pricing information, as it helped them make purchase decisions. Sielicka-Różyńska [13] used eye tracking to study the ecologically friendly labels on gluten-free cookie packaging that included both visual (logo) and textual (text) components. Variations in label types were discovered by the study. Presented verbally, labels enhanced the product's information and cleared up any doubts. When shopping, consumers who are familiar with eco-friendly labels found products more quickly when the labels were presented visually. Another study on eco-labels is carried out by Takahashi [14], with a particular focus on certified organic coffee and other eco-friendly

labels. The results showed that while knowledge about certification programs had no effect on coffee purchases, knowing about them in advance increased the intention to buy. The study, which made use of eye-tracking technology, found that a one-second increase in participants' visual attention increased their likelihood of buying certified organic coffee by 22 percent.

The factors under investigation in this study set themselves apart in various ways. First, Grimmer and Wolley [15] suggest that including personal benefits in advertising can significantly increase consumers' interest in the product. Conversely, environmental benefits tend to resonate more strongly with consumers who are more environmentally conscious. To expand their customer base, companies looking to expand consumer segments can achieve increased interest across all segments by including personal benefits. Second, the presence or absence of price information in advertising proves to be a critical factor, as highlighted in the study of Huddleston et al. [16]. In particular, the lack of price information combined with comprehensive information in advertising is likely to have a greater impact on consumer perception. Thus, the inclusion or omission of price information has a significant impact on customer perception. Thirdly, another key factor that stands out is the design of the eco-label [17]. Consumers who are familiar with environmental issues tend to understand eco-label logos better, while less familiar consumers may find eco-label text more understandable. This discrepancy in understanding between consumers who are familiar with eco-labels and those who are not familiar with eco-labels leads to different perceptions of these consumer groups. Therefore, this study is designed to examine the essential components of eco-friendly product advertisement that effectively capture consumers' visual attention.

MEHODS

This study investigates how consumers' visual attention is affected by three critical factors when they see advertisements for eco-friendly personal care products: benefits, price information, and eco-labels. Every component is thought to be essential in influencing consumer preferences and perceptions regarding products that are environmentally conscious. The following hypotheses are proposed for this study:

H1 : Advertisements emphasizing environmental benefits will yield distinct visual attention compared to those highlighting personal benefits.

We hypothesize that there is a significant difference in the visual attention received by advertisements that emphasize environmental benefits versus advertisements that emphasize personal benefits. By examining this distinction, we aim to uncover how consumers respond to the dual aspects of eco-friendly products - namely their impact on personal well-being and their contribution to environmental sustainability.

H2 : Advertisements incorporating pricing information will elicit a different level of visual attention compared to those without pricing details.

Building upon the multifaceted nature of consumer decision, our second hypothesis suggests that the presence or absence of pricing information significantly influences visual attention. We anticipate that advertisements featuring pricing details will prompt a different level of scrutiny and engagement from consumers compared to those lacking specific pricing information. This hypothesis delves into the intricate relationship between transparency in pricing and consumers' visual focus.

H3 : Advertisements featuring eco-labels with logos will generate varied visual attention compared to those featuring eco-labels with text.

Recognizing the varied ways in which eco-labels are presented, our third hypothesis proposes that advertisements featuring eco-labels with logos will elicit distinct visual attention in comparison to those featuring eco-labels with text. This hypothesis delves into the visual processing nuances associated with different representations of eco-labels, acknowledging that logos and text may have varying impacts on consumers' attention and comprehension.

Table 1. Combinations of Advertisement Stimuli in the Experiment

No	Benefit	Price	Eco-label	No.	Benefit	Price	Eco-label
1.	Environment	With	Logo	5.	Personal	With	Logo
2.	Environment	With	Text	6.	Personal	With	Text
3.	Environment	Without	Logo	7.	Personal	Without	Logo
4.	Environment	Without	Text	8.	Personal	Without	Teks

Study Design and Instrument

This research employed an eye-tracking device to detect participants' eye movements when viewing advertisement stimuli. Each factor was set into two levels that represent Levels represent specific tiers at which these factors would vary. Based on the combinations of these factors and levels, eight advertisement stimuli were designed and presented to research participants using a Gazepoint GP3 Desktop Eye-tracker device. The combinations of these stimulus advertisements are detailed in Table 1. This study employed a within-subject design, wherein participants were exposed to all the stimuli presented in the research. This approach allowed participants to provide qualitative feedback on the displayed advertisement stimuli. To minimize the potential bias arising from the sequential display of advertising stimuli, a partial counterbalancing was employed to show the sequence of presentation.

