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INFLUENCE OF AUDIOVISUAL STIMULI ON EMOTIONS AND SUSTAINABLE CONSUMPTION BEHAVIORS

A Study of Young People in an Emerging Economy

MARELBY AMADO MATEUS[1], ALFREDO GUZMÁN RINCÓN[2]
[1]CENTRUM Católica Graduate Business School, Pontificia Universidad Católica del Perú, Lima, Perú
[2]Corporación Universitaria de Asturias, Bogotá, Colombia

KEYWORDS

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ABSTRACT

The study explores strategies to effectively promote sustainable products to Generation Z by examining the emotional impact of audiovisual stimuli. Through a mixed-methods approach, FaceReader software captured microexpressions, while open-ended questionnaires provided qualitative insights. Results indicate a predominance of neutral emotions, with notable variations in happiness and sadness, and a polarization between environmental concern and optimism for change. Findings highlight the importance of emotional engagement in shaping sustainable behaviors. The research enhances understanding of sustainable consumption in emerging economies, offering valuable insights for marketers aiming to connect with environmentally conscious young consumers.

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1. Introduction

In response to the imminent climate crisis and the urgent need to shift towards sustainable business paradigms (Van Tulder & van Mil, 2022), sustainable consumption behaviors emerge as essential for addressing these challenge (Guzmán Rincón et al., 2021). Although previous studies provide solid theoretical foundations (Biswas, 2017; Mishra et al., 2023; Vargas-Merino et al., 2023), significant challenges remain in translating these principles into concrete sustainable practices, revealing a gap between environmental awareness and effective action (Boz et al., 2020). Colombia, in particular, faces the dual challenge of fostering economic growth while conserving its ecosystem (Departamento Nacional de Planeación [DNP], 2023). The nation has introduced legislation to promote sustainability (Ley 99, 1993; Resolución 1283, 2016), aiming to create a trade environment that balances ecological goals (Ministerio de Ambiente y Desarrollo Sostenible, 2021) and aligns with the UN Sustainable Development Goals on responsible production and consumption. Nonetheless, gaps persist between environmental legislation and practical implementation (Hlaváček et al., 2023; Ministerio de Ambiente y Desarrollo Sostenible, 2021). Research on sustainable consumption thus seeks to bridge this gap by providing insights that foster sustainable purchasing decisions. Colombian consumers, increasingly environmentally conscious, especially post-Covid-19, show positive trends towards practices like recycling and preferring eco-friendly products (Carrillo & Guzman, 2021; Portafolio, 2021). However, further research is necessary to ensure these actions translate into meaningful impacts, contributing to social well-being and the preservation of natural heritage.

Literature on consumer behavior in sustainable consumption emphasizes personal and social motivators, such as individual values, social influence, and environmental awareness (White et al., 2019). Personal goals like self-fulfillment and social factors, including post-materialism and ecological innovation, notably shape consumer choices (Chen et al., 2022). Companies adopting sustainable practices invest heavily in promoting responsible consumption and showcasing their sustainability efforts (Kazemi et al., 2023). However, incorporating sustainable materials often raises production costs (Lacasa et al., 2016; Smith, 2021), complicating supply chain management due to challenges in sourcing certified suppliers (Mandal et al., 2021; Martins et al., 2023). Achieving sustainability also demands R&D investments to drive product innovation (Enyoghasi & Badurdeen, 2023; Koshksaray et al., 2023). Furthermore, companies face difficulties in communicating effectively with target segments and maintaining transparency and credibility (Duan et al., 2022; Jain et al., 2022). Consumers may lack complete information, question value claims, or prioritize price, disadvantaging sustainable companies needing to set higher prices to remain profitable (Loughlin, 2023).

Grounded in the Colombian context, this study examines how marketing strategies can drive conscious and sustainable consumption (Prendergast & Tsang, 2019), encouraging Colombian companies to offer products and services that meet environmental and social standards (Ministry of Environment and Sustainable Development, 2022) and communicate these values in ways that emotionally engage consumers. By decoding emotional responses to audiovisual stimuli, this research aims to answer: What type of audiovisual stimuli, positive or negative, generates a greater emotional impact and recall of sustainability's benefits among young people? Focusing on university students—digitally native, socially conscious, and influential in shaping both current consumption trends and future market practices (Dabija et al., 2020)—the study provides insights that can guide companies in aligning strategies with the values of this influential demographic to foster large-scale behavioral change (Ahmad & Zhang, 2020; Sofi et al., 2020; Streimikiene et al., 2023). Understanding the influence of audiovisual stimuli on emotions and purchasing behavior (Juárez-Varón et al., 2023) highlights the capacity of businesses to design impactful marketing campaigns. Such campaigns, rooted in consumer psychology, not only encourage sustainable practices but also strengthen brand-customer connections, underscoring the value of emotionally resonant messages that contribute to both individual and societal benefits, positioning companies as pivotal players in promoting sustainability (Borah et al., 2022; Vadakkepatt et al., 2021).

FaceReader is an advanced tool for analyzing human emotions in response to audiovisual stimuli, particularly relevant for sustainable consumption research (Zhu et al., 2023; Chiang et al., 2022). This facial expression analysis tool (FEA) captures and categorizes emotions—such as happiness, surprise, and disgust—while measuring viewer attention and engagement in response to advertisements (Lobo et al., 2024). This study leverages FaceReader to predict consumer advertising preferences by

identifying subtle emotional reactions often overlooked by traditional surveys (Eng et al., 2022). Real-time microexpression data, grounded in the Facial Action Coding System (FACS), provides unfiltered insights that can inform marketing campaigns targeting younger, sustainability-conscious demographics (Ausin-Azofra et al., 2021). By bridging the gap between environmental awareness and actionable behaviors, FaceReader offers valuable data for promoting sustainable purchasing practices (Sharma, 2021). This work supports companies in meeting the rising demand for sustainability (Vadakkepatt et al., 2021) by analyzing emotions and perceptions induced by sustainable audiovisual content in university students through a mixed-methods approach (de Haan et al., 2020). Insights from microexpressions related to sustainable messages aid in developing marketing strategies that align with consumer values, optimize online experiences, encourage conscious consumption, and strengthen competitive advantage through genuine sustainable practices and emotional engagement with consumers.

2. Literature review

2.1. Sustainable Consumption

Sustainable consumption is defined as the use of goods and services that meet basic needs and improve quality of life while minimizing the use of natural resources, toxic materials, and waste emissions throughout their lifecycle, without compromising the needs of future generations (Norwegian Ministry of the Environment, 1994). This concept has evolved to include structural changes towards more sustainable consumption, linking it with social well-being and sustainable lifestyles (United Nations Environment Programme, 2016). White et al. (2019) define sustainable consumption as actions that reduce adverse environmental impacts and the use of natural resources throughout the lifecycle of products and services. Sustainable consumption is influenced by internal and external factors that guide decision-making to minimize environmental impact and promote reuse and recycling (Streimikiene et al., 2023).

Several factors impact sustainable consumption, such as environmental knowledge, ecological awareness, education, income, environmental attitude, product quality, price, perceived environmental impact, social influence, motivation, and availability of sustainability information (Chen et al., 2022; Streimikiene et al., 2023). Additionally, sources such as science, opinions from family and friends, social media, and store consultants significantly affect sustainable purchasing decisions (Biswas, 2017). Access to information on the environmental impact of purchases raises consumer concern and promotes behavioral changes (Ahmed et al., 2021). Other factors, including place of purchase, product packaging, associated characteristics, functional attributes, and the emotions generated, also influence sustainable purchasing behavior (Agrawal & Rahman, 2015).

