

## SENSORY NEUROMARKETING: THE IMPACT OF THE SENSES ON CONSUMER BEHAVIOR

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### ABSTRACT

**Introduction:** Sensory neuromarketing integrates neuroscience and marketing principles to influence consumer behavior through sensory stimulation. In an overstimulated environment, this discipline aims to capture consumer attention and create emotional connections that drive purchasing decisions. **Methodology:** A qualitative systematic literature review was conducted, applying inclusion and exclusion criteria to select relevant studies on sensory neuromarketing's impact. **Results:** A total of 22 studies were analyzed, showing that multisensory strategies are more effective in physical environments, while digital marketing predominantly relies on single-sense stimulation. **Discussion:** Several technical barriers, such as the complexity of integrating multiple stimuli, and psychological barriers, including sensory habituation, may reduce the effectiveness of sensory marketing strategies. **Conclusions:** While sensory neuromarketing presents an innovative and effective approach, its implementation must be adapted to specific contexts to maximize its impact.

**Keywords:** consumer behavior; sensory stimulation; multisensory strategies; sensory neuromarketing; advertising.

### 1. INTRODUCTION

Today's society, defined by a constant bombardment of stimuli, poses significant challenges for brands seeking to capture consumer attention in an effective and distinctive way. Moreover, in an environment where consumers are increasingly selective and demanding, traditional marketing strategies have been limited in their ability to influence purchasing decisions (Erenkol & Merve, 2015). In this scenario, sensory neuromarketing emerges as a promising alternative, since it aims to stimulate the senses to bring about emotional and cognitive responses whose purpose is to significantly influence consumers' perceptions and, ultimately, their purchasing behavior (De Garcillá, 2015). According to Yactayo-Moreno and Vargas-Merino (2021), it can be considered as:

[...] an innovative marketing strategy that uses stimuli and elements that consumers perceive through their senses to influence their perception, judgment, and behavior. It is also the study that links the senses of consumers and the application of the understanding of sensation and perception to the field of marketing. Therefore, it can be said that it is a strategy that through sensory stimuli



helps the consumer to participate in the purchase by interacting with the five senses. (p. 4)

In a global context, sensory neuromarketing has been employed in different ways according to the cultural and economic specificities of each region. For example, in Japan, luxury stores have integrated specific scents into their facilities to create a unconscious association between fragrance and brand exclusivity (Jang & Lee, 2019). In Germany, the automotive industry has implemented tactile stimuli in vehicle interiors to improve consumers' perceptions of quality and comfort (Abdolmohamad et al., 2022). Similarly, in Latin America, sectors such as food have resorted to olfactory marketing strategies in supermarkets to stimulate impulse purchases through the aroma of freshly baked goods or freshly brewed coffee (Cuesta et al., 2020). These cases show that the effectiveness of sensory neuromarketing depends not only on the type of stimulus used, but also on the socioeconomic and cultural context in which it is implemented.

Thus, in general, neuromarketing combines the principles of neuroscience with marketing practices to understand and exploit consumers' brain responses to advertising stimuli through the use of advanced brain imaging technologies and other physiological measurement techniques. Its main goal is to optimize marketing strategies by designing messages and advertising campaigns that effectively impact consumers' brains, thus influencing their purchasing behavior in a predictive and measurable way (Jiménez-Marín et al., 2019). Within this discipline, sensory neuromarketing focuses specifically on the way in which sensory stimuli, such as visual, auditory, olfactory, and tactile, affect brain activity:

The main function of sensitivity is to identify those elements presented to an organism in the environment. The sensory development that humans have achieved allows them to have an information process of the environment and to identify stimuli. In terms of identity applied in marketing, it is stated that humans have a sensitivity that allows them to distinguish several sensitive qualities between products and services. Humans have sufficient capacities to identify a brand through hearing and sight, but also through smell, among other senses. (Fornelli & Sánchez, 2016, p. 18)

This approach is based on the idea that the senses play a fundamental role in forming the perceptions and emotions that drive consumer decisions. Therefore, sensory neuromarketing examines how different stimuli can activate areas of the brain associated with positive emotional responses in order to create a stronger memory and emotional connection with the product or brand (Yactayo-Moreno & Vargas-Merino, 2021).