Participants

Participants for the study were recruited using convenience sampling, with specific criteria: 1) Age above 18 years, 2) Non-color blindness, 3) Active social media users, 4) Participants interested in environmental issues and knowledgeable about eco-friendly products. The data collection occurred offline in a laboratory equipped with an eye-tracking device. Participant recruitment involved distributing forms, and interested individuals who met the research criteria were eligible to register.

Sample size determination adhered to the guidelines outlined by [18] for the smallest sample size needed when using an eye-tracker. According to these guidelines, at least 30 participants are needed to create an effective heat map from eye-tracking results. However, to minimize the potential for bias and technical errors, the study aimed to include 39 participants. In this study, there were 43 participants involved, which exceeds the minimum required sample size. All participants involved in this study volunteered without any coercion or pressure. We accommodated the participants' schedules accordingly. Additionally, an initial agreement ensured the confidentiality of all participants' data, explicitly prohibiting its use outside the scope of this study.

The advertisements presented to participants were dummy and did not reference specific companies or brands. Nevertheless, during the advertisement design process, the researcher conducted benchmarking against 50 advertisements for eco-friendly personal care products posted on the social media platform Instagram. The advertisement stimuli featuring various component combinations can be seen in Figure 1.

Experimental Procedures

During the experiment's execution, participants entered the research room and completed an initial questionnaire containing their demographic information and preferences about eco-friendly products. Subsequently, the researcher explained the research protocol and presented the research scenario. Participants were then asked to sit in front of a computer equipped with a remote eye-tracker, and the calibration of the device was conducted. Once successful calibration was achieved, participants were presented with the advertisement stimuli one by one in a random order. Participants were allotted 15 seconds to see each component within the advertisement. After the experiment, participants were asked to fill out an evaluation questionnaire about their recall of the advertisements.

The eye-tracker testing generated heat map data, as previously described. The heat map displayed a color gradient ranging from low to high visual attention, typically represented by blue, green, yellow, and red. The red color on the