2.2. Marketing, Behavior, and Emotions

Contemporary marketing prioritizes understanding and influencing purchasing behaviors through various tactics (Yan et al., 2023). Emotional appeals, like pride or admiration, align positive emotions with fundamental human values, proving effective in fostering sustainable consumption behaviors (Antonetti & Maklan, 2014). Bai et al. (2017) emphasize adapting marketing to cultural differences in values and emotions, enhancing segmentation and reach. This multidimensional approach allows for personalized and culturally sensitive strategies, reflecting the complexity of consumer behavior. Emotions play a pivotal role, often bridging the gap between attitudes and sustainable purchasing actions, although positive attitudes towards eco-friendly products do not always translate into purchases (Seo et al., 2016). Emotions such as respect and anger significantly impact sustainable choices, while factors like eco-friendly packaging costs and social influences create gaps between attitudes and actions (Ketelsen et al., 2020; White et al., 2019).

Understanding consumer emotions is crucial for promoting sustainable products, as emotions drive purchasing decisions, which are often rationalized post-facto (Ampuero & Vila, 2006). Positive emotions enhance perceptions of green packaging, helping bridge the gap between attitudes and behaviors (Rokka & Uusitalo, 2008). Marketing strategies that leverage emotional insights foster stronger preferences for sustainable options. The interconnected relationship between behavior, marketing, and

emotions in sustainable consumption reveals that targeted emotional marketing can influence consumer behavior (Brosch et al., 2021). This approach not only builds brand perception and customer loyalty but also promotes willingness to pay premium prices, positioning companies to effectively drive sustainable behavior change (Diallo et al., 2021; Verhoef et al., 2015).

2.3. Emotions and Consumer Behavior

According to White et al. (2019), decision-making is influenced by affect and cognition, with emotions being either positive or negative. Positive emotions such as admiration (Yan et al., 2023) and anticipated pride drive pro-environmental intentions and sustainable behaviors (Schneider et al., 2017). These emotions act as reinforcement mechanisms, where previously experienced positive affect motivates future pro-environmental actions (Bissing-Olson et al., 2016). Conversely, negative emotions like sadness, shame (Yan et al., 2023), and collective guilt can also promote sustainable behaviors (Brosch et al., 2021). However, while negative emotions can drive sustainable actions, they may also decrease well-being, necessitating a balance between their positive outcomes and potential negative effects.

Pro-environmental advertising activates positive emotions through images and slogans aligned with social values, influencing sustainable consumption decisions (Brosch, 2021; White et al., 2019; Yan et al., 2023). Marketing should emphasize the emotional benefits of sustainable behaviors, making them more relevant to consumers. While positive emotions are beneficial, combining them with negative emotions can also promote sustainable behavior, depending on individuals' commitment levels (Brosch, 2021; Odou & Schill, 2020; White et al., 2019). Integrating these emotional dynamics into marketing strategies is crucial for bridging the gap between attitudes and sustainable purchasing behaviors.

2.4. Emotions, Sounds, and Behavior

The relationship between sound, emotions, and purchasing behavior is deeply rooted in consumer psychology and sensory marketing. Sounds impact emotions and perceptions, influencing decisions (Hussain, 2019). Studies reveal that sensory experiences, including hearing, play a crucial role in shaping emotions and guiding consumer actions (Chen & Lin, 2018). Psychological factors such as attention, motivation, and past experiences shape how sounds evoke emotional responses, impacting consumer focus and auditory perception (Asutay & Västfjäll, 2019). These insights underscore the strategic role of sound in marketing, showing its potential to significantly influence consumer choices.

The Stimulus-Organism-Response (SOR) model by Mehrabian and Russell (1974) provides a framework for understanding how external stimuli, like auditory cues, affect internal emotional and cognitive states that drive behavior (Zhai et al., 2019). In consumer contexts, the SOR model examines how marketing elements, such as store atmosphere and advertisements, shape perceptions, leading to purchase decisions. Recent studies illustrate how stimuli, including Instagram ads, shape purchasing intentions and clarify emotional and cognitive responses to diverse retail environments, highlighting the SOR model's utility in crafting consumer-centered marketing strategies (Hussain et al., 2022; Kwok et al., 2022; Vieira, 2013).

3. Objectives

The main objective of this article is to explore strategies to effectively promote sustainable products among Generation Z by examining the emotional impact of audiovisual stimuli. In this sense, the following specific objectives were proposed:

1. Analyze emotional responses triggered by audiovisual stimuli in the context of sustainable consumption, using FaceReader to quantify emotional reactions, including happiness, sadness and fear, as well as their levels of valence and arousal.
2. Assess the influence of positive and negative emotional stimuli on Generation Z's motivation and engagement, identifying the most effective emotional triggers to promote awareness, recall and adoption of sustainable consumption behaviors.
3. Provide evidence-based information for the design of marketing strategies that leverage emotional engagement to reinforce the connection between sustainability values and consumer

behavior, thereby increasing the effectiveness of campaigns targeting young environmentally conscious consumers.

4. Methodology

This study employs a mixed methodology, utilizing FaceReader for quantitative analysis of facial expressions and open-ended questions for qualitative insights into participants' perceptions and knowledge about responsible consumption.

4.1. Quantitative Methodology - FaceReader

The quantitative phase utilized FaceReader 7.1, an AI-based facial expression analysis tool from Noldus Information Technology, to measure participants' emotional responses. FaceReader identifies and quantifies six primary emotions—happiness, sadness, anger, surprise, scared and disgust- alongside a neutral state. Based on Ekman's Facial Action Coding System (FACS) (Ekman, 1992), FaceReader links specific facial muscle movements (Action Units) to emotional expressions and assesses emotional valence (positive or negative) and arousal levels for precise emotional insights (Lewinski et al., 2014). The software's process involves face detection, classification of facial expressions across 500+ facial points, and emotion categorization (Landmann, 2023). Past research validates FaceReader's accuracy and reliability, with up to 96% accuracy in emotions like happiness and surprise, highlighting its suitability for consumer behavior studies (Lewinski et al., 2014).

A Logitech HD Pro Webcam C920 captured participants' facial responses during a 28-second video stimulus, structured to provoke a spectrum of emotions: 12 seconds of negative imagery with intense music, followed by 16 seconds of positive images with soothing music. This design evaluated participants' emotional range and intensity. The study engaged 36 participants aged 18-22 from three universities, each briefed on the research objectives and providing consent. Conducted in controlled neuromarketing labs, this sample size is appropriate for exploratory research in neuromarketing, where even small groups provide valuable insights into emotional and behavioral patterns (Creswell, 2014; Solnais et al., 2013).