Thus, one of the goals of sensory neuromarketing is to determine which types of sensory stimuli in the advertising environment are most effective in producing emotional responses that translate into purchase decisions. Studies in this area have shown that certain colors, sounds, or even aromas can enhance the perception of a product and increase its attractiveness (Abdolmohamad et al., 2022). For example, the strategic use of warm colors is associated with feelings of comfort and attractiveness, while certain aromas can evoke pleasant memories and increase the predisposition to purchase (De Garcillá, 2015). It should be noted that sensory neuromarketing also focuses on the synergy between different sensory stimuli and how their combination can be used to strengthen the effectiveness of advertising campaigns. Therefore, understanding how and

why certain stimuli influence purchase decisions is extremely important for marketers to design multisensory experiences that capture consumers' attention and promote a deep and lasting emotional connection with the brand (Rodas-Areiza & Montoya-Restrepo, 2018). In this sense:

In order for a company to be successful in using sensory marketing, it is necessary that the strategy must be integrated. This means using everyday techniques that influence all the senses in some way to try to sell more. It is not enough to see or talk about the product; it must be experienced and associated with a certain lifestyle. Sensory integration is of paramount importance, since, otherwise, the effect on consumers can be counterproductive, and, therefore, will lead to confusion and, far from improving perception, it would bring negative results: an anti-marketing would result. Therefore, it is possible to first define the senses managed by sensory marketing, a preliminary step to propose a strategy in line with the brand image. Thus, olfactory, tactile, sound and gustatory marketing can be distinguished. (Jiménez-Marín et al., 2019, p. 124)

In this way, it is understood that today, when individuals are constantly bombarded by an incessant flow of information, sensory neuromarketing is presented as a potentially powerful tool to penetrate the barrier of insensitivity generated by this excess (Erenkol & Merve, 2015). By creating more meaningful interactions, this discipline seeks to evoke emotional responses in consumers that are directly linked to their brands (De Garcillá, 2015). However, the debate on the effectiveness of different types of sensory stimuli is extensive and full of complexities. Academics and marketers continue to explore which of the senses—sight, hearing, smell, taste, or touch—has the greatest impact on consumer behavior in different shopping contexts. This discussion becomes even more complex when considering differences across industries (Erenkol & Merve, 2015; Jiménez-Marín et al., 2019; Rodas-Areiza & Montoya-Restrepo, 2018).

In this regard, it is important to note that the selection of sensory stimuli varies significantly depending on the environment in which marketing campaigns are implemented, whether in a face-to-face context, such as in retail stores, or in a digital context, such as on e-commerce platforms. This variability is also observed in the specific industries in which sensory neuromarketing is applied. Sectors such as fashion, food or entertainment may use different approaches to sensory stimulation, depending on the particular characteristics and expectations of their target audience. Given this complexity and the need for a better understanding of how different sensory stimuli affect consumer behavior in different conditions and sectors, this study aims to analyze the application and effectiveness of sensory neuromarketing through a review of the existing literature. The purpose of this analysis is to provide a clear vision of how different sensory techniques can be optimized to improve marketing effectiveness in an increasingly competitive and stimulus-saturated world.

## 2. OBJECTIVES

In today's environment, marked by an increasing stimulus saturation and increasingly critical consumers, sensory neuromarketing is emerging as an innovative strategy to capture attention and guide purchase decisions. However, questions remain about which senses are prioritized and why, and how they are adapted to different contexts and industries. The research presented seeks to address these unknowns through a

systematic review of the literature, focusing on the interaction between sensory stimulation and consumer behavior. The question that guides this analysis is fundamental: How does the stimulation of the senses through neuromarketing influence consumers' decisions in different fields and commercial sectors? Based on this, the following research objectives are defined.

