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ECOPRODUCTS IN THE DYNAMIC ERA OF DIGITAL COMMUNICATION: A NEUROMARKETING STUDY OF USERS' EMOTIONAL REACTIONS ON SOCIAL MEDIA

Simona ŠČEPKOVÁ - Anna ZAUŠKOVÁ

ABSTRACT:

In the present era, where social media have become a primary tool for interaction between brands and consumers, the importance of emotional reactions triggered by observing public comments is increasingly emphasised. This study analyses how these reactions shape the decision-making process when purchasing eco-friendly products. The aim of this study is to bridge the gap in the analysis of emotional reactions from social media users who are exposed to various unofficial information published on social media while gathering information about eco-products, which can significantly influence their purchasing decisions. The objective is to examine, compare, and evaluate how positive and negative sentiment in user comments affects the perception and value of eco-products amongst other social media users. The findings indicate that posts with positive comments foster increased engagement and a favourable perception of products, while negative comments lead to doubt and frustration. In the neuromarketing experiment, we found that 81.8% of respondents considered the visual design of the eco-product and the ecological brand message attractive, with 63.6% reporting that negative social media comments had a significant impact on their perception of the brand. These results support the hypothesis that emotional reactions to comments are a strong factor in consumer decision-making, suggesting that positive reviews may serve as social proof, while negative comments can cause cognitive dissonance. Through this study, we aim to contribute to a deeper understanding of the dynamics between emotional reactions and the perception of eco-products in the digital communication era, which has significant implications for the marketing strategies of ecological brands.

KEY WORDS:

consumer decision behaviour, eco-products, emotional reactions, neuromarketing, social media, social proof

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1 Introduction

The world we currently live in can be described as the “era of digital communicators”. We create content that we share and publish through various online platforms. Our research employs a combination of quantitative and qualitative methods, with a clear emphasis on the diversity of virtual communicators. The findings include the identification of key topics regarding the perception of emotional responses from social media users, tracking trends across time and space, and analysing communication patterns and interactions. The rapid consumption that has led society towards the fast fashion syndrome has its historical roots in the 1990s when cheap and disposable goods were produced through low-cost manufacturing methods. It is no surprise that so-called virtual influencers and “opinion ambassadors” on various digital platforms often promote fast fashion and consumption trends, with the sole aim of adapting to dynamically changing trends. However, this behaviour, according to Curtis-Smith (2023), accelerates the evolution of fashion, fostering a culture of repetitive consumption. Additionally, this behaviour is a significant contributor to the complexity of solid waste recycling (Radwan et al., 2012). Today, consumers are increasingly engaged in sustainable consumption practices to actively contribute to environmental protection (Moser, 2015; Luthra et al., 2016). The packaging industry plays a key role in protecting the environment and achieving sustainable development goals (Martinho et al., 2015). The aim of eco-packaging, a recent innovation, is to create a harmonious balance between environmental and economic progress (Martinho et al., 2015). As a result, organisations are actively developing various strategies to reduce packaging waste (Mintel et al., 2018). A prominent example can be observed in Walmart’s commitment to achieving “packaging neutrality” by 2025, through initiatives focused on waste reduction, reuse, and recycling (Hunt et al., 2018).

Based on the above-mentioned insights, we can conclude that the increasing pressure on sustainable practices in consumer behaviour arises not only from ecological awareness but also from the ever-changing market demands. Digital platforms play a crucial role in disseminating sustainable trends. We are observing how these platforms influence consumer decision-making. As a result of this phenomenon, brands are now compelled to adapt their marketing strategies to reflect the growing demand for sustainable solutions, such as eco-friendly packaging and transparent production processes. Furthermore, virtual influencers are increasingly involved in promoting sustainable products, indicating a positive shift in public perceptions of sustainability. This cultural shift also becomes a strategic advantage for companies that leverage this trend to strengthen their brand and support sustainable development. Many organisations are taking initiatives to educate consumers about eco-brands (Prakash et al., 2019). However, Gustavo et al. (2018) highlight that organisations still primarily fear the economic costs of ensuring environmental benefits due to packaging redesign. According to their research, companies remain uncertain about consumer responses to redesigned packaging. The goal of sustainable packaging, therefore, largely depends on consumer acceptance of such initiatives (Ketelsen et al., 2020; Boz et al., 2020). Consequently, understanding consumers’ intent to purchase eco-friendly alternatives to conventional products becomes crucial.

2 Theoretical Framework

Digital Communication as a Key Factor in Building Awareness of Eco-Products

In the context of consumer adoption of eco-friendly products, the role of digital communication cannot be overstated. Digital platforms serve as dynamic conduits through which information about eco-products is disseminated, perceptions are shaped, and ultimately, consumer acceptance is fostered. The advent of the digital age has catalysed the formation of virtual communities, which have become an integral part of contemporary communication culture. The virtual space facilitates interaction and the exchange of knowledge and information, influencing consumer behaviour and, more broadly, societal behaviour and polarisation. Numerous scientific studies today confirm that digital platforms are an effective means of spreading information and shaping consumer perceptions. Ultimately, these platforms can also enhance consumer acceptance of eco-products. The rise of the digital age has led to the establishment of virtual communities as a significant and continuously evolving entity. The digital environment, where individuals gather to interact and share their experiences, has deeply permeated modern culture. Globally, communities are increasingly interconnected through digital media. The way individuals engage in communication and foster relationships within virtual communities has profound implications for scientific research and society as a whole. In the realm of virtual brand communities, it is essential to mention the Social Identity Theory (SIT), which provides a comprehensive theoretical framework for exploring the complex dynamics that govern relationships between consumers and brands. Social Identity Theory offers a framework within social psychology that examines the influence of self-conception, cognitive processes, and social beliefs on group dynamics and intergroup interactions. Originally formulated in the 1970s to explain intergroup relations, SIT underwent significant expansion in the early 1980s, broadening its scope to include a deeper understanding of group processes and in-group dynamics. Applying SIT to the context of virtual brand communities provides researchers with valuable insights into the intricate dynamics underpinning relationships between consumers and brands in the digital sphere. Understanding these dynamics is crucial for businesses seeking to navigate and thrive within the evolving landscape of digital communication and consumer behaviour.

The opportunity to join and belong to an online community represents a significant source of perceived value for consumers (Sun et al., 2022), inherently aligned with the core objectives upon which brand virtual communities are based (Bhattacharya & Sen, 2003). Digital communication and presentation capabilities assist companies in creating a vital mechanism for maintaining continuous relationships with customers, thereby fostering an environment where individuals can meet, share knowledge, and engage in mutual exchange of information and opinions. Virtual communities are carefully designed to enhance customer experience (CX) by intensifying user engagement and optimising value delivery through the cultivation of stable connections, functional systems, and rapid problem-solving mechanisms. According to various scholarly studies (Barnatt, 1998; De Valck et al., 2009; Park et al., 2013; Zaglia, 2013; Tajvidi & Tajvidi, 2020; Strunk & Strich, 2023; Aljanabi & Mohammed, 2023), virtual communities can benefit companies by fostering stronger and more interconnected relationships with their customers. As Spaulding (2009) noted, members of virtual communities can indeed become loyal customers. The synergistic alignment of improving CX and creating online communities plays a significant role not only in enhancing customer loyalty but also in activating public engagement.

Generally, consumers tend to attach significance to the opinions of others when making purchasing decisions. It is not uncommon for customers to discuss their purchase intentions with family members, relatives, friends, or colleagues, whom they may even ask for advice or inquire about their previous experiences with a particular product when considering its purchase. As a result of such interactions, consumers are influenced, which, according to our findings, likely impacts their purchasing behaviour. In relation to the influence that members of virtual groups may exert on potential customers, it is essential to clarify the difference between a reference group and a virtual group. A reference group refers to an individual or group of individuals who significantly influence a person's behaviour. The primary difference between virtual and traditional reference groups lies in the fact that joining virtual communities is a voluntary and conscious decision, while membership in traditional reference groups may be

conditioned by random factors such as birth or geographic proximity. Individuals are free to join a virtual community according to their preferences, motivated by factors such as shared interests, similar opinions, or a general alignment in thought on various issues. This can lead virtual communities to assume a more influential role as reference groups compared to traditional communities, with which an individual may not necessarily feel a deep connection.

It is important to note that the actual behaviour of an individual outside the virtual community may not be observable by other community members. Moreover, virtual communities are characterised by minimal barriers to entry or exit. What does this mean? If a situation arises where a member disagrees with the established norms of the group, the simplest solution is to leave the virtual community and join another that shares similar opinions and behaviours. In contrast, in traditional reference groups, the ability to leave the group and distance oneself from the ‘pressure’ to adhere to norms is less accessible or restricted. Consequently, it is assumed that the influence of a reference group, which sets norms, on physical behaviour (real-life behaviour) is less likely to manifest within virtual communities. It is crucial to note that this situation primarily concerns the influence of the virtual reference group on an individual’s real-life behaviour. On the other hand, when considering the influence of a reference group on an individual’s online behaviour, the concept of normative influence becomes relevant. Research studies by authors (Nadler, 2020; Kaye et al., 2022; Kroencke et al., 2023) suggest that group norms concerning online behaviour emerge during prolonged computer-mediated interaction and communication between individuals.