4.2. Qualitative Methodology - Open Surveys

The qualitative phase of the study employs open-ended surveys to capture participants' emotions and perceptions regarding sustainable consumption, providing narrative insights that complement the quantitative data gathered through FaceReader. These surveys, conducted immediately after participants view the stimulus video, are recorded in audio format to allow for in-depth thematic analysis. Ensuring confidentiality creates a safe environment for participants to express their thoughts openly, facilitating a deeper exploration of the factors influencing sustainable purchasing decisions. Data triangulation is achieved by integrating statistical analysis of microexpressions with thematic interpretations of survey responses, applying a convergent triangulation approach that highlights both complementary insights and discrepancies (Flick, 2004). To ensure result consistency and robustness, cross-validation is performed, dividing the data into subsets for separate analysis and comparison, thereby enhancing the stability and generalizability of findings (Kohavi, 1995). Adherence to strict ethical guidelines safeguards participants' identities, maintains data confidentiality, and emphasizes their emotional and physical well-being. The research protocol, reviewed and approved by the Ethics Committee on June 26, 2023, under act No. 147 of the CEI-UR, reinforces the ethical commitment throughout all study phases.

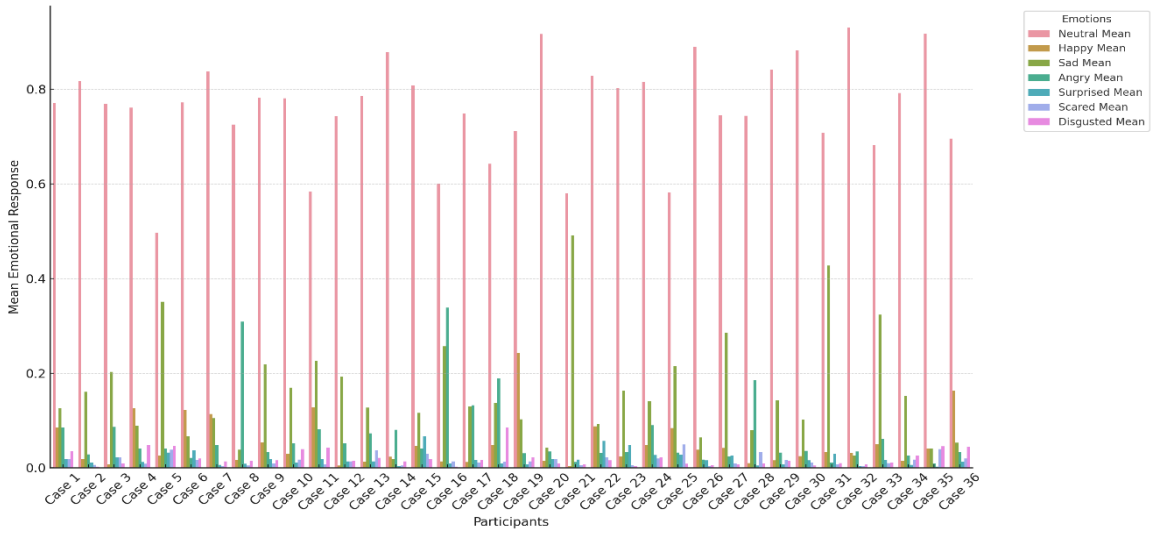
5. Results

5.1. Quantitative Analysis Results

Regarding the results of using FaceReader, the detailed analysis revealed significant patterns in the emotional responses of the participants (see Figure 1). Neutral emotion predominated in most cases, with averages varying approximately between 0.50 and 0.80. In terms of happiness and sadness, notable variability was observed. Happiness averages fluctuated, with some participants showing low values

near 0.02 and others reaching higher values around 0.13, reflecting differences in the positive reception of stimuli. On the other hand, sadness presented averages that in some cases were close to 0.35, showing a significant emotional response in certain participants. Regarding emotions such as anger, surprise, fear, and disgust, these generally showed less intense responses. The averages for these emotions were below 0.10, although with some notable exceptions among participants.

Figure 1. Average Emotional Response per Participant

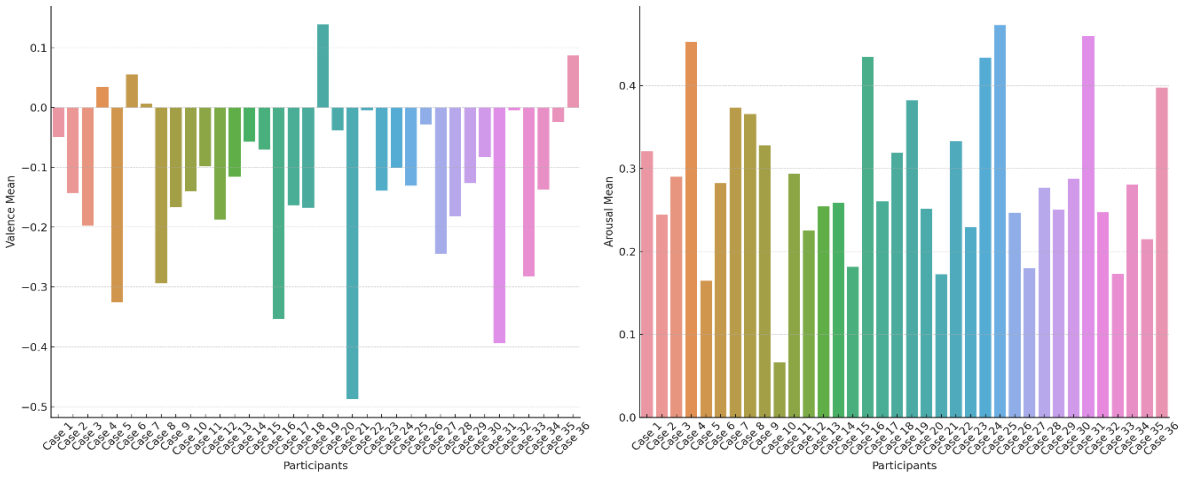


For valence, which measures the positivity or negativity of the emotional experience, the mean values (Figure 2a) varied among participants. Some participants showed relatively high valence means, indicating a generally positive perception of the stimuli. In contrast, other participants presented lower valence means, suggesting a less positive or even negative perception. This variability signals that audiovisual stimuli are interpreted very differently in terms of their likability or dislike among participants. As for arousal, which indicates the level of emotional excitement or calmness, significant differences were also found among participants (Figure 2b). Some showed higher mean arousal values, reflecting greater emotional reactivity or excitement in response to the stimuli presented in the audiovisual material. On the other hand, other participants recorded lower mean arousal values, indicating a calmer or less intense emotional response. These differences in the intensity of the emotional response suggest that participants experienced and processed the audiovisual stimuli with varied levels of emotional activation.

Participants clustered into three main groups (see Figure 3 at 0.6 distance). The first group was composed of six participants, the second by five, and the third by 26. Among the emotions presented across the groups, the ANOVA test identified statistically significant differences for neutrality ($F = 26.54$, p-value < 0.01), anger ($F = 20.68$, p-value < 0.01), and sadness ($F = 52.87$, p-value < 0.01). For happiness ($F = 1.07$, p-value $= 0.356$), surprise ($F = 1.35$, p-value $= 0.274$), fear ($F = 0.33$, p-value $= 0.723$), and disgust ($F = 0.25$, p-value $= 0.356$), no statistically significant differences were found.

The results of the Tukey post-hoc test for emotions showed that, for the emotion of sadness, significant differences were found between groups one and two, and between groups one and three, with group one showing lower levels of sadness compared to the other two groups (see Table 1). However, no significant differences were observed between groups two and three regarding this emotion. For anger, there is a significant difference between groups one and two, with group two showing higher levels of anger than group one. A significant difference was also found between groups two and three, with group two again showing higher levels of anger. Finally, for the neutral emotion, although no significant differences were found between groups one and two, significant differences were observed between groups one and three, and between groups two and three. These differences indicated that group three tends to have a more neutral emotional response compared to the other two groups.