### **2.1. General objective**

- To analyze, through a systematic review of the current literature, the use of different senses in advertising campaigns and their effectiveness in influencing consumer behavior.

### **2.2. Specific objectives**

- 1) Identify the most frequently used senses in neuromarketing strategies.
- 2) Analyze the influence of context (face-to-face or digital) and industry on the choice of senses stimulated in marketing campaigns.
- 3) Explore the technical and psychological limitations associated with sensory stimulation in different commercial and advertising environments.
- 4) Evaluate the effectiveness of multisensory strategies compared to those that focus on a single sense.

## **3. METHODOLOGY**

The bibliographic review was chosen as the research design for the present work. As such, its scope is exploratory-descriptive because, on the one hand, it focuses on "studying a little-studied topic or research problem" or "novel phenomenon" (Hernández-Sampieri et al., 2014, p. 91) and, on the other hand, it "seeks to specify the properties, characteristics and profiles of people, groups, communities, processes, objects or any other phenomenon that is the subject of an analysis" (Hernández-Sampieri et al., 2014, p. 92).

The review carried out, then, is formed as a starting point for interventions or more in-depth research. It is, therefore, a work with a qualitative approach, since "it tries to capture the core of interest and the key elements of the reality studied, thus facilitating the understanding of meanings, development contexts and processes" (Tonon, 2011, p. 2). It was decided to conduct the literature review by adapting the PRISMA protocol (Page et al., 2021) due to the usefulness of its process in identifying, screening, eligibility, and inclusion of articles using previously established inclusion and exclusion criteria. As mentioned above, this review focuses on the analysis of the use of sensory neuromarketing, whose tools aim to capture the attention of consumers by stimulating their senses, thus generating emotional and cognitive responses that influence their perception and decision making.

According to the objective of the research, the object of study is the use of different senses in advertising campaigns and their effectiveness in influencing consumer behavior. Therefore, the search terms were limited to: consumer behavior—consumer behavior; sensory stimulation—sensory stimulation; multisensory strategies—multisensory strategies; sensory neuromarketing—sensory neuromarketing. These were linked in different ways with Boolean operators such as "OR", "AND" and "NOT" in open databases

(free and open access), such as Dialnet, Directory of Open Access Journals (DOAJ), Scielo and Google Academic, to finally proceed with the selection of articles to be analyzed.

For the search and selection process, it was necessary to delimit the inclusion criteria: year of publication (between 2015 and 2024), language (English and Spanish), type of document (articles from popular scientific journals) and type of study (reviews, experimental, applied interventions, case studies and controls). Those that did not meet these criteria were excluded (published before 2015; in a language other than Spanish or English; thesis, books, book chapters; opinion articles, intervention proposals without application). The final selection was based on the qualitative evaluation of the works, their content and their results. The process is shown in the following table (Table 1). The information is analyzed qualitatively and in depth in the discussion section.

**Table 1.** *Procedure for searching and selecting articles*

Phase		Articles
Identification	Articles identified after searching various databases	7910
	Articles identified after applying inclusion criteria	129
Screening	Abstracts excluded	70
	Abstracts screened	59
Eligibility	Full studies excluded	24
	Full studies for detailed assessment	35
Inclusion	Studies included after qualitative assessment	22

**Source:** Own elaboration (2022) from Page et al. (2021).

As shown in the table above, the search and selection process of articles for the sensory neuromarketing study initially identified 7,910 articles from various databases. After applying the inclusion criteria, the number was reduced to 129 articles. Of these, 59 abstracts were reviewed and 70 that did not meet the established criteria were eliminated. Subsequently, 35 studies were considered for detailed evaluation and 24 were excluded. Finally, 19 studies were included in the review after a qualitative assessment of their content and relevance to the topic under review. The discussion of this study is based on the analysis of these 22 selected studies, which provide the necessary empirical basis to address the objectives set.