Consumer Purchasing Behaviour of Eco-Products in the Digital Age

General consumer satisfaction with organic products surpasses satisfaction with inorganic food (Paul & Rana, 2012). Satisfaction with an eco-friendly variant of a product—whether it be food, cosmetics, or footwear—is influenced by a range of independent factors. According to several studies (Charrua et al., 2020; Araújo & Marjotta-Maistro, 2022; Akter et al., 2023; Nittala & Moturu, 2023), key determinants of satisfaction with eco-friendly products include beliefs in their health benefits, specifically their nutritional value, certification, taste, quality, and price, along with convictions regarding the environmental benefits they offer. Lockie et al. (2004), in their research, reveal that women, more so than men, and adolescents exhibit positive attitudes towards organic food. However, Gundala (2021) did not corroborate this finding in his study. Consequently, it is difficult to determine with certainty whether marketing communications targeting eco-friendly consumers should focus more on women or men, though regular assessments of customer satisfaction could provide insight into this issue.

Consumers generally perceive eco-friendly products to be expensive, which is not always proportional to the quality of the products. In our opinion, it is important for consumers to realise that while the initial cost of an eco-friendly product may be higher, over the long term, the price becomes more affordable, as eco-friendly products are often designed for extended use—such as in contrast to fast fashion clothing or footwear. Of course, this factor depends largely on the type of product (e.g., reusable wax wraps for children’s lunches vs. traditional paper lunch bags). Increasing attention is being directed towards the concept of resource conservation, environmental protection, and public health maintenance. The general public acknowledges that adopting eco-friendly consumption habits can lead to reduced resource utilisation and pollution. However, despite growing recognition of the environmental benefits associated with eco-friendly products, there has been no significant increase in the market share of such products (Bray et al., 2011). One possible explanation, in our view, is that the perceived importance of environmental issues—namely the prioritisation of eco-products over conventional alternatives—does not necessarily translate into a widespread pattern of eco-friendly consumer behaviour. There exists a disconnect between individuals’ perceived environmental efficacy and their actual green consumer behaviour (Moser, 2015; Tseng & Wang, 2023).

To effectively promote the consumption of ecological products, it is imperative to identify and address these “gaps” and to ensure alignment between intention and behaviour. One of the research questions we pose in the process of mapping ecological consumers is: “How can we comprehend the purchasing behaviour of consumers of ecological products?” The purchasing behaviour of these consumers is influenced by a multitude of independent variables, amongst which age is not the sole determining factor. It is evident that consumer purchasing behaviour is

also shaped by patterns that individuals develop based on their experiences. We contend that these patterns are significantly influenced by the information potential customers acquire prior to making a purchase. This assertion is corroborated by a study conducted by PwC (2023), which indicates that over 55% of consumers consider information search prior to purchase as a primary source in the formation of their opinions, subsequently impacting their purchasing decisions. Furthermore, it is crucial to acknowledge that today's consumers possess a greater degree of technological proficiency than those of previous years. The scenario in which a consumer adds a specific ecological product to their cart results from a series of decisions, which often includes online information searches, where Internet users seek the opinions and experiences of others (eWOM), as well as information retrieval through official communication channels (e.g., the official websites of ecologically oriented businesses, monitoring research reports, or statistical findings from research agencies). According to Igarová et al. (2022) and our own findings, one of the two most prevalent activities for information gathering involves searching for information and opinions on social media, alongside engaging with acquaintances and friends through traditional word-of-mouth (WOM).

Contemporary consumers, particularly the Millennial generation, increasingly favour brands that can be categorised as sustainable (ESW, 2023). According to the findings of recent research, it is evident that certain product categories emphasising sustainability have experienced growth rates that are double those of their conventional counterparts. However, at the core of environmentally conscious entrepreneurial intentions lies a perplexing paradox: a limited number of consumers with a positive attitude towards ecological products and services possess control over financial resources. A report from Statista (2024) indicates that millennials (individuals currently aged 28 to 43) constitute the largest group, comprising 25% of the total sample of 4,036 respondents, who are willing to pay what the report describes as "extra finances" for ecological products compared to their conventional, unsustainable variants. In contrast, the findings suggest that the silent generation – individuals aged 78 to 96 – would be willing to pay extra for ecological products only in a representation of 10% of the total research sample of 4,036 respondents. ESW published the results of a recent survey revealing that 65% of individuals expressed a desire to purchase brands that are purpose-driven and advocate for sustainability; however, only approximately 26% of this intent is translated into action (ESW, 2023). The conclusions of both studies may be correlated with current income levels – given that senior citizens are predominantly reliant on pensions, their financial income is likely lower than that of the more financially stable millennial group, which is generally considered to be actively employed. It can be asserted that the findings of both studies underscore the growing consumer preference, particularly amongst Millennials, for sustainable business practices. Notably, 67% of Millennials are more active on social media and favour online information acquisition, in contrast to only 28% of seniors who prefer traditional communication channels such as television, radio, newspapers, and other media (Nissen, 2023). However, since certain product categories emphasising sustainability exhibit remarkable growth rates compared to conventional alternatives, a paradox emerges concerning the limited financial control of environmentally conscious consumers.

The studies highlight certain generational differences – Millennials demonstrate a greater willingness to pay for ecological products than the silent generation, which shows a preference for conventional options. Furthermore, despite expressed desires to support sustainability, there exists a substantial gap between intention and action, underscoring the complexities of consumer behaviour. The correlation between income levels and sustainable purchasing behaviour further points to socio-economic factors that influence consumer decision-making. Ultimately, understanding these nuances is essential for businesses striving to navigate the evolving landscape of consumer preferences and effectively promote sustainable practices.

As we outlined in the introduction to this section of the study, members of a virtual community can evolve into loyal customers, potentially triggering a public activation effect. Observing the behaviours of others situated within the same environment (for instance, in a virtual group) may enhance our sense of emotional engagement, which is closely linked to the maintenance of a positive self-concept (Cialdini & Goldstein, 2004). Moreover, individuals may voluntarily allow themselves to be influenced by the emotions experienced by others, not solely because they share similar intriguing opinions, but primarily due to their membership in a common social group (Eslinger et al., 2021). It is also imperative to consider the opposite behaviour and its implications for the individual. The well-

documented phenomenon of “misguided” conformity to group norms has been the subject of numerous research studies (Wright, 1986; Abrams & Hogg, 2010; Giguère et al., 2014; Vaswani et al., 2021). This phenomenon highlights the reality that individuals whose behaviours diverge from established group patterns and norms may face social misunderstanding and rejection (Kurajda & Doktorová, 2022).

The degree of engagement with environmental issues serves as an indicator of how individuals recognise the significance of these concerns for their personal well-being. According to the study by Matthes et al. (2014), individuals with a limited sense of environmental engagement tend to exhibit apathy towards ecological issues, whereas those with a heightened sense of engagement are more likely to demonstrate a commitment to environmentally protective behaviours. The authors of the study by Sun et al. (2022) assert that the stronger the value placed on experiences in co-creating corporate social responsibility (CSR), the greater the interest amongst consumers in purchasing ecological products. The authors also conclude that participation in environmental matters, as an inherent element, has the capacity to transform individuals’ cognitive processes, particularly concerning self-construction. Therefore, environmental participation plays a moderating role in the interactive influence of co-creating corporate social responsibility and self-construction on the intention to purchase ecological products. Ščepková and Zaušková (2023) indicate that the emergence of new forms of social interaction amongst individuals, particularly through social media, fosters the creation and dissemination of what is termed community communication regarding businesses and their products. This rapid information acquisition and the ability to compare products and entities (ecologically focused entities versus those that do not offer ecological products) engender a shift in consumer behaviour. Accordingly, ecological businesses should, as suggested by Araújo et al. (2023), develop CSR activities and communicate them effectively through the media channels frequented by their target audience to enhance brand value and improve brand image. This approach should not only raise awareness about ecological products and the necessity of their purchase in light of improving environmental sustainability, but also cultivate favourable emotions towards the ecological alternatives of conventional products. The increasing demand for these alternatives may not only mitigate the environmental burden on the planet but could also correlate with enhanced consumer satisfaction resulting from ecological engagement.

Emotional Reactions of Social Media Users in the Context of Eco-Product Communication

Currently, social media play a pivotal role in shaping marketing strategies for various business-oriented entities, not only for those promoting eco-products. They have become an increasingly significant aspect of evaluating the effectiveness of communication and presentation of these entities. Social media provide a platform that allows brands to create and disseminate content tailored to the needs and preferences of consumers. Moreover, the social media environment not only facilitates interaction between brands and consumers but also evokes a wide range of emotional responses amongst users, which can influence purchasing decisions and enhance or diminish brand loyalty.