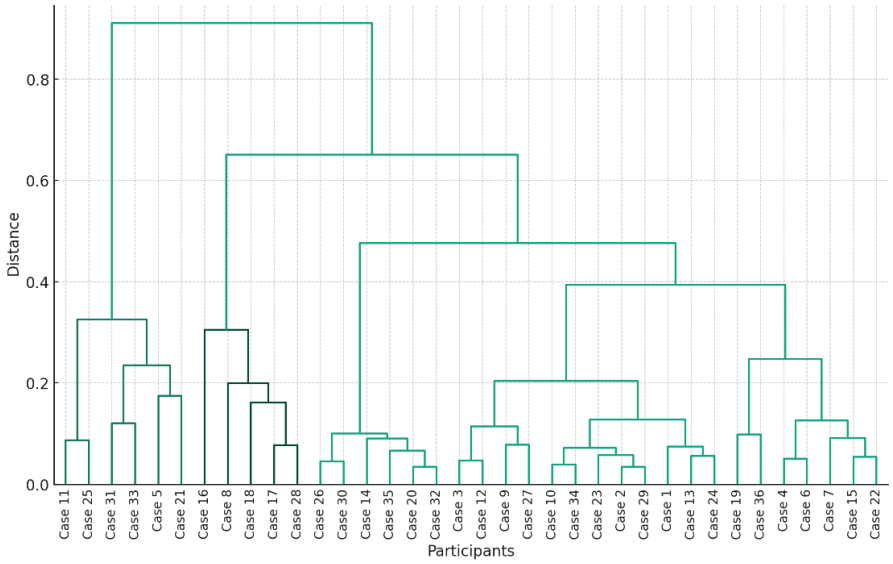
Figure 2. Average valence and arousal response of participants. (a) Represents the average valence. (b) Represents the average arousal.



(a) (b)

Source: Own Elaboration, 2024.

Figure 3. Dendrogram of hierarchical clustering.



Source: Own Elaboration, 2024.

Table 1. Tukey's post hoc test results.

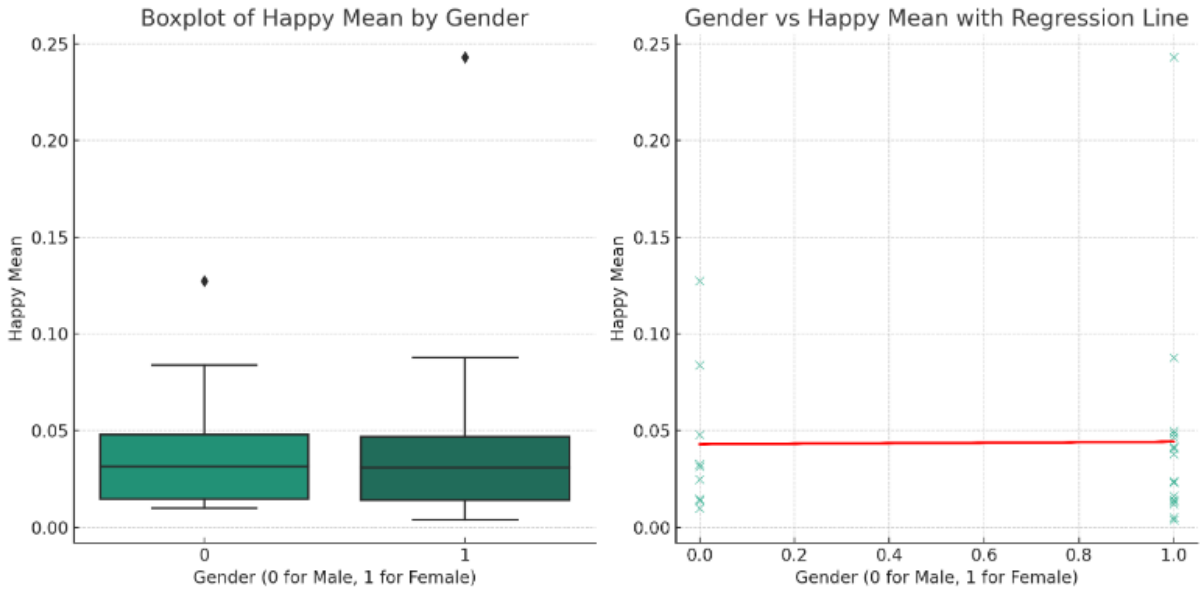
Emotion	Grup 1	Grup 2	Mean Difference	P - value
Sad Mean	1	2	-0.2105	< 0.01
Sad Mean	1	3	-0.2187	< 0.01
Sad Mean	2	3	-0.0081	0.900
Angry Mean	1	2	0.1906	< 0.01
Angry Mean	1	3	0.0032	0.9000
Angry Mean	2	3	-0.1875	< 0.01
Neutral Mean	1	2	0.0866	0.0920
Neutral Mean	1	3	0.2054	< 0.01
Neutral Mean	2	3	0.1188	< 0.01

Source: Own Elaboration, 2024.

5.1.1.Gender Analysis

Furthermore, an analysis sought to examine the incidence of gender variable and the results categorized into happiness or joy. For this, an analysis of variance (ANOVA) was conducted, resulting in an F Statistic of 0.00398 and a p-value of 0.9503. And given that a p-value significantly greater than 0.05 indicates that there is no statistically significant difference between hapiness and gender. A Boxplot was also made (Fig. 4a), which shows the distribution of hapiness for each gender. The lack of significant differences in the median and variability between genders is evident. A Scatterplot with Regression Line (Fig. 4b) was also conducted, which represents each observation with the regression line. The red line shows the modeled relationship, which is almost flat, indicating a weak relationship between gender and happiness.

Figure 4. Relationship of gender with happiness. (a) Bloxplot of gender and happiness. (b) Scatterplot for gender and happiness.

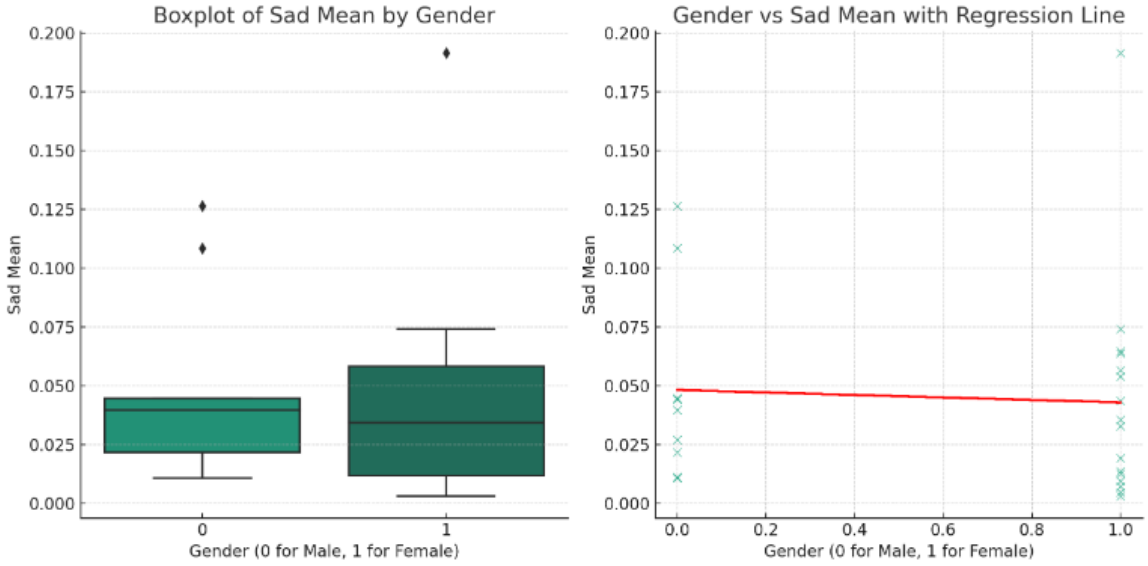


(a) (b)

Source: Own Elaboration, 2024.