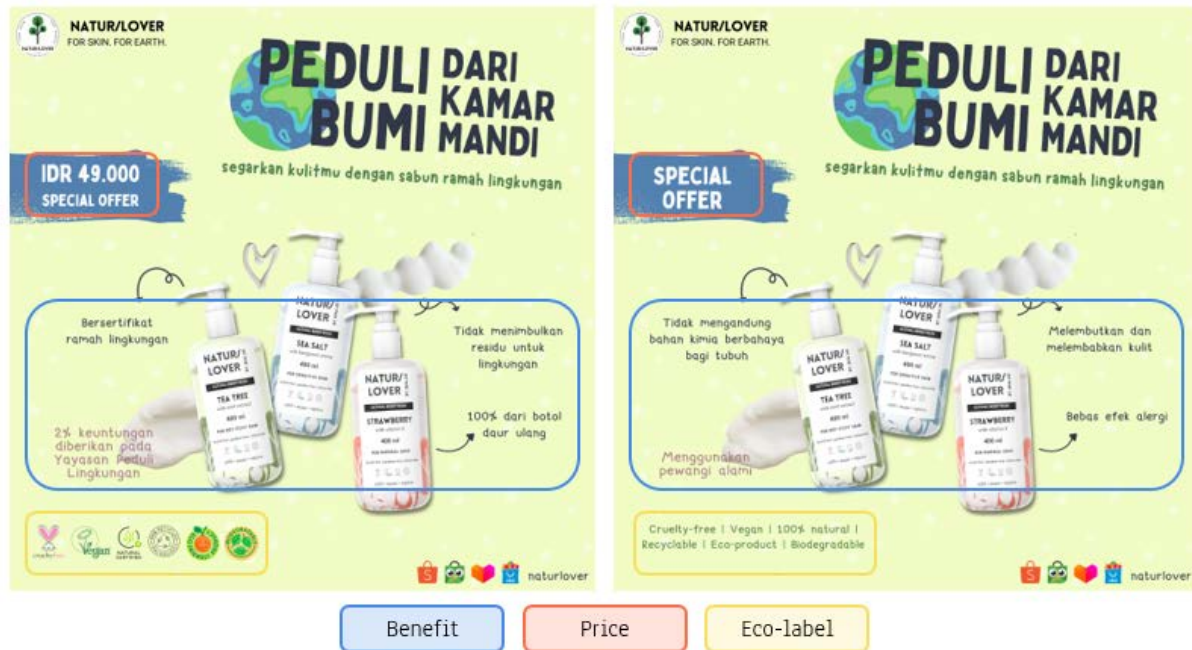


Figure 1. Components in Advertisement Stimuli (the language is adjustable)

heat map showed high fixation. The redder the color on the heat map, the higher the visual attention of an individual [7].

Statistical analysis testing is employed to ensure that a study possesses adequate capability to detect significant differences or effects if they exist, aiming to prevent misinterpretations resulting from an insufficient sample size. Subsequently, normality tests were conducted on the data to decide whether parametric or non-parametric tests should be employed for inter-factor comparisons. These tests were then used to find significant differences among the displayed advertisement components.

RESULTS AND DISCUSSION

Before commencing the experiment, participants were asked to complete an initial questionnaire comprising demographic details, their level of interest in environmental issues, and their perceptions regarding eco-friendly personal care products. The outcomes of this study indicate that, according to the information gathered from the initial questionnaire completed by participants, all research criteria were fulfilled. It was observed that all participants showed an interest in environmental issues, and each individual reported using eco-friendly personal care products. The total number of study participants was 43, including females (67%) and males (33%), with an age range of 18-31 years (98%). These participants showed considerable interest in environmental issues (97%) and had all used eco-friendly soap products (100%). The participants also showed a relatively high level of familiarity with eco-labels (58%).

The participants expressed a favorable preference for eco-friendly soap products. This was shown by their agreement that eco-friendly liquid soap is a product that does not harm the environment (25%), is beneficial for humans, animals, and the environment (82%), and comes in recyclable packaging (58%). Based on the evaluation questionnaire, participants were able to recall the information regarding the benefits presented in the advertisements (60%), the prices displayed in the advertisements (93%), and the number of eco-labels in the advertisements (35%). In terms of the importance of components in eco-friendly advertisements, participants ranked personal benefits as the most crucial, followed by environmental benefits, eco-labels, and lastly, pricing information.