In this subsection, we focus on the specific emotional responses most frequently triggered by communication regarding eco-products on social media, as well as the factors contributing to the emergence of these emotions. Emphasis will be placed on understanding how emotional aspects affect the perception of eco-products and how they can lead to more effective marketing tactics and strategies for environmentally oriented entities or brands. Consumers are becoming increasingly discerning, seeking not only a functional and practically useful product at a reasonable price but also a product that provides a pleasant user experience. The rise in environmental awareness has led to an increasing interest in eco-friendly goods, which people often seek out specifically through social media.

For entities and brands striving to effectively convey messages about sustainability and the necessity of purchasing eco-friendly product variants through social media, understanding users’ emotional reactions to such content is paramount. Social media offer a unique framework in which emotions are elicited through visual, textual, and audiovisual content in real-time. Brands focused on eco-products must recognise that sustainability communication triggers specific emotional responses, which are not always confined to the positive spectrum.

In the context of defining the term “emotion”, it is pertinent to mention that one of the earliest theorists to delineate the theory of emotions was Charles Darwin, who, in 1888, posited that humans possess a limited set of

biologically predetermined emotions developed to facilitate survival (Hess & Thibault, 2009). Emotions are often regarded as consciously experienced and intentional. In relation to our conducted neuromarketing research, it is essential to acknowledge that there are various theories of emotion, which can be categorised into three fundamental types:

- a) *physiological theories* – which assert that emotions are responsible for bodily reactions;
- b) *neurological theories* – which posit that activity in the brain leads to emotional responses;
- c) *cognitive theories* – which define that thoughts and other mental activities play a crucial role in the formation of emotions.

Emotions such as hope, pride, or admiration towards responsible brands can be crucial factors in the realm of brand loyalty. Conversely, negative emotions – such as disappointment or guilt stemming from inconsistent implementation of ecological measures – can undermine consumer trust (Achar et al., 2016). One significant factor contributing to the formation of emotional responses is the visual processing of communication campaigns. Our findings indicate that visual elements are paramount in eliciting emotional responses amongst recipients of communication campaigns when presenting eco-products. Elements such as colour, typography, and symbols (e.g., the colour green, natural textures, or recycling symbols) significantly contribute to the generation of positive emotions. Neuromarketing research demonstrated that viewing such visually crafted advertisements activated brain regions associated with positive perceptions of sustainability, particularly in the ventromedial prefrontal cortex, suggesting an emotional investment in the value of the eco-product.

In addition to visual elements, verbal communication plays a critical role. Research by Amriza et al. (2024) demonstrates that clearly articulated messages regarding environmental benefits evoke positive emotional responses. Verbal emphasis on specific ecological advantages (e.g., “together we will save the Earth”, “environmental protection”, “reduction of carbon footprint”, or the phrase “planet-friendly”) can elicit feelings of pride and moral responsibility amongst consumers. Conversely, when communication is vague or manipulative, as is the case with “greenwashing”, it may lead to the emergence of negative emotions (Amriza et al., 2024), including distrust and feelings of anger. This emotional pattern has also been corroborated by our findings, which will be discussed in the interpretation of results in the subsequent section of this article. Data from functional magnetic resonance imaging (fMRI) indicate that content that fosters feelings of environmental awareness activates limbic areas of the brain associated with empathetic and ethical decision-making. This correlates with a higher tendency for consumers to gravitate towards products and services marketed as environmentally responsible.

Regarding the emotional responses of social media users when receiving communication messages about eco-products, it is imperative to consider the demographic factor. Our research has confirmed that younger consumers (specifically, Generations Y and Z) exhibit intense emotional reactions to communications concerning ecological products. We posit that this may be related to their more substantial engagement with sustainability issues, particularly through digital platforms, as well as their heightened sensitivity to environmental and social concerns. In the subsequent sections of this article, we will delve into a deeper analysis of the behavioural implications of these emotional responses and their impact on long-term loyalty and consumer decision-making. An illustrative example of this is the exploration of strategies for authentic consumer engagement and the use of social media as a “bridge” for building trust, which may enhance the market share of eco-oriented brands.

3 Methodology

In the first section of this study, we present a set of theoretical frameworks pertaining to the primary issue, which we will elucidate comprehensively in the subsequent chapter. The information obtained was derived from secondary sources, predominantly from international authors, and was based on a content analysis of various studies and journals from relevant databases such as Web of Science and Scopus, as well as scientific blogs and scholarly

articles. We augmented the theoretical framework with a description and comparative analysis of perspectives on the phenomenon of changing emotional responses to eco-products amongst social media users, who have been influenced by community communication through text comments, commonly referred to as the “bottom-up effect” (Čábyová, 2023; Hladíková & Madleňák, 2023; Ščepková & Zaušková, 2023). The aim of the introductory section, thus the theoretical foundations, was to provide a comprehensive overview of the addressed issue and to establish a solid foundation for future empirical investigations.

The empirical section of this contribution focuses on investigating the impact of positive and negative sentiment in user comments on social media, which were published in response to image-text posts by an environmentally oriented entity, on the perceived value and quality of eco-products amongst other social media users through selected neuromarketing methods. It also identifies how emotional responses elicited by public text comments influence consumers’ decision-making processes when purchasing eco-products. The research observed emotional activation and attention levels of respondents while viewing two posts from an ecological brand published on a social media platform, with each post containing elements of the bottom-up effect in the form of user comments. These posts were displayed in a full-screen interface for a duration of 45 seconds. Neuromarketing measurements were conducted on two groups of respondents using eye-tracking methodology and emotional valence analysis. The neuro-research was subsequently supported by additional validation of the findings for comparison through personal data collection from selected respondent samples. It is important to clarify the two research groups involved. One group was exposed to user comments with positive sentiment, while the other group was exposed to comments with negative sentiment. The posts from the ecological enterprise remained consistent in both cases, without any alterations, as did the visual components of the posts.

We can conclude that through the selected neuromarketing research technique of eye-tracking, which is a tool for analysing attention by linking visual focus with cognitive and emotional responses of study participants, we were able to interpret significant findings that can assist environmentally oriented brands in promoting eco-products. This methodology can aid in the creation of more effective promotional content designed to engage social media users and encourage them to express their opinions. Additionally, as previously mentioned, a conventional research technique was employed in the form of a questionnaire that participants completed immediately after the neuro-research was concluded.

Objective of the Neuromarketing Research and Research Contribution

The aim of the neuromarketing research was to investigate, describe, and evaluate whether and how positive and negative sentiment in user comments on social media influences the perception of eco-products and the ecological brand, despite the main brand message remaining unchanged while only the user comments vary. Furthermore, the study sought to ascertain the significance of this phenomenon in altering opinions and beliefs regarding eco-products and ecological brands. We also focused on the manner, in which emotional responses on social media, elicited by public comments and feedback from other users, shape consumers’ decision-making processes when purchasing eco-products. A key question was to understand whether, and if so, to what extent positive comments (e.g., commendatory or supportive remarks) versus negative sentiment comments (e.g., product criticism, disappointment, or false claims about the product) modify social media users’ emotional responses towards the brand and the presented eco-products.

Research Design and Procedures

To address the research problem, we employed a qualitative research approach, conducted through neuromarketing research. This methodology enables us to obtain valuable data and insights into the research issue in a manner distinct from that achievable through quantitative questionnaire-based studies. The application of this method is exceptionally beneficial, as it provides a deeper understanding of users’ emotional responses to the promotion of eco-products within the social media environment. Neuromarketing combines psychology and neuroscience to analyse how consumers react to marketing stimuli, offering valuable insights into the subconscious processes that influence respondents’ decision-making. This approach allows for the capture of nuances in

emotional responses that may remain hidden and undetected by traditional quantitative research methods. Moreover, neuromarketing research yields substantial data regarding the perception and evaluation of eco-products. Additionally, qualitative research facilitates the capture of complex opinions and attitudes of respondents, enriching theoretical frameworks and marketing strategies. In this manner, we can better comprehend the dynamics of interactions between environmentally oriented brands and potential or actual consumers of eco-products. Our study integrates neuromarketing techniques with questionnaires assessing attitudes towards comments and eco-products, through which we investigate the purchasing decision-making and perception of eco-products amongst participants following the neuromarketing research. Our objective is to obtain comprehensive findings regarding the emotional responses of social media users to the published image-text communication posts of an ecological business entity, which include comments from discussing users of the network.