Similarly, gender was related to the emotion "sadness." An Analysis of Variance (ANOVA) was performed, resulting in an F Statistic of 0.08052 and a p-value of 0.7791. This indicates that there are no statistically significant differences in "sadness" between genders. A Boxplot was also made (Fig. 5a), which shows the distribution of sadness for each gender. However, no significant differences in the median and variability between genders are observed. Likewise, the Scatter Plot with Regression Line (Fig. 5b) represents each observation with the regression line. The red line, which is almost horizontal, indicates a weak or nonexistent relationship between gender and "sadness".

Figure 5. Relationship of gender with sadness. (a) Bloxplot of gender and sadness. (b) Scatterplot for gender and sadness.



(a) (b)

Source: Own Elaboration, 2024.

The analyses and visualizations suggest that there is no statistically significant relationship between gender and the emotions of Joy and Sadness in this dataset, indicating that gender does not appear to be a significant predictor of sadness or happiness in this sample.

5.2. Qualitative Analysis Results

5.2.1. What emotions and/or impressions did the video generate for you?

After analyzing the participants' responses to the question about the emotions and/or impressions generated by the video, a qualitative analysis identified and grouped the trends in the responses. There is a clear division between negative and positive emotions and perceptions, with variations in the frequency of each type of response.

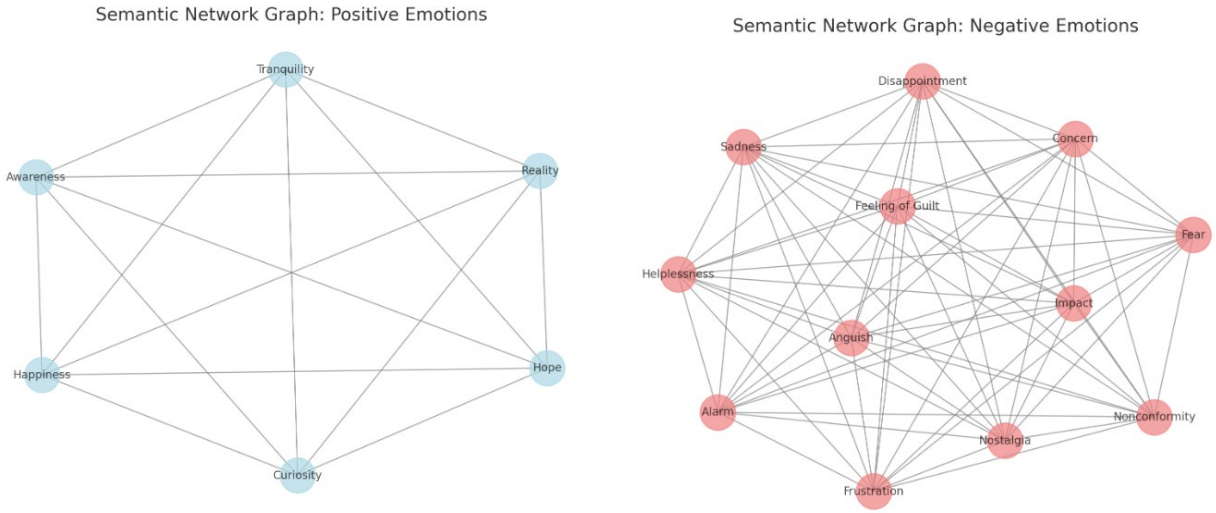
Negative emotions and perceptions included concern and fear, frequently mentioned in relation to environmental impact and changes in the world. Alarm and impact were initial feelings provoked by the video's images. Sadness and helplessness were common in response to pollution and environmental damage. Feelings of guilt and disappointment were linked to personal contributions and the reality of environmental damage. Nonconformity and frustration indicated discontent with the current situation. Nostalgia and anguish reflected longing for the past and anxiety about the state of the environment. *Positive emotions* and perceptions included tranquility and hope, feelings of relief and optimism regarding recycling and sustainability efforts. Curiosity and awareness indicated increased interest and understanding of environmental issues. Reality and happiness reflected recognition of the current situation and positive feelings towards the presented solutions.

The percentage of occurrence for each category of emotions and perceptions was calculated by counting the frequency of mentions for each type and determining its proportion relative to the total responses. The analysis revealed that sadness and helplessness accounted for 28.57%, representing the most frequently mentioned category, suggesting a prevalent emotional response to the topic. This was followed by curiosity and awareness at 17.14%, and reality and happiness at 11.43%, indicating a significant level of engagement and reflection among participants. Other categories, including alarm and impact (8.57%), nostalgia and anguish (8.57%), tranquility and hope (8.57%), concern and fear (5.71%), feeling of guilt and disappointment (5.71%), and nonconformity and frustration (5.71%), were also present, though to a lesser extent. Overall, these percentages reflect a general tendency towards

emotions that convey both concern and awareness about environmental issues, accompanied by a nuanced balance between despair and hope for positive change.

Following the initial analysis, a semantic network graph was constructed to visually represent the range of emotions and perceptions elicited by the question "What emotions and/or impressions did the video generate for you?" (Fig. 6a, 6b). This network encapsulates the diversity of emotional responses, including concern, fear, alarm, tranquility, impact, sadness, hope, curiosity, feeling of guilt, reality, nonconformity, frustration, nostalgia, disappointment, awareness, helplessness, happiness, and anguish. By mapping these interconnected sentiments, the semantic network provides a comprehensive view of the complex emotional landscape evoked by the video, capturing both negative and positive reactions and highlighting how these emotions interrelate within the context of participants' awareness and attitudes toward environmental issues.

Figure 6. Semantic Network for the question "What emotions and/or impressions did the video generate for you? (a) Positive Emotions. (b) Negative Emotions.



(a) (b)

Source: Own Elaboration, 2024.

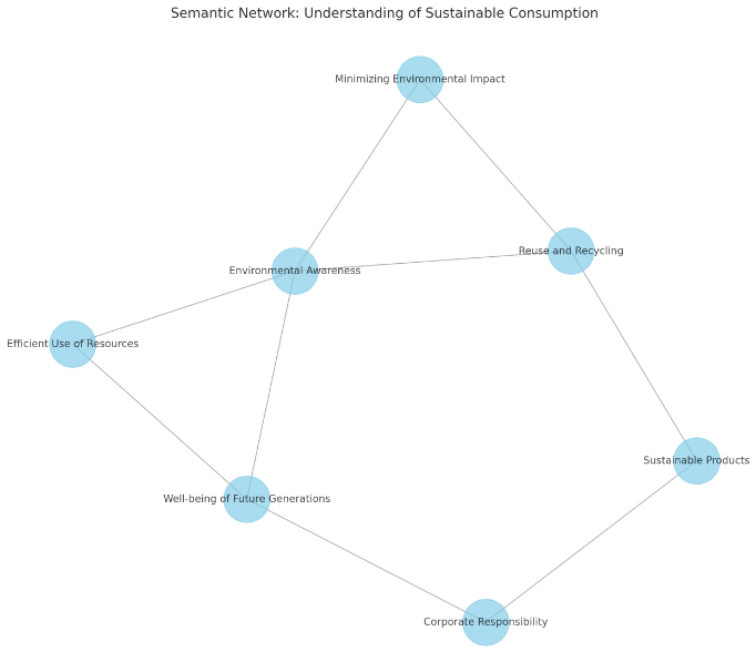
5.2.2. What do you understand by the concept of sustainable consumption?