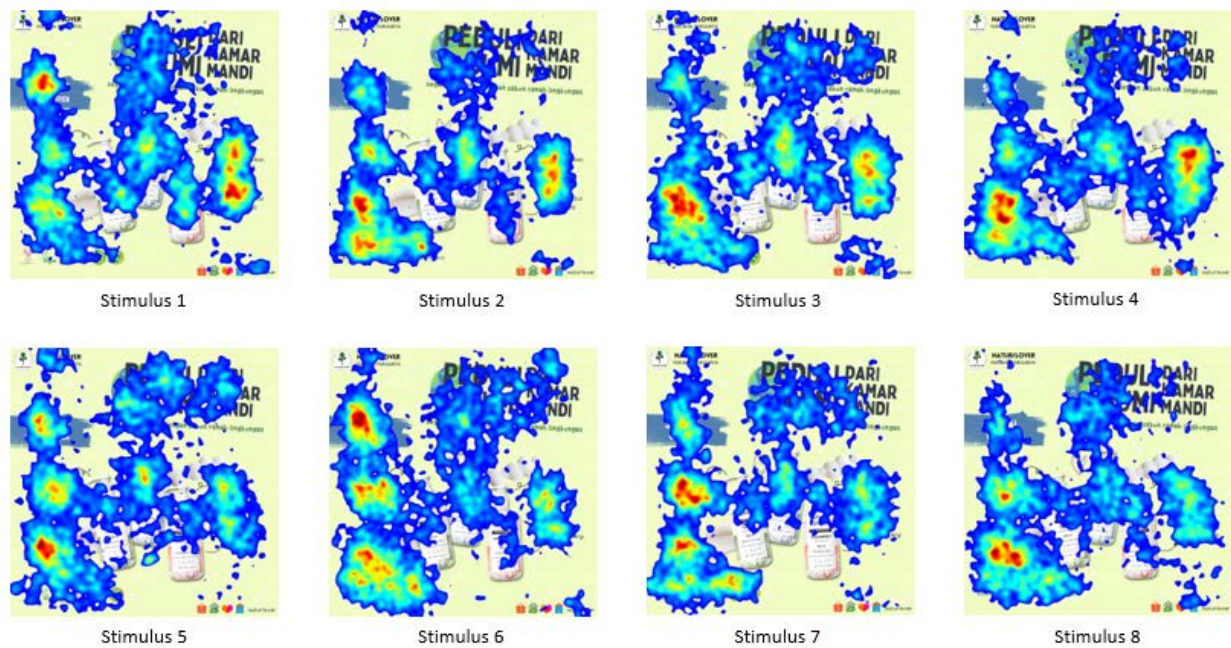


Figure 2. Heatmap of Stimulus

In the eye-tracking study, the heat map was a crucial investigation aspect. The heat map is a visual depiction of data collected using an eye-tracker and serves as a qualitative assessment of the obtained results. Heat maps can provide insights into eye gaze patterns and visual preferences in a specific **context** [7]. Figure 2 displays the results of the heat map obtained from the eye-tracker. Based on these results, all participants focused their gaze on the Area of Interest (AOI), which forms the primary focus of the study, encompassing components related to benefits, pricing information, and eco-labels within the advertisement.

Table 2 displays the total duration of fixations on each AOI observed by participants in the stimuli in seconds. For the benefit factor, the AOI observed for the longest duration was environmental benefits. For the price factor, the AOI that was seen for the longest duration was the advertisement that included pricing information. For the eco-label factor, the AOI observed for the longest duration was the eco-label with text. Environmental benefits were seen for the longest duration in stimulus 3, while personal benefits were seen for the longest duration in stimulus 8. Pricing information was seen for the longest duration in stimulus 6, and the area of the advertisement that did not include pricing information was still seen for the longest duration in stimulus 3. The eco-label with a logo was seen for the longest duration in stimulus 7, while the eco-label with text was seen for the longest duration in stimulus 2.

Tabel 2. Total Duration of AOI

Stimulus	Benefit		Price		Eco-label	
	Environment	Personal	With	Without	Logo	Text
Stimulus 1	124,930		14,986		8,346	
Stimulus 2	129,848		12,686			23,777
Stimulus 3	147,131			11,844	18,191	
Stimulus 4	176,093			8,028		15,449
Stimulus 5		127,686	15,938		16,389	
Stimulus 6		110,160	18,989			18,857
Stimulus 7		111,450		9,830	20,002	
Stimulus 8		132,097		6,390		16,382

Table 3. Normality Test of Samples

Factors	Kolmogorov-Smirnov	Sig.	Description
Benefit	0,124	0,000	Non-normal
Price	0,251	0,000	Non-normal
Eco-label	0,301	0,000	Non-normal

Table 4. Mann-Whitney test result

Factors	Level	Sig.	Description
Benefit	Environment	0,046	There is a difference
	Personal		
Price	With	0,030	There is a difference
	Without		
Eco-label	Logo	0,325	There is no difference
	Text		

Statistically, the first test was conducted to assess each research factor's statistical power. The statistical power test used the G*Power software to provide the actual power value and the smallest sample size needed [19]. The results obtained for this study indicated an actual power of 0.951, suggesting a good opportunity to detect actual effects in the population. The minimum sample size needed for each stimulus was 122 samples. This study exceeded the smallest sample size requirement, as the total sample size obtained was 172 for each stimulus.