Prior to the execution of the actual experiment, which combines two types of research and information validation, we dedicated significant time to preparing the materials for the neuromarketing study, as well as for the online questionnaire. At the outset of the neuromarketing research, it was imperative to prepare four image-text posts related to a specifically selected eco-product from an ecological brand. Each post was to include textual comments, with two posts containing comments with positive sentiment and the remaining two supplemented with comments featuring negative sentiment. The processing of natural language, or NLP techniques, involved sentiment analysis. In our case, we employed a text sentiment analyser. We created a research database of comments consisting of 30 favourable textual comments, 30 unfavourable textual comments, and 30 stylistically neutral comments. For the purposes of the neuromarketing experiment, however, we did not utilise all comments; instead, we selected appropriate comments based on predefined criteria: 1. heightened emotions, 2. clearly and succinctly communicated issues or joys, 3. personal experiences, 4. illogical simple phrases, and 5. both objective and subjective causes of satisfaction or dissatisfaction. The sentiment of the textual comments we generated for the study was subsequently validated and categorised according to the resultant data obtained from the available NLP software solution, specifically the BERT tool. The categorisation scale for the texts is illustrated in the figure below (Figure 1).



Figure 1. Score range of the text analysis

Source: own processing, 2024

Subsequently, we selected 5 positive and 5 negative comments, which we integrated into the pre-established template of the ecological brand’s image-text post. It was then necessary to create an online questionnaire. We developed two versions of the questionnaire, as we had two research groups. One questionnaire was designated for the group that viewed negative comments associated with the posts on social media, while the second questionnaire was for the other research group that observed positive comments.

Both questionnaires contained 11 questions, which were presented to the respondents immediately after they scanned the QR code with their smartphones at the conclusion of the neuromarketing experiment. The questionnaire served as a verification tool for the data obtained from the experiment; thus, it included 10 closed-ended questions and 1 open-ended question (a text-based response to a supplementary query). We supplemented the online questionnaire with questions aimed at assessing the impact of the company’s communication, as well as the influence of comments on the credibility and perception of eco-products, given that respondents experienced varying emotional responses in relation to these two values during the research.

Characteristics of the Research Sample and Research Materials

The study was conducted in October 2023. Our research sample comprises students aged between 22 and 28 years (members of Generations Y and Z), and the research materials consist of four image-text posts from an

ecological brand showcasing eco-products and the company's environmental activities, published on a selected social media platform. Prior to the implementation of the study, it was essential to determine the research sample of respondents. Given that this is a qualitative study, it was not necessary to calculate the sample size using a known formula. According to both international and domestic authors, a suitable research sample for this type of investigation typically ranges from 15 to 30 participants, a notion supported by the assertions of Krajčovič & Darázš (2021) and Fournier et al. (2020). We opted for a total sample size of 22 respondents, as this number allowed for the division into two equally sized research groups. It is important to note that the respondents, who represent Generations Y and Z, were selected randomly. We believe that a random sampling approach was appropriate, as each element of the population had an equal probability of being included in the sample. To ensure randomness, we employed a lottery principle, utilising a computer to randomly generate numbers assigned to the entire population of students, which comprised 69 students corresponding to Generations Y and Z. Given our intention to create two equally sized research groups, we defined the total sample size to consist of 22 students. The result was a set of 22 randomly selected numbers, with each number corresponding to a different student. The selected sample of respondents was subsequently divided into two groups to achieve the primary objective of the research.

Two Research Groups

- The group that observed the official posts of the ecological brand, which included unofficial communication in the form of textual comments with positive sentiment (n = 11).
- The group that observed the official posts of the ecological brand, which included unofficial communication in the form of textual comments with negative sentiment (n = 11).

Criteria for Participant Selection

Through random sampling, we obtained a diverse sample of 22 social media users aged 22 to 28 years (belonging to Generations Y and Z), specifically comprising students from the Faculty of Mass Media Communication at UCM. This sample encompassed a variety of demographic, geographic, behavioural, and psychographic factors, as well as previously unknown environmental attitudes, to maintain the impartiality and objectivity of the research.

Data Collection Methods

The execution of our experimental study was dynamic, as research participants arrived at the laboratory at a prearranged time to prevent data distortion and to mitigate the effects of exhaustion or fatigue from waiting during the course of the experiment following the previous participant. Upon their arrival at the laboratory, students were seated and given several minutes to familiarise themselves with the equipment and the research process. After calibrating their eyes to the screen, a high-resolution video was launched across the entire desktop interface of the computer, featuring three social media post snapshots with five comments each (one group = positive comments, one group = negative comments). Each of the two post snapshots remained static for the entire duration of its display – 45 seconds. The total playback time for all three snapshots, in the form of posts, was 90 seconds.

Participants were monitored using two technologies: a Logitech camera and a SmartEye eye-tracking device. For the purposes of data collection in the neuromarketing research, we employed the iMotions 9.2 software. Methodologically, we applied various techniques and methods, including emotional valence analysis and gaze path analysis, through which we observed the emotional activation of both respondent samples. This also facilitated the evaluation of heat maps, from which we can generate a comprehensive analysis for data interpretation.

The neuro-research experiment complements the qualitative study, which was conducted via an online supplementary questionnaire that students accessed within two minutes immediately after viewing the video posts in the laboratory. During the completion of the questionnaire, students were in a separate room without the presence of the researchers conducting the study, to prevent any potential influence on the respondents and to create a calm environment for contemplation of the questions. This type of qualitative inquiry served to validate the

perception of the presented posts from the ecological brand, along with comments from discussing social media users within both research groups.

For the purposes of analysing the acquired data, we also employ standard statistical methods designed for data interpretation. One of the most commonly used methods is descriptive statistics, which is also known as summary statistics. This method encompasses techniques essential for generating clear conclusions about the obtained data through descriptive methods, as well as through graphs, diagrams, and tables. In this contribution, we utilise tables and graphs. We acquired a set of data through neuromarketing techniques, including:

- a) eye-tracking analysis – this involves recording where the research participant is looking, resulting in heat maps that display the distribution of fixations as well as static Areas of Interest (AOI). From these, we can derive additional data suitable for analysis (Krajčovič & Darázs, 2021; Zurawicki, 2010; Kenning et al., 2007; Calvert & Calvert, 2014),
- b) emotional valence analysis – this reflects whether the emotions experienced by the research participant during the viewing of the examined content were positive, negative, or neutral.

Table 1. Methodology of qualitative neuromarketing research

Type of Research	Qualitative Inquiry
Research Technique	Eye-tracker
Sample Selection	Students from Generations Y and Z Aged 22 to 28
Sample Size	22 Respondents
Sample Size – Female Participants	13
Sample Size – Male Participants	9
Method	Facial Muscle Detection, Eye Camera, Questionnaire Survey
Data Evaluation Approach	Content Analysis, Synthesis, Comparison, Deduction, Graphical Visualisation, Univariate Data Analysis
Format and Type of Questionnaire Following Neuromarketing Research	Online Questionnaire Completed in the Room Adjacent to the Laboratory (Immediately Following the Neuromarketing Research)
Number of Questions in the Questionnaire Following Neuromarketing Research	11
Location of Implementation	Trnava, Slovakia
Date of Research Implementation	October 10, 2023

Source: own processing, 2024

Formulation of Research Hypotheses

To achieve the research objective, a crucial part of the conceptualisation process is necessary. In this section, we define the research question and the research hypotheses. The results from the neuromarketing study are compared and analysed alongside the data obtained from the questionnaire survey. The collected data is then generalised, followed by a process of verification or falsification of the following pre-established hypotheses.

RQ1: Does the official and unofficial presentation of eco-products on social media influence users' perceptions of eco-products?

Research Hypotheses:

H1: If ecological brands on social media display a higher proportion of positive user comments when presenting eco-products, other users from Generation Y and Z will perceive the eco-product favourably after viewing these comments.

H2: If ecological brands on social media display a higher proportion of negative user comments when presenting eco-products, other users from Generation Y and Z will perceive the eco-product negatively after viewing these comments.

H3: Positive sentiment in user comments on social media regarding ecological brand posts positively influences the emotional response to the ecological brand and the perception of the quality of eco-products amongst other users from Generation Y and Z.

H4: Negative sentiment in user comments on social media regarding ecological brand posts leads to a decrease in trust and a more negative perception of the value and quality of eco-products amongst other users from Generation Y and Z.

H5: We hypothesise that emotional responses elicited by publicly published opinions of social media users regarding ecological brand posts have a direct impact on the decision-making process of Generation Y and Z when purchasing eco-products.

H6: We hypothesise that there is a relationship between an increased likelihood of purchasing an eco-product and the presence of prevailing positive comments on social media.

The research hypotheses are derived from a logical progression based on prior studies that have addressed the issue of eco-product perception. Confirming or refuting all research hypotheses will lead us to an answer to the primary research question, namely whether official and unofficial presentations of eco-products on social media influence the perception of eco-products amongst users of these networks.