An analysis of participants' responses to the question "What do you understand by the concept of sustainable consumption?" reveals several prominent trends that illustrate their understanding of the topic. The most frequently mentioned concept, encompassing 31.25% of responses, is environmental awareness and impact minimization. Participants emphasized the importance of consciously using resources to reduce environmental harm and ensure planetary protection for future generations, citing examples such as selecting eco-friendly products and minimizing waste. Responsible consumption and consumer education follows with 25.0% of responses, where participants stressed the role of informed decision-making, including a preference for biodegradable products and avoidance of overexploitation. Meanwhile, reuse and recycling, representing 15.625% of responses, reflects a focus on extending the life of products and reusing resources to reduce waste and optimize the use of existing materials. Another 15.625% of participants highlighted personal scale sustainability, emphasizing changes in personal consumption habits, such as reducing unnecessary purchases and choosing environmentally less harmful alternatives. Lastly, inclusion of sustainable practices in business and production accounted for 12.5% of responses, with participants underscoring the need for companies to adopt sustainable practices, use biodegradable materials, and demonstrate corporate responsibility in minimizing ecological damage. These percentages suggest a strong inclination toward environmental protection and resource-conscious behavior, with a collective recognition of sustainability's multifaceted implications at both individual and corporate levels.

Following an analysis of participants' responses regarding the concept of sustainable consumption, a semantic network was developed to illustrate the diversity of perceptions and focal points identified.

This network graph identifies key nodes—central concepts or terms—and the connections between them, based on participants' responses, to highlight the primary aspects and interrelations among the ideas expressed (Fig. 7). The key nodes include environmental awareness, with an emphasis on recognizing the environmental impact of consumption; reuse and recycling, underscoring the importance of extending product life; minimizing environmental impact, a recurring theme reflecting the desire to reduce ecological footprints; corporate responsibility, where participants stress the need for businesses to adopt sustainable practices; efficient use of resources, focused on controlled and effective resource utilization; well-being of future generations, emphasizing concerns for future resource availability and environmental quality; and sustainable products, referring to preferences for environmentally friendly or biodegradable items. Connections in the network illustrate relationships among these nodes: environmental awareness links to minimizing environmental impact, reuse and recycling, and efficient use of resources; reuse and recycling connect with minimizing environmental impact and sustainable products; corporate responsibility is associated with sustainable products and the well-being of future generations; and well-being of future generations links to both environmental awareness and efficient resource use.

Figure 7. Semantic Network for the question "What do you understand about the concept of sustainable consumption?



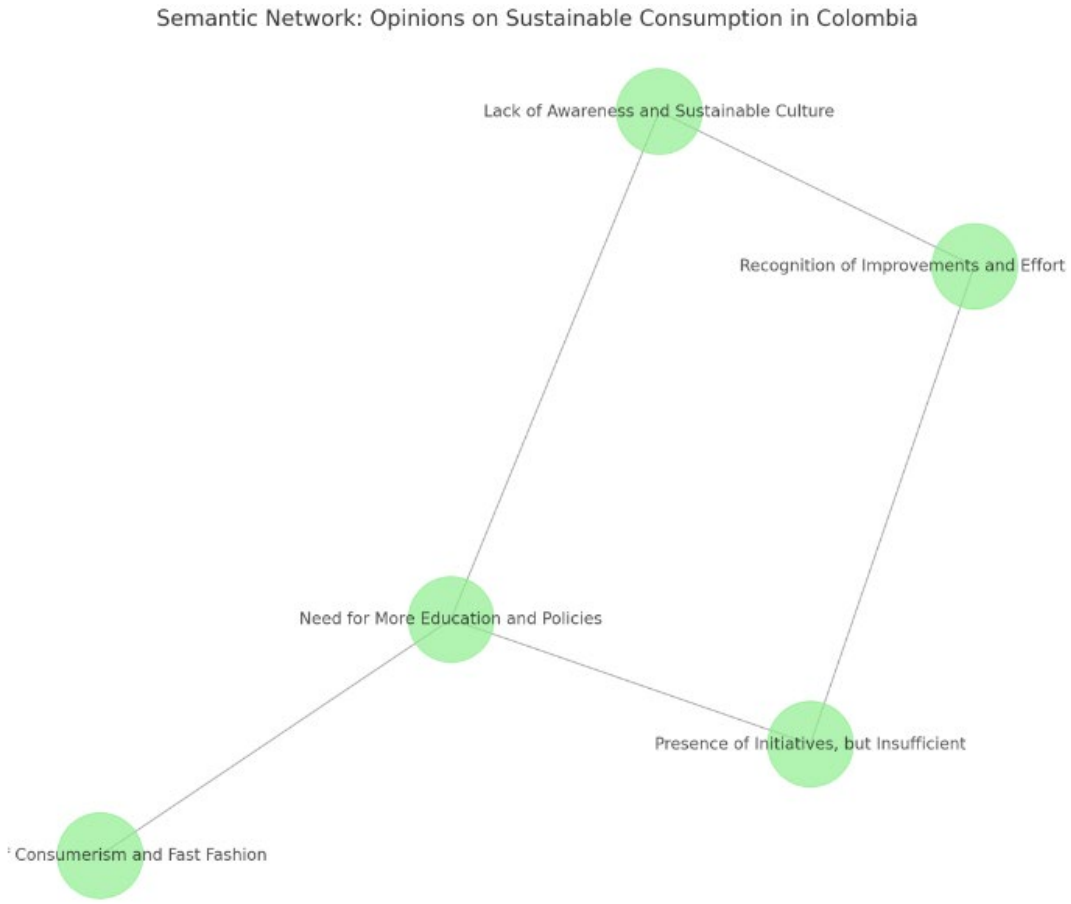
Source: Own Elaboration, 2024.

5.2.3. What is your opinion on sustainable consumption in Colombia?

The analysis of participants' views on sustainable consumption in Colombia reveals several prominent trends, highlighting both challenges and areas for improvement. A significant portion of respondents (30%) expressed concerns about a widespread lack of awareness and cultural engagement with sustainable practices, suggesting that Colombian society still has limited understanding and adoption of sustainable consumption habits. Additionally, 25% acknowledged the existence of various sustainability initiatives, though they criticized these efforts as being insufficient or too restricted in scope to make a meaningful impact. The importance of education and policy development emerged as a recurring theme, with 20% of participants advocating for stronger educational programs and more comprehensive policies to encourage environmentally responsible behaviors across the population. Meanwhile, 15% of respondents pointed to the adverse effects of consumerism, particularly within the fast fashion industry, as a major obstacle to sustainability in Colombia. A smaller segment (10%) recognized recent improvements and initiatives aimed at enhancing sustainability practices, although they agreed that much work remains to be done to achieve significant progress. To further illustrate these findings, a

semantic network graph is provided as supplementary material, visually mapping the relationships among these perspectives and offering an organized view of participants' collective opinions.