#### 4. DISCUSSION

This section deals with the analysis of the selected papers, included in Table 2. It focuses on the evaluation of the different senses used in neuromarketing and their effectiveness depending on the context and industry. It also examines the influence of variables such as the digital or physical environment and the nature of the industry on the choice and effectiveness of sensory stimuli. The technical and psychological limitations that these strategies face in their practical application are also identified. Finally, a comparative evaluation of strategies that use multiple stimuli versus those that focus on a single sense is conducted to determine which approach is more effective in capturing and satisfying consumer expectations. In this way, the aim is to provide a holistic vision of the challenges

and opportunities presented by sensory neuromarketing within the field of contemporary marketing.

**Table 2.** *Various papers with their authors*

Author/Year	Study title	Type of research	Involved senses	Key results
<b>Abdolmohamad et al. (2022)</b>	The effect of multi-sensory marketing on consumer behavior	Experimental	Sight, hearing, smell	Multi-sensory strategies increase brand recall.
<b>Cuesta et al. (2020)</b>	Influence of olfactory and visual sensory stimuli in the perfume-purchase decision	Case Study	Smell, sight	The fragrance influences 75% of perfume purchase decisions.
<b>Jiménez-Marín et al. (2019)</b>	Sensory marketing: the concept, its techniques and its application at the point of sale	Review	Sight, hearing, touch	The use of tactile stimuli in stores improves the perception of product quality.
<b>Jang &amp; Lee (2019)</b>	Applying effective sensory marketing to sustainable coffee shop business management	Experimental	Smell, taste	The combination of fragrances and flavors increases customer loyalty in coffee shops.
<b>Rosenlacher &amp; Tichy (2020)</b>	The effect of sensory marketing from the perspective of neuromarketing	Review	Sight, hearing	In digital advertising, visual and auditory stimuli increase the conversion rates.

**Source:** Own elaboration (2024).

#### 4.1. The predominance of senses in sensory neuromarketing

Sensory neuromarketing is based on the stimulation of the five senses to influence consumers' purchasing decisions (Jiménez-Marín et al., 2019). However, various studies show that not all senses have the same relevance or generate the same impact on consumer behavior (Erenkol & Merve, 2015). The impact of sensory neuromarketing varies significantly depending on markets and cultures. In the United States, the entertainment industry has used sound and visual effects in advertisements to evoke intense emotions in viewers, as evidenced by the use of immersive soundscapes in movie theaters and streaming platforms (Rosenlacher & Tichy, 2020). In contrast, in emerging markets such as India and Brazil, where competition from local brands is high, companies have begun to experiment with taste and smell marketing strategies at fairs and gastronomic events to reinforce the identity of their products (Ortegón-Cortázar & Gómez, 2016). This approach suggests that sensory preferences can be shaped by factors



such as cultural exposure and familiarity with certain stimuli, highlighting the importance of adapting neuromarketing strategies to each specific context.

In this regard, Yugcha et al. (2020) state that:

Humans can remember 1% of what they touch, 2% of what they hear, 5% of what they see, 15% of what they taste, and 35% of what they smell; therefore, as the senses are activated, sensory effects stimulate memories that are associated with emotions and remain in the consumer's mind (p. 147).

However, sight and hearing stand out as the predominant senses in marketing strategies in both digital and physical environments (Nadanyiova et al., 2018). According to Fondevila-Gascón et al. (2023):

90% of the information our brains perceive is visual. For 80% of consumers, color is the primary attribute of brand recognition and for 85%, it triggers a purchase decision. It also responds to different moods. The interactive factor can also condition emotions, as proven by the Hybrid broadcast broadband TV (HbbTV) audiovisual standard. The external determinants (those that come from the stimulus) are intensity, volume, contrast, motion, novelty, and repetition. The internal (coming from the individual) are habits, social elements and motivations. [The acoustic sense is the second most used sense (2% of the sounds heard are remembered), and smell generates a memory of 35%. 75% of personal emotions are related to smells, hence their influence on the emotional state. The sense of taste is the least studied of all the sensory marketing senses, and its management has been applied mainly in the field of gastronomy. [...] Tactical marketing is