4 Results

In this section of the study, we shall interpret the results obtained from our neuromarketing research and survey questionnaires, which will serve as the basis for presenting scientific hypotheses that will either be confirmed or refuted. The findings from the neuromarketing study provide a comprehensive analysis of how sentiment expressed in social media comments influences users' emotional and cognitive responses to the promotion of ecological products, as well as to eco-products more broadly. The results reveal a clear correlation between the emotional valence of users' comments, their perception of value, and the quality of eco-products. Through the integration of eye-tracking data and analysis of emotional valence, we observed significant differences in user engagement and emotional activation when exposed to both positive and negative sentiment. These insights are further substantiated by the outcomes of the questionnaire conducted following the completion of the initial phase of the research – neuroscientific investigation. The results from this portion of the study offer a deeper understanding of how these emotional reactions shape consumer decision-making, particularly within the examined Generation Y and Z cohorts. The subsequent section presents key findings of the study in relation to the individual research hypotheses, examining the nuances of sentiment's impact on the perception of ecological products and future purchasing intentions.

Results of the Research on Positive Textual Comments Associated with an Ecological Brand Post

The initial research sample consisted of respondents who viewed two posts presented through a 90-second video that featured favourable comments from social media users pertaining to the ecological brand's post. Below the image of the post (Figure 2), which captures the current eye movement of the study participants, we observe an emotional timeline that graphically represents the emotional responses, including various emotional states of the

participants (e.g., interest, surprise, happiness, satisfaction, confusion, etc.). Beneath the image is a graph depicting the diverse emotional reactions of the participants, recorded via the Affectiva AFFDEX system, which can identify various emotions based on facial expressions. This system measures the following emotional states. Based on the curves presented in the graph in Figure 2, we can conclude that at certain moments, **there was an increase in attention and interest**. Regarding the measurement outcomes of the system, we must state that the emotional timeline captures the following emotions:

- a) **Anger, sadness, disgust, fear, and contempt** – these values exhibit a score of 0, indicating that the content displayed in this frame elicited no negative emotional responses from the respondents. These findings are further corroborated by the results of the questionnaire, as 90.9% of respondents indicated that no information presented during the viewing of the individual frames provoked or elicited any significant degree of anger.
- b) **Joy and surprise** – similarly, these emotional reactions do not exhibit significant deviations, suggesting that the emotions experienced by recipients during exposure to the situation depicted in the given screen frame are predominantly neutral or mild.
- c) **Interest and attention** – these indicators demonstrate the highest levels of activity. The curves indicate that at certain moments, participants in the study exhibited heightened levels of “attention” and “interest”. This finding corresponds with the moments when visual elements, such as the image of the eco-product “Barefoot”, and the primary textual comments from social media users were being observed. This observation can also be substantiated by an additional research method conducted immediately following the completion of the neuromarketing investigation, as the vast majority of respondents – specifically, 90.9% – indicated in the questionnaire that they appreciated the manner in which the eco-product was presented and communicated on the social media platform.
- d) **Sentimentality and confusion** – both values remain low, which may suggest that participants did not feel uncertain during this frame and did not exhibit mixed emotional responses.

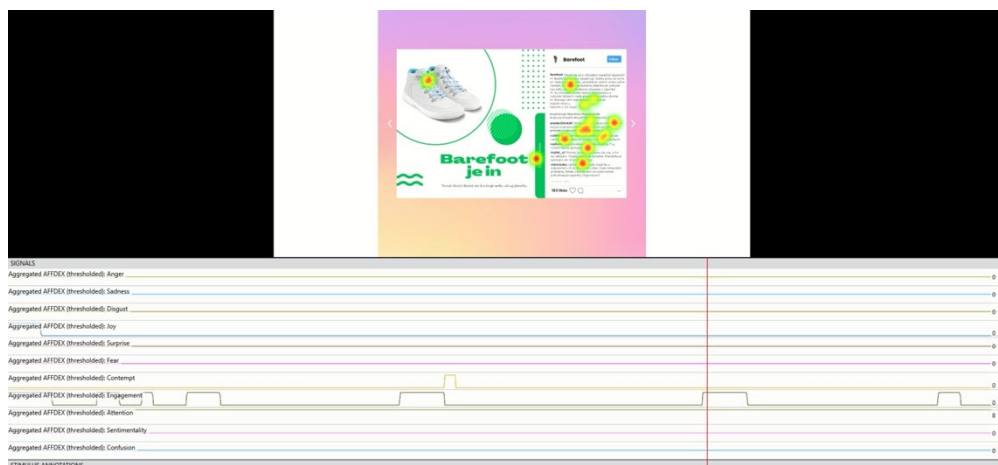


Figure 2. Emotional timeline of Post 1 on the social media platform for the eco-product “Barefoot” and user comments

Source: own processing, 2024

The results of the first frame (Figure 2) of the neuromarketing study, which features an eco-brand post of a visual-textual nature accompanied by positive sentiment comments from social media users, indicate that the respondents identified the image of the eco-product, ecological footwear (“Barefoot”), as a key visual element. This finding was verified through a supplementary question in the online questionnaire and subsequently confirmed, as the data reveal that 81.8% of respondents expressed that the image of barefoot footwear and the slogan “Barefoot is in” were the most appealing aspects of the communication frame. This identified pattern clearly indicates that the

design and core message of the promoted post were effectively conceived, successfully capturing consumers' visual attention. The image of the ecological variant of classic footwear, which served as the central visual element of the post, acted as a focal point of interest, suggesting that the visual details of the product are crucial for eliciting interest in the product itself. The textual slogan "Barefoot is in", which simultaneously communicates a trend aspect and the ecological benefits of the product, also garnered significant attention, thereby reinforcing the effectiveness of the communication message.

The graphs of emotional responses further indicate heightened attention and engagement during moments when participants observed the most salient visual and textual elements in the frame. According to the questionnaire findings, 64.6% of respondents perceived the text of the eco-subject post as lengthy. Conversely, 81.8% of respondents reported that they were particularly interested in the comments from discussing users beneath the eco-product post. To delineate what type of text recipients found engaging, we inquired in the online questionnaire following the research about which type of user comments intrigued them the most, providing them with four options: "method of communicating information" (0%), "personal experience with the product" (77.8%), "positive product recommendation" (11.1%), and "negative product recommendation" (11.1%). Amongst these options, the comments describing personal experiences with the product resonated most with respondents, as evidenced by 77.8% of the responses. These findings suggest that the combination of a visually appealing product with well-formulated textual content can effectively stimulate not only visual but also cognitive engagement amongst social media users.

Regarding the emotional response, it was predominantly neutral to slightly positive. This type of response indicates that the promotion of the eco-product was perceived as clear and interesting, without eliciting confusion or negative feelings. The low values of negative emotions, such as anger, sadness, or disgust, suggest that this type of promotion communicates effectively without provoking adverse emotional reactions, which would otherwise signal the need for content reworking. These results affirm the effectiveness of the post's communication and its ability to capture attention while positively influencing recipients' emotional experiences without unnecessary emotional overload.

According to the results of the first neuromarketing study, the display of two eco-brand posts with positive text comments by users on social media did not elicit negative emotional reactions from respondents. The results of our neuromarketing research, presented using the Affectiva AFFDEX system, show the following facts: the values for emotions such as anger, sadness, fear and contempt are at 0, which was also confirmed by the answers in our follow-up questionnaire, where 90.9% of the participants stated that the content did not evoke negative emotions from them. Positive emotions, such as joy and surprise, were only slightly present, suggesting that emotional responses were predominantly neutral. In contrast, the indicators for "interest" and "attention" exhibited the greatest activity, correlating with the visual elements of the post – the product image and user comments. These findings were supported by the questionnaire, in which 90.9% of participants indicated that they appreciated the communication of the eco-product. Sentimentality and confusion were negligible, indicating a clear and consistent understanding of the content.

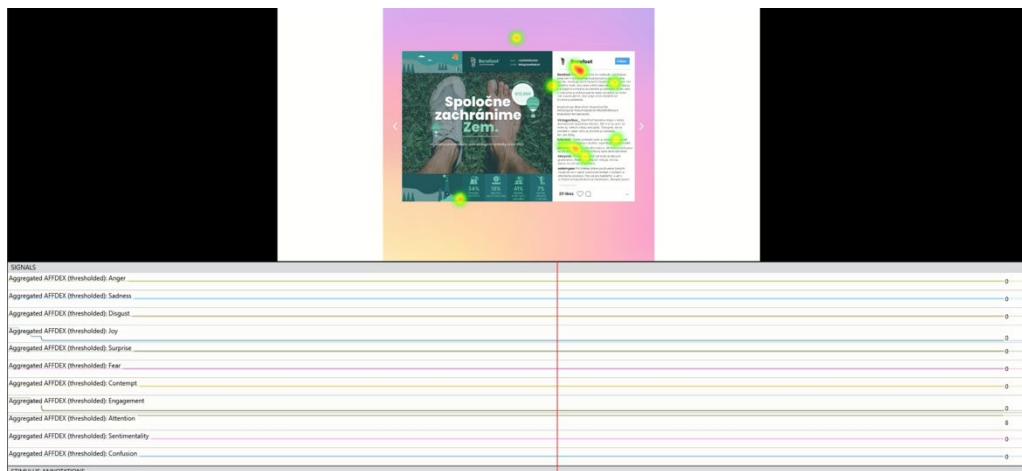
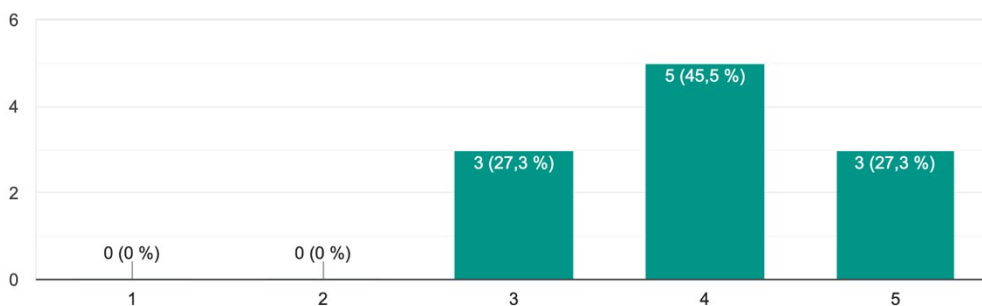