Figure 8. Semantic Network for the question What is your opinion about sustainable consumption in Colombia?



Source: Own Elaboration, 2024.

The semantic network graph illustrates the main opinions on sustainable consumption in Colombia, based on participants' responses. Each node represents a key trend identified in the responses, and the lines connect the nodes that are related to each other, showing how these opinions and themes interact and influence each other.

5.2.4. Which behaviors of yours do you recognize in the images shown in the video?

Participants' responses regarding the behaviors they recognized in the video images were analyzed based on the frequency and representativeness of each type of response. Findings indicate that 30% of participants identified their behaviors with images related to recycling and the use of reusable bags, aligning themselves with sustainable practices aimed at reducing single-use plastics (Figures 9 and 10). Additionally, 20% recognized behaviors in images depicting a lack of awareness about the environmental impact of their consumption habits, particularly regarding the use and disposal of plastic, reflecting a critical self-perception concerning their current consumption behaviors (Figures 11 and 12). A further 15% expressed a connection with activities related to tree planting and an appreciation for nature, suggesting a preference for sustainability actions tied to natural preservation (Figures 13 and 14). Another 15% saw themselves reflected in images of sustainable and responsible behaviors, although not necessarily in all depicted actions, but rather in specific practices that resonated with their personal habits (Figures 15 and 16). Ten percent of participants associated with images related to clothing consumption and sustainable fashion, highlighting reflections on the environmental impact of fashion consumption (Figure 17). Finally, 10% reported not identifying with any of the images or lacking a clear awareness of sustainable consumption, underscoring the diversity in levels of self-perception

and environmental awareness among participants. The referenced figures are provided as supplementary material to offer detailed visual support that enriches the analysis.

Images 1 and 2. Sustainable Practices: Reducing Plastic Waste

Source: Freely Usable Images Sourced from Freepik

Images 3 and 4. Waste in Urban and Natural Environments

Source: Freely Usable Images Sourced from Unsplash (Image 3) and Pexels (Image 4)

Images 5 and 6. Environmental Care

Source: Freely Usable Images Sourced from Shutterstock

Images 7 and 8. Ecological Practices

Source: Freely Usable Images Sourced from Shutterstock (Image 7) and Freepik (Image 8)

Image 9. Clothing Landfill in the Atacama Desert

Source: Image by an Unknown Author, Published on Reddit (2021)

5.2.5. Of the images presented to you in the video, which ones motivate you to do something different, and what would you do?

The analysis of participants' responses to the video images revealed several main trends regarding the aspects that motivated them to act differently and the specific actions they proposed. Recycling and reuse emerged as a prominent motivator, with 25% of participants feeling encouraged by images of recycling practices, such as using bottles for planting vegetables. Environmental awareness and consumption reduction followed closely, with 20% of participants indicating that images highlighting environmental impact and the need to reduce plastic and waste spurred them to reconsider their consumption habits. Another 15% expressed a desire to engage in reforestation and enhance their connection with nature, inspired by images of tree planting. Similarly, 15% mentioned a commitment to responsible and sustainable consumption, including choosing eco-friendly products and supporting businesses with responsible practices. Images related to the impact on water and natural resources motivated 10% of participants to consider actions to conserve these resources. Lastly, 15% of participants reported either a lack of motivation from the images or a need for more impactful actions to drive meaningful change. These percentages provide insight into the diverse motivations and intended actions prompted by the video, reflecting participants' varied responses to sustainability-focused imagery.

5.2.6. Results of Organism Changes According to the S-O-R Model

According to the Stimulus-Organism-Response (S-O-R) model developed by Mehrabian and Russell (1974), external stimuli, such as audiovisual content, provoke internal changes within the "organism," influencing both emotional and cognitive states that ultimately lead to observable responses or specific behaviors. This study applied this framework to examine how various types of audiovisual stimuli related to sustainable consumption affect the internal states of participants. Using a mixed-methods approach, quantitative data gathered through FaceReader were combined with qualitative insights from participant responses, providing a comprehensive view of the internal reactions elicited by the stimuli.

Quantitative analysis through FaceReader captured core emotions such as happiness, sadness, fear, and surprise, which represent participants' immediate reactions to audiovisual stimuli showcasing different aspects of sustainable consumption and environmental impact. The data revealed a distinct difference in emotional responses depending on the nature of the stimuli: negative stimuli, highlighting environmental damage and pollution, triggered heightened emotional arousal, particularly reflected in increased sadness and fear. This pattern suggests that negative stimuli can evoke an intense emotional response that not only captures the viewer's attention but also confronts them with the severity of environmental issues, fostering an immediate awareness of the urgency to adopt sustainable behaviors. In contrast, positive stimuli, which focused on sustainable practices and solutions, elicited more balanced emotional responses, with a predominance of happiness and curiosity. This indicates that positive stimuli may encourage a favorable emotional connection toward sustainability without evoking the intense emotional burden associated with negative stimuli, potentially fostering a greater willingness to adopt sustainable behaviors in the long term.

Qualitatively, participant responses further enriched these findings by providing a deeper understanding of the emotional nuances. Negative emotions and perceptions, such as concern, fear, sadness, helplessness, and frustration, were frequently mentioned in relation to environmental damage and personal contributions to it. Specifically, sadness and helplessness were the most commonly expressed emotions (28.57%), indicating the emotional burden participants felt in response to environmental issues. Conversely, positive emotions, such as tranquility, hope, and curiosity, were associated with the video's portrayal of sustainability efforts and solutions. These emotions, while less frequent (8.57% for tranquility and hope; 17.14% for curiosity and awareness), indicate a degree of optimism towards individual actions and societal progress in sustainability. The qualitative analysis also unveiled that participants expressed a heightened awareness of sustainable practices, with responses emphasizing environmental awareness (31.25%) and impact minimization, as well as the importance of recycling and responsible consumption. This cognitive shift reflects how participants are not only emotionally affected but are also cognitively engaged with the concepts of sustainability, aligning with the "organism" element of the S-O-R model, which posits that internal changes are both emotional and cognitive.

The combined results indicate that audiovisual stimuli related to environmental impact and sustainability play a substantial role in shaping both the emotional and cognitive states of individuals. Emotions such as sadness, fear, curiosity, and hope act as essential intermediaries, linking the stimuli with intentions toward sustainable consumption. These findings highlight the pivotal role of emotional responses in deepening environmental awareness and fostering motivation for behavioral change. By demonstrating the internal transformations prompted by these stimuli, this study reinforces the S-O-R model's principle that changes within the organism are fundamental in driving external behaviors, thereby underscoring the potential of emotionally resonant content to support sustainability initiatives at a broader societal level.

6. Discussion and Implications

This study, rooted in the Stimulus-Organism-Response (S-O-R) model by Mehrabian and Russell (1974), sheds light on how audiovisual stimuli impact emotional states, shaping consumer behavior towards sustainable consumption. By analyzing emotional responses through FaceReader, the research demonstrates that specific stimuli, whether positive or negative, generates distinct emotional reactions that influence cognitive processing. Negative stimuli, such as imagery of environmental degradation, elicited heightened emotional arousal, primarily sadness and fear, which are crucial in raising awareness of ecological issues. On the other hand, positive stimuli showcasing sustainable practices fostered emotions like happiness and hope, highlighting the dual role of emotions in motivating sustainable actions. These findings reinforce the centrality of emotional engagement in sustainability campaigns, extending prior research (Hussain, 2019; Chen & Lin, 2018) on the influence of sensory stimuli on consumer decision-making and linking it specifically to sustainable consumption. Moreover, the results underscore the practical application of the S-O-R model in designing effective marketing strategies that leverage emotional triggers to drive behavior change.