Normality tests for the fixation duration data were conducted using the Kolmogorov-Smirnov method with Minitab software. The results of the normality test for the samples can be seen in Table 3. Based on the results, the data of fixation duration for the research factors did not follow a normal distribution as they had a significance value of < 0.05 . Therefore, to find the differences between treatments, the Mann-Whitney U test, a non-parametric test, was used as an alternative to the paired t-test when the data did not meet the normality assumption [20]. The results of the Mann-Whitney test can be seen in Table 4. Based on the test, there is a significant difference for the benefit factor, showing a difference between advertisements displaying environmental benefits and advertisements displaying personal benefits. The price factor also differs significantly, showing a difference between advertisements displaying pricing information and those not. However, the eco-label factor does not show a significant difference, showing no distinction between advertisements displaying an eco-label with a logo and those displaying an eco-label with text.

To clearly observe the differences among each factor and level in the study, descriptive statistics can be employed and elucidated in Table 5. it can be observed that the differences among the factors within the eco-label factor are

Table 5. The total duration of AOI in each level

Level	Sample	Minimum	Maximum	Average	Std. Dev
<i>Benefit</i>					
Environment	172	0,00	10,98	3,361	2,709
Personal	172	0,00	9,09	2,799	2,370
<i>Price</i>					
With	172	0,00	3,14	0,364	0,518
Without	172	0,00	1,81	0,210	0,296
<i>Eco-label</i>					
Logo	172	0,00	5,36	0,366	0,746
Text	172	0,00	4,27	0,433	0,785

minimal. This insignificance may lead to the absence of a significant distinction between the eco-label logo and eco-label text.

Hypothesis H1 in this study is confirmed and indicates advertisements emphasizing environmental benefits will yield distinct visual attention compared to those highlighting personal benefits. This result is consistent with the findings of [8], who said that there is a difference between advertising with environmental benefits and advertising with personal benefits. Phau and Ong [21] explained that consumers respond more positively to advertisements related to product benefits compared to environmental information. Their study also revealed that environmental messages are better associated when the product brand is genuinely environmentally friendly, rather than when environmental messages are displayed on neutral-brand products. On the other hand, messages related to personal benefits are more generic and can be applied to products across brands. Grimmer and Woolley [15] investigated that environmental benefits are more significant when consumers are aware of their environmental awareness. In contrast, consumers with low environmental awareness tend to buy products that emphasize personal benefits. In this study, based on the initial questionnaire results, participants were informed about environmental issues and positively perceived eco-friendly products. This is clear in the participants' extended fixation duration on advertisements that show environmental benefits when contrasted with advertisements highlighting personal benefits.

Hypothesis H2 in this study is also confirmed, indicating that advertisements incorporating pricing information will elicit a different level of visual attention compared to those without pricing details. This result aligns with the findings of [16], who said that there is a significant difference between advertisements displaying price information and advertisements not displaying price information. Advertisements serve as additional information for consumers [22]. With the certainty of price provided through advertisements, consumers can more easily make purchase decisions. Price is one of the critical pieces of information in advertisements [23]. Whether the price in an advertisement is high or low does not significantly affect consumers; what is important is that price information tends to be more memorable. This is corroborated by findings from the evaluation questionnaire, where 93% of participants showed a strong recollection of the product prices. Consumers with a strong environmental awareness are willing to pay 15-20% more for eco-friendly products than conventional products [24]. The fact indicates that price information in advertisements is crucial in deciding consumer purchase decisions. Georgakarakou et al. [25] suggests that young consumers are willing to pay more for eco-friendly products. This study can be related to the fact that 98% of the participants are young consumers, proving their strong environmental awareness and willingness to use eco-friendly products.

In contrast, visual attention did not change for eco-label advertisements with a logo compared to eco-label advertisements with text, meaning that hypothesis H3 is rejected. This result differs from the findings of [26], who reported a significant difference between these two types of eco-labels. Eco-labels in advertisements serve as informational tools and can enhance trust in environmental product claims. Research by [14] also found that labels attract visual attention from consumers and can influence their desire to buy a product. An increase in visual attention for one second can increase the likelihood of purchase by 22%. Furthermore, Khachatryan [27] stated that different eco-label formats can affect visual attention, preferences, and product evaluations.