Figure 3. Emotional timeline of Post 2 on the social media platform for the eco-product “Barefoot” and user comments
Source: own processing, 2024

In regard to the interpretation of the results from the second frame (Figure 3), which features the eco-product – barefoot footwear – alongside a human foot positioned on grass, with the text “Together we will save the Earth: We proudly present our ecological results for 2022” overlaying the image of the feet, it can be concluded that no significant deviations in emotional engagement were recorded throughout the monitoring period. Therefore, we do not reflect that this visual-textual post, containing comments from users with positive sentiment, effectively engaged the participants of the study.

In conclusion, it is essential to present two key summaries: the reactions of commenting individuals were predominantly perceived by the study participants as neutral (63.6% reported this). This information was unexpected, as the images within this research group only displayed positive reactions, specifically comments exhibiting positive textual sentiment. Participants indicated through the questionnaire that their perception of the eco-product, after viewing the two posts published on social media with textual comments from users, predominantly aligned with a Likert scale coefficient (ranging from 1 to 5, where 5 represents very positive and 1 represents very negative) of 4, which signifies “significantly positive.”



Graph 1. The interpretation of the resulting data regarding the questionnaire question: “How do you perceive the product ‘Barefoot’ footwear after viewing the two frames, which included the social media post and positive comments from discussants?”
Source: own processing, 2024

For a better understanding of the evaluation of the final question in the online questionnaire, which addresses the change in preferences towards the eco-product barefoot footwear after viewing two posts accompanied by

favourable comments, we present a graphical evaluation of the resultant data. Graph 1 confirms that 0% of respondents indicate a negative perception of the eco-product following the research, while 27.3% perceive the product as significantly positive.

Results of the Research with Negative Textual Comments on the Post by the Ecological Brand

In the following section, we present the resultant interpretations for the second research sample comprising respondents from Generation Y and Z, who viewed two posts published by the same eco-brand as in the first research sample – each lasting 45 seconds – while being exposed to posts containing user comments with negative textual sentiment. As in the previous case, the graphic depiction of the emotional timeline, visible beneath the image from the research at that moment (Figure 4), illustrates the current eye movement data captured through the eye tracker and the participants’ emotional responses to the observed stimuli. The emotional experiences of the participants in this research sample are depicted through the Affectiva AFFDEX system, consistent with the first research group.

Based on the deviations in the curves presented in the graphical representation found in Figure 3, we deduce that there were shifts in emotions such as joy and engagement at certain intervals. Regarding the results from the measurement system, we must conclude that the emotional timeline captures the following emotions:

- a) **Anger, Sadness, Disgust, Fear, and Contempt** – these values remained at a numerical value of 0, indicating that the content displayed in this frame did not evoke any negative emotional responses in the respondents. These observations were corroborated through questionnaire analysis, revealing that the reactions of social media users in the comments had a notably negative impact on this group of participants, with over half of the respondents (63.6%) indicating this. From a supplementary research question posed to the respondents via the online questionnaire post-study, the most frequently cited disconcerting factors included: “controversial comments suggesting the overpriced nature of barefoot footwear of average quality”, “negative experiences with the product”, “false information”, and remarks like “I’ll never buy again!” and “I paid 140 € for a subpar product”, which significantly affected my perception.
- b) **Joy and Surprise** – regarding the emotion of “joy”, we observed a minor fluctuation shortly after the commencement of the research, wherein some participants experienced this emotional state for a few seconds; however, this was brief, and no further instances of this emotion occurred for the remainder of the observation period. In this regard, the results of the online questionnaire indicated that 36.4% of the study participants found the reactions of the commenting users to be neutral, which is an intriguing finding in light of the previously interpreted conclusions presented in section (a).
- c) **Interest and Attention** – as with the first research group, we observe a change in emotional engagement in this group as well, where this emotion exhibited two distinct shifts in the overall data: initially showing a downward trend, followed by a marked change in engagement approximately 15 seconds after the image was displayed. Given the heightened level of attention observed during the viewing of this image, particularly when recipients focused on the negative textual comments from social media users, we can assert, in alignment with previous claims, that the presence of comments with negative textual sentiment correlates with increased attention from recipients compared to posts featuring neutral or positive comments. This assertion is further supported by the data regarding the inquiry into eliciting interest or attention, which revealed that 54.5% of respondents experienced these emotional states.
- d) **Sentimentality and Confusion** – no significant deviations were noted for either of these values; however, the resultant data from the questionnaire indicate that 45.5% of respondents acknowledged that their disinterest in the company presenting the eco-product, as well as in following their social media accounts or website, could be attributed to the information they gleaned from the comments associated with the post.

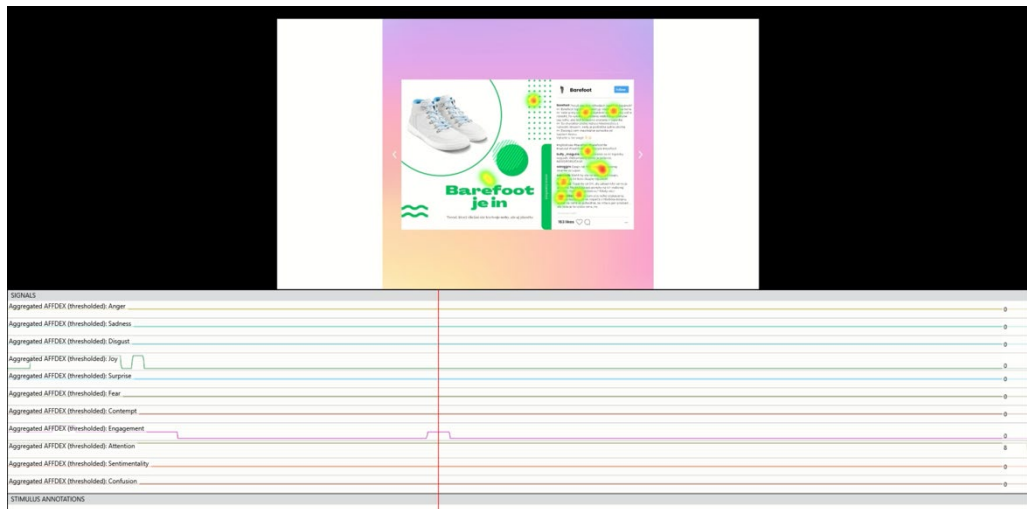


Figure 4. Emotional timeline of Post 1 on the social media platform for the eco-product “Barefoot” and user comments
Source: own processing, 2024

As previously discussed in the evaluation of the second image for the first research group, we similarly present the assessment of the second image of the visual-textual post containing user comments for the second research group. Figure 5 displays the same communicative message from the ecological brand as Figure 2; however, in this graphical representation of the emotional timeline of the post, we observe deviations in multiple emotional experiences. Based on the deviations of the curves illustrated in the graphical depiction presented in Figure 4, it is imperative to note that we are recording deviations in emotional values such as happiness, contempt, engagement, and attention. The emotional timeline for this image captures the following emotional data:

- a) **Anger, Sadness, Disgust, And Fear** – the resultant values for these emotions do not exhibit any changes throughout the duration of the observation of this image. However, supplementary questioning via the questionnaire reveals that 54.5% of respondents felt outraged or experienced some degree of anger during the viewing of the posts.
- b) **Joy And Surprise** – in relation to the emotional response characterised by the experience of joy, we observe a decrease in intensity within the first five seconds of viewing this image, which subsequently increased after another seven seconds. However, no further changes in emotional values were recorded for the remainder of the observation period. Based on the results from the neuromarketing study utilising eye-tracking technology, it can be concluded that the emotion of “surprise” remained consistent throughout the duration of the neuromarketing investigation. During the observation of visual stimuli, there were no significant behavioural changes in the respondents that would indicate unexpected reactions or emotional fluctuations associated with surprise. This may suggest either an inadequate stimulating capability of the employed stimuli to elicit this particular emotion or a stable emotional response amongst participants throughout the study.
- c) **Interest and Attention** – based on the findings from the neuromarketing research, it is evident that the emotion of engagement underwent ten changes during the observation of the analysed image, with the most pronounced shifts occurring at moments when respondents viewed negative comments. Data obtained via eye-tracking indicates that these portions of the posts elicited the greatest attention. The questionnaire revealed that 62.5% of respondents were most captivated by comments related to personal experiences with the product. This data correlates with the heightened level of attention observed during the viewing of the image, as 63.6% of respondents indicated that the negative comments had a detrimental effect on them, thereby affirming their engagement and sensitive reaction to the content.