The research also explores the psychological mechanisms underpinning the link between sound perception and emotional impact, particularly among university students in an emerging economy. Factors such as attention, motivation, and prior experiences (Asutay & Västfjäll, 2019) shape how audiovisual stimuli are processed, influencing both emotional responses and purchasing decisions. The study reveals that stimuli addressing environmental and social concerns elicited more intense and lasting emotional reactions, consistent with findings by Vieira (2013) and Kwok et al. (2022), which emphasize the role of environmental and marketing factors in shaping consumer perceptions. By focusing on a demographic with high environmental awareness, the study provides actionable insights into tailoring communication strategies that resonate with their values and motivate sustainable behaviors. However, the findings also indicate that emotional engagement alone may not suffice; structural and contextual factors must also be addressed to translate emotions into actionable behaviors.

Despite the promise of heightened emotional engagement, a significant challenge lies in converting such engagement into consistent sustainable purchasing behaviors. The study highlights the prevalence of emotional neutrality among participants, suggesting possible desensitization to environmental messaging or a weak connection between awareness and tangible actions. This finding challenges traditional applications of the S-O-R model, which assumes a straightforward pathway from emotional states to external behaviors, and underscores the complexity of the stimulus-response relationship. Marketers must therefore adopt a more nuanced approach that bridges the gap between emotional engagement and actionable change. Strategies should go beyond raising awareness to fostering a deeper, practical connection between sustainability values and consumer decision-making. For instance, integrating personalized messaging that aligns with individual motivations and experiences could enhance the effectiveness of campaigns in driving sustainable behaviors.

Lastly, the study emphasizes the need for adaptive and flexible marketing strategies that account for the diversity in emotional responses and perceptions. While some stimuli successfully evoked strong positive emotions like optimism and hope for sustainable change, others failed to resonate, pointing to the importance of tailoring marketing efforts to address the varied expectations and experiences of consumers. This nuanced understanding of consumer behavior not only broadens the application of the S-O-R model but also provides practical guidance for businesses aiming to engage sustainability-conscious consumers. By combining sensory marketing insights with sustainability principles, companies can design campaigns that not only educate but also inspire meaningful actions. Ultimately, this research highlights the theoretical and practical significance of emotions in shaping sustainable consumption behaviors and offers a framework for developing strategies that align with the evolving expectations of environmentally aware generations.

7. Conclusions

The quantitative analysis using FaceReader revealed distinct patterns in the participants' emotional responses, with neutrality being the predominant emotion across most cases. However, there were notable variations in the intensity of emotions like happiness and sadness, suggesting differences in how participants received and processed the stimuli. Emotions such as anger, surprise, fear, and disgust generally elicited less intense responses, indicating that the stimuli were more likely to provoke contemplative or neutral reactions rather than extreme emotional arousal. Additionally, variations in valence and arousal among participants highlighted differing levels of positive or negative perception and varying degrees of emotional engagement in response to the stimuli. When participants were segmented into three groups, statistically significant differences emerged in the emotions of neutrality, anger, and sadness, while no significant gender-based differences were observed in the emotional responses.

In the qualitative analysis, a clear division between negative and positive emotions and perceptions emerged, with "Sadness and Helplessness" being the most frequently mentioned category, followed by "Curiosity and Awareness," and subsequently "Reality and Happiness." This distribution of responses reflects a general tendency toward environmental concern and a heightened sense of awareness, paired with an undercurrent of hope and optimism for potential change. Participants demonstrated a varied understanding of sustainable consumption, focusing on themes such as environmental awareness, impact minimization, reuse and recycling, responsible consumption, and the integration of sustainable

practices in business operations. This qualitative insight underscores the dual emotional response of concern and hope, capturing the complexity of attitudes toward sustainability.
Several trends were identified, including the lack of awareness and sustainable culture, the presence of initiatives but insufficient, the need for more education and policies, the impact of consumerism and fast fashion, and the recognition of improvements and efforts in sustainability. Participants identified with images related to recycling, the use of reusable bags, awareness of the impact of consumption, planting and nature activities, and consumption of clothing and sustainable fashion. Some did not identify with any image or lacked strong awareness of sustainable consumption. The video images motivated participants towards recycling and reuse, environmental awareness, consumption reduction, reforestation actions and connection with nature, and responsible and sustainable consumption. However, some participants did not feel motivated or saw the need for more significant actions.

8. Recommendations Limitations and Future Research Directions

This study emphasizes the importance of sustainability-focused strategies for companies aiming to connect with environmentally conscious demographics, particularly university students. Companies should adopt transparent and genuine communication strategies that align with corporate sustainability values, highlighting practices such as recycling, reuse, and responsible sourcing. Visual storytelling, combined with educational campaigns that inspire positive emotional engagement, can effectively bridge the gap between awareness and action. By fostering emotional connections with their audiences, brands can not only promote sustainable consumption but also position themselves as trusted and socially responsible market leaders. Collaborating with credible environmental organizations can amplify the impact of these initiatives, enhancing both reach and authenticity. This aligns with the Stimulus-Organism-Response (SOR) model, which underscores the transformation of consumer perceptions through targeted environmental and marketing stimuli.

Additionally, businesses should focus on promoting eco-friendly products and implementing reward programs that incentivize sustainable behaviors. Loyalty schemes, designed to reward eco-conscious purchasing, reinforce shared responsibility between companies and consumers. These programs can shift perceptions of sustainable products by emphasizing their environmental and personal benefits, such as durability and quality. Transparent communication about production processes and environmental certifications further strengthens consumer trust, empowering informed decision-making that aligns with sustainability values. Innovations in digital marketing strategies, leveraging platforms and tools with minimal environmental footprints, also offer a means to engage young consumers effectively while reinforcing corporate commitments to sustainability.

Despite its contributions, this research has certain limitations. The focus on university students in an emerging economy context limits the generalizability of its findings to other demographics or regions with varying cultural, economic, and social conditions. Furthermore, while FaceReader proved useful for analyzing emotional responses to audiovisual stimuli, its reliance on facial microexpressions may introduce biases or miss deeper contextual factors influencing emotions. Additionally, the short-term nature of the study precludes insights into the long-term effects of these stimuli on purchasing behaviors. These methodological constraints highlight the need for broader approaches to understand the complexities of sustainable consumption decisions.

Future research should expand its scope to explore diverse demographic and cultural contexts, incorporating variables such as socioeconomic status, regional influences, and cultural norms. Examining the interplay of multiple sensory stimuli—beyond audiovisual content—can offer richer insights into the decision-making processes behind sustainable consumption. Longitudinal studies assessing the durability of emotional responses over time would also help clarify their influence on long-term consumer behavior. Incorporating complementary methods, such as ethnographic research or advanced analytics, could provide a more comprehensive understanding of how emotional and cognitive factors shape purchasing decisions. By addressing these gaps, future studies can offer actionable insights that help businesses foster meaningful behavioral changes, ultimately advancing global sustainability goals.

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