In fact, limited studies delve into the significance of differences in the presentation of eco-labels in environmentally friendly advertisements. Taufique et al. [28] stated that regardless of the type of eco-label used, the most important aspect is ensuring that the information within the eco-label is well-received and understood by consumers, making the eco-label effective in distinguishing environmentally friendly products from conventional ones. Based on the eye-tracking results obtained, participants' fixation duration when viewing eco-labels in the form of a logo and the form of text did not significantly differ. The result shows that participants' visual attention did not substantially vary between the two types of eco-labels. Eco-labels with logo formats from certification bodies will be more effective if consumers understand the logo's meaning, while eco-labels in text format are likely to be better understood by consumers unfamiliar with the symbolism of eco-label graphics.

This study reveals that the visual attention represented by the three research factors significantly influences consumers' trust in products. Specifically, the factors of benefits and eco-labels in this research represent knowledge

and information regarding the product. Knowledge stands as a pivotal element in advertisements, as a consumer's familiarity with a product enhances their confidence. Consumers tend to focus on information they consider crucial in their purchasing decisions [29]. Product information can manifest in various forms such as text, images, videos, audio, and more [8]. Companies need to emphasize this informational aspect, enabling consumers to transition from conventional to environmentally friendly products. To achieve this, companies could recruit marketing and advertising teams well-versed in environmental issues, effectively communicating them through advertisements. Collaborating with influential figures in environmental campaigns could also aid in marketing strategies.

Pricing stands as a crucial factor influencing purchasing decisions, particularly evident in consumer surveys, where it poses a significant barrier to adopting eco-friendly products. Companies must delve into pricing strategies associated with the perceived benefits of the products. To reshape consumer perceptions of eco-friendly items, companies should create compelling advertisements, offer discounts, introduce innovative products, and employ other approaches to instill consumer confidence in their ability to purchase eco-friendly goods [30]. Furthermore, implementing a value-based pricing method could serve as a strategic approach in marketing eco-friendly products [31]. With the escalating demand for environmentally friendly products, companies need astute pricing strategies to manage demand, monitor sustainable sales, allocate funds for ongoing product promotion, and consider effective production costs.

Apart from the eco-label's appearance, the label's placement in environmentally friendly advertisements is a significant consideration. Varied perspectives exist in research regarding the label's positioning. Amiri et al. [32] recommended placing the logo and product name in the center of the page to capture attention. Conversely, Jiang [33] suggested positioning the logo on the left or upper left side. Both studies advocate presenting the logo as a graphical element. In this research, the eco-label was situated on the left, adhering to the "F-pattern" where individuals tend to focus on left-sided information over the right [34]. The eco-label's elements aim to represent authoritative labeling, fostering consumer trust and diminishing scepticism toward eco-friendly products. Responsible label inclusion following applicable regulations is paramount for companies. Furthermore, active monitoring of regulatory changes ensures compliance, reinforcing customer trust.

CONCLUSION

Based on the three factors examined concerning consumers' visual attention to components in environmentally friendly personal care product advertisements, both the benefits and price information have proven significant effects. In contrast, the factor of eco-label did not show significant differences. To enhance consumers' interest in environmentally friendly products, companies can design advertisements by tailoring benefit descriptions to different target markets, including price information, and incorporating eco-labels that align with the intended target audience. The utilization of an eye-tracker as an instrument within neuromarketing demonstrates a significant contrast compared to conventional methods. Employing an eye-tracker is an innovative methodology that substantially enhances precision in measuring interest within the marketing realm.

In summary, the key takeaway from this study is that when it comes to promoting environmentally friendly personal care products, highlighting distinct benefits and providing transparent pricing information in advertisements can significantly influence consumers' visual attention and, ultimately, their purchasing decisions. To advance future research endeavors, several recommendations could amplify the depth and scope of subsequent studies. Firstly, considering additional factors within advertisements to enhance their appeal and precision in targeting specific audiences is pivotal. Secondly, broadening the participant pool to encompass diverse backgrounds would bolster the study's overall generalizability. This could involve comparing and contrasting two distinct consumer groups: environmentally conscious consumers and those less aware of environmental issues. Additionally, delving into the exploration of sophisticated research tools, such as incorporating wearable eye-trackers, could provide a more nuanced understanding of consumer behavior. These proposed avenues for further investigation hold significant potential to extend and refine the current study's findings for a more comprehensive understanding of consumer responses in eco-friendly advertising.

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CONFLICT OF INTEREST

The authors disclose no financial or personal conflicts of interest that could compromise the study's integrity.

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