- d) **Sentimentality and Confusion** – for both analysed metrics, we do not observe any statistically significant deviations. Nevertheless, the data gathered from the questionnaire suggests that 45.5% of respondents who viewed the image featuring a post with negative comments acknowledge that their disinterest in the company offering the eco-product, as well as their limited engagement with its social media accounts or website, may be influenced by the information gleaned from the comments associated with the post.

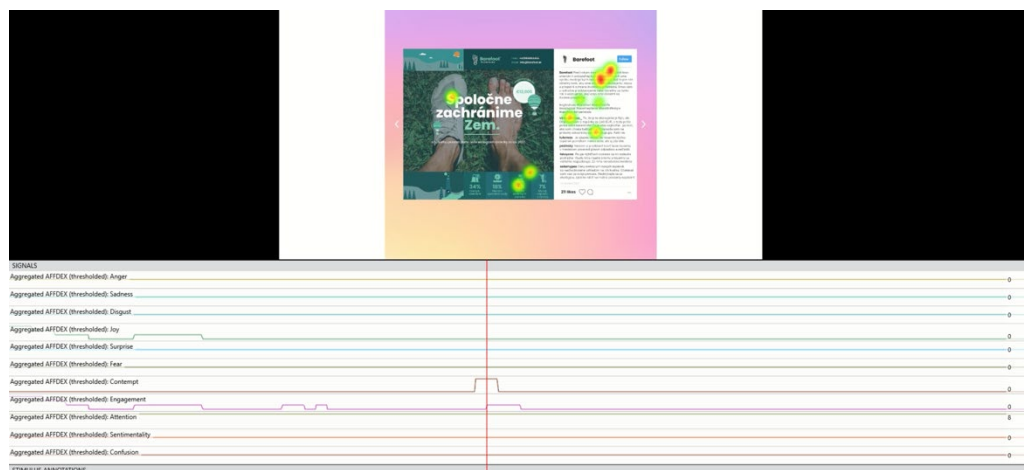
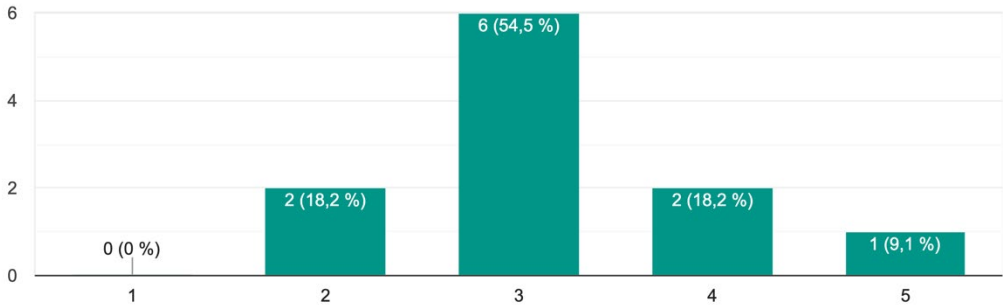


Figure 5. Emotional timeline of Post 2 on the social networking site for the eco-product “Barefoot” and user comments
Source: own processing, 2024

The findings from the neuromarketing research focused on users’ emotional responses while viewing the image-text post of the ecological brand reveal discrepancies in the experience of specific emotions. Emotions such as happiness, contempt, engagement, and attention exhibit significant temporal variations. In contrast, emotions such as anger, sadness, disgust, and fear remain stable, with 54.5% of respondents indicating feelings of outrage or anger while viewing the two clips containing text comments with negative sentiment. The emotional response of “joy” exhibited a decreasing trend within the first five seconds, followed by a brief resurgence, and subsequently remained stable for the remainder of the video. The emotion of “surprise” maintained a consistent level, suggesting either a low stimulative capacity of the stimuli or a stable emotional response throughout the observation period. The most notable occurrence of the emotion “engagement” was observed in relation to negative comments, which captivated 62.5% of respondents, indicating a correlation with an increase in the emotion of “attention”. Despite the absence of statistically significant deviations in the metrics of “sentimentality” and “confusion”, 45.5% of respondents reported that negative comments influenced their attitudes towards the ecological brand, subsequently diminishing their interest in following the brand.

Based on the analysis of the second image, which depicts barefoot footwear alongside a foot standing on grass, accompanied by the text “Together We Will Save the Earth: We Proudly Present Our Ecological Results for 2022”, it can be concluded that no significant changes in the emotion of “engagement” were recorded during the monitoring period. This image-text post, despite the negative comments in terms of user sentiment, did not elicit increased attention from the research participants. The final findings reveal two significant observations:

- the majority of participants (63.6%) regarded the reactions of commenting individuals as negative, a presumption supported by the high number of negative comments displayed within this research group,
- respondents indicated in the questionnaires that they predominantly perceived the eco-product as negative after viewing the two posts that included user comments. On a Likert scale from 1 (most negative) to 5 (very positive), the product received an average rating of 3, indicating a slightly negative perception of the brand.



Graph 2. The interpretation of the resulting data regarding the questionnaire question: “How do you perceive the product ‘Barefoot’ footwear after viewing the two frames, which included the social media post and negative comments from discussants?”

Source: own processing, 2024

To provide a more complete understanding of the evaluation of the last question in the online questionnaire, which concerns the identification of changes in preferences towards an eco-friendly product (barefoot footwear) after viewing two posts that contained unfavourable comments by users about an eco-friendly product, we present a graphical representation of the resulting data. Figure 2 confirms that 0% of respondents reported a strongly negative perception of the eco-product after the research, while only 9.1% of respondents considered the eco-product strongly positive. Compared to the evaluation of the resulting data in Figure 1, a significant difference can be observed in the perception of the eco-product by the respondents after the research segment.

5 Conclusion

The presented results of the neuromarketing study focused on examining the emotional and cognitive responses of users exposed to image-text posts on social media promoting ecological products. As noted by Achar et al. (2016), the emotions embedded in marketing stimuli, including communication campaigns on social media, influence decision-making through processes governed by cognitive evaluation. Emotions that are not directly related to decision-making can still impact choices by shaping evaluative tendencies (Achar et al., 2016). Key insights were derived from data obtained through eye-tracking tools and the analysis of emotional valence using the Affectiva AFFDEX system, in conjunction with post-exposure surveys. Our study underscores the importance of combining visually appealing product presentations with positive social sentiment, which enhances user engagement and elicits favourable emotional responses in the marketing of ecological products.

Conclusive Summary for the Research on Emotional Reactions of Respondents from Generations Y and Z – First Research Group with Textual Comments of Positive Sentiment

In the preceding chapter of this study, we revealed that posts on social media accompanied by positive user comments did not elicit negative emotions such as anger, sadness, or disgust. The emotional responses were predominantly neutral to mildly positive, with notable peaks in attention and engagement observed particularly during the presentation of images of ecological products, such as barefoot footwear. This suggests the effectiveness of the visual design of ecological products in capturing user interest. The presence of positive sentiment in user comments enhanced the attention and engagement of respondents. The combination of product design and its sustainability message (“Barefoot is in”) successfully captured the visual and cognitive attention of the recipients. Data from the questionnaire survey confirmed that 81.8% of respondents considered the image and slogan of the

product to be the most interesting aspects. Respondents also demonstrated an increased interest in comments where users shared personal experiences with ecological products, with 77.8% expressing such interest, highlighting the significant impact of social media recommendations on consumer perceptions and purchase intentions.

Conclusive Summary for the Research on Emotional Reactions of Respondents from Generations Y and Z – Second Research Group with Textual Comments of Negative Sentiment

Despite stable values of anger, sadness, fear, and disgust (which remained at zero levels), 63.6% of respondents indicated that the comments accompanying the post elicited emotional changes. For illustrative purposes, we present a specific real example: “I paid 140 € for a subpar product”, which forms part of their brand perception and provokes feelings of outrage. “Joy” was recorded only transiently at the beginning of the post viewing and subsequently declined, while “surprise” remained constant, indicating a low stimulation capacity of the visual stimuli. Respondents exhibited a tendency for “engagement” when observing unpleasant comments, with 62.5% focusing primarily on personal experiences related to the product. This trend correlates with the heightened attention these comments elicited. The product’s evaluation on a Likert scale amongst respondents averaged a score of 3, indicating a “slightly negative” perception, with only 9.1% viewing the product favourably. The majority of respondents perceived the product similarly after viewing two posts and comments with negative sentiment, without significant deviations in emotional responses and opinions. Although statistically significant deviations in “sentimentality” and the emotion of “confusion” were not observed, 45.5% of respondents confirmed that the information derived from negative comments may have contributed to a decreased interest in the company. Overall, these findings indicate that comments on social media have a profound impact on emotional experiences and perceptions amongst respondents, thereby underscoring the significance of messaging and communication on social networks in the context of neuromarketing.

Discussion on the Impact of Comments on Users’ Emotional Reactions

In recent years, social media have emerged as a significant arena for interaction between brands and consumers. User comments on social media play a crucial role in consumer decision-making processes and shifts in emotional reactions. This discussion will focus on the impact of comments on emotional responses of users and their potential influence on purchasing behaviour. Emotional reactions, whether positive or negative, can shape perceptions and opinions about products and brands, with user comments on social media serving as a significant factor in this process. Positive comments can elicit feelings of trust and positive evaluation, while negative comments can induce doubt and frustration. Numerous research studies (De Ligt et al., 2012; Vences et al., 2020; Ray et al., 2021; Novak & Kiknadze, 2024; Wang et al., 2024) demonstrate that posts with positive comments typically generate positive emotional responses, such as joy and satisfaction. Research (Cao et al., 2024; Cheng & Li, 2024; Li et al., 2024; Singgalen, 2024) indicates that positive sentiment in comments leads to increased user engagement and favourable perceptions of products. This effect is further amplified by the visual design of products, which can be attractive to users and promote positive emotional experiences. Conversely, posts with negative comments can profoundly impact the emotional responses of social media users. Our findings indicate that while comments rated as “average”, stemming from feelings of anger and sadness, remain low, 63.6% of respondents reported that negative comments influenced their overall opinion of the ecological brand. Critiques regarding product quality can elicit feelings of outrage and disappointment, affecting the overall perception of the brand and heightening consumer concerns about quality. In addressing the complexity of this issue, it is essential to mention the influence of psychological mechanisms in the discussed discourse. It is evident that emotional reactions to comments are supported by psychological mechanisms such as social proof (Ščepková & Zaušková, 2023) and cognitive dissonance. Positive comments can act as social proof, enhancing trust in the product and motivating potential customers to purchase. Conversely, negative comments can create cognitive dissonance when consumers are confronted with recommendations that contradict their prior beliefs or emotional experiences.

Conclusions for the Verification of Research Hypotheses

In this section of the study, we focus on the analysis and synthesis of the results to evaluate the six research propositions of our investigation, which focuses on the impact of comments on the emotional reactions of social network users in the context of eco-friendly products. Considering the dynamics of interaction between Generation Y and Z users, our assumptions reflect the complex relationship between positive and negative sentiment in online comments on social networking sites and their impact on consumer perception, trust and decision making. In the following sections, we discuss each of the assumptions, and our analysis draws on neuromarketing data and psychological theories to contribute to a deeper understanding of the mechanisms influencing purchase behaviour in digital environments. These findings not only shed light on particular aspects of user interactions, but also provide practical implications for organic brand marketing strategies.

H1: If ecological brands on social media display a higher proportion of positive user comments when presenting eco-products, other users from Generation Y and Z will perceive the eco-product favourably after viewing these comments.

The resulting analysis of the collected data, which we present in the previous pages of the paper, confirms that the presence of higher levels of positive comments in eco-brand posts leads to a more favourable perception of eco-products amongst Generation Y and Z users. Respondents showed higher emotional engagement and positive valence when interacting with the content, supporting the theory that positive social proof increases trust and willingness to try even previously unknown new products.

H2: If ecological brands on social media display a higher proportion of negative user comments when presenting eco-products, other users from Generation Y and Z will perceive the eco-product negatively after viewing these comments.

Based on the data, we can report that we observed a relationship between higher rates of negative comments on eco-label posts and negative perceptions of eco-products. A higher incidence of negative comments is significantly associated with a worse perception of eco-products amongst respondents. These findings are consistent with psychological theories suggesting that negative stimuli have a stronger influence on decision making and emotional reactions than positive ones.

H3: Positive sentiment in user comments on social media regarding ecological brand posts positively influences the emotional response to the ecological brand and the perception of the quality of eco-products amongst other users from Generation Y and Z.

Our results described in the previous section of this study suggest that positive sentiment in user comments significantly influences emotional response and perceptions of eco-product quality. Respondents who were exposed to positive eco-product evaluations in neuromarketing research showed increased satisfaction and positive emotional experience, supporting the assumption that positive communication signals increase overall product value amongst other social media users belonging to generational cohorts Y and Z.

H4: Negative sentiment in user comments on social media regarding ecological brand posts leads to a decrease in trust and a more negative perception of the value and quality of eco-products amongst other users from Generation Y and Z.

The findings of our study confirm that negative comments do indeed lead to a decrease in trust towards the eco-product and a more negative perception of the value of eco-products. Respondents who were exposed to

comments with negative textual sentiment in the research reported lower ratings of the quality of the eco-product and showed less willingness to subsequently recommend the eco-product, underlining the importance of the textual sentiment of the information disseminated towards the reputation of the organic brand and the eco-product.

H5: We hypothesise that emotional responses elicited by publicly published opinions of social media users regarding ecological brand posts have a direct impact on the decision-making process of Generation Y and Z when purchasing eco-products.

Our results show that the emotional responses elicited by publicly published opinions on eco-label contributions through text comments have a significant impact on the decision-making process of Generation Y and Z users when purchasing eco-products. Higher emotional involvement was associated with an increased likelihood of purchase, suggesting that emotional aspects play a key role in the consumer decision-making process.

H6: We hypothesise that there is a relationship between an increased likelihood of purchasing an eco-product and the presence of prevailing positive comments on social media.

Our findings support the hypothesis that the prevalence of positive comments on social media increases the likelihood of purchasing eco-products. Respondents who experienced a high proportion of positive reviews not only showed a higher willingness to buy the product, but we also observed a tendency to recommend the product to their friends, underlining the importance of positive sentiment in online product promotion.

In conclusion, it is crucial to emphasise the significance of comments on emotional responses and decision-making processes of users in the context of ecological products. Both positive and negative comments exert a powerful influence on the perception, trust, and decision-making processes of Generations Y and Z, suggesting that effective management of online reputation and communication is an essential step towards achieving success in the presentation of eco-products.

Conclusions and Limits for Future Investigations of the Issue

The influence of comments, as outlined by Li et al. (2023), on the emotional responses of social media users is intricate and multifaceted. Positive comments tend to foster favourable emotional experiences and engagement, whereas negative comments may elicit doubt and frustration. These dynamics have a significant impact on brand perception and consumer decision-making. Given the increasing role of social media in marketing, future research should continue to explore these interactions to better understand their impact on consumer behaviour and strategic approaches in marketing. Currently, neuromarketing plays a crucial role in comprehending the emotional and cognitive reactions of users to social media posts (Vences et al., 2020). The findings presented in the study focused on ecological products affirm that emotions elicited by marketing stimuli, including comments on social media, significantly influence consumers' purchasing decisions.

To conduct this investigation, we employed neuromarketing technologies such as eye-tracking and emotional valence analysis using the Affectiva AFFDEX tool, thereby integrating quantitative and qualitative approaches. The findings indicate that posts with positive comments elicited neutral to mildly positive emotional responses amongst respondents, with heightened "attention" and "engagement" particularly observed when visually appealing ecological products, such as barefoot footwear, were displayed. This suggests that product design and sustainability messaging directly influence users' emotional perceptions. Respondents expressed interest in the personal experiences of other users, underscoring the importance of social proof in the online environment.

Conversely, the study also examined the impact of negative comments. Although the values of emotional reactions such as "anger", "sadness", and "disgust" remained at minimal levels, our survey revealed that over half of the respondents, specifically 63.6%, acknowledged that negative comments had a profound impact on their perception of the ecological brand. These comments, particularly critiques regarding product quality, incited

feelings of “outrage” and “disappointment”, which may have long-term consequences for consumer purchasing decisions. Respondents demonstrated an interest in comments and their content, suggesting that negative perceptions can also influence “engagement” and “attention”.

In light of the research findings, it is evident that comments on social media have a fundamental impact on users’ emotional experiences, thereby influencing their purchasing intentions. These results emphasise the importance of effective communication and the implementation of appropriate communication strategies on social media that reflect the emotional sentiments and reactions of users. Future research, according to our convictions and the insights gained regarding the issue at hand, should focus on supplementing and expanding knowledge of the topic, as well as investigating the long-term effects of emotional responses on consumer behaviour, to achieve a better understanding of the dynamics between emotional engagement and decision-making processes in the online environment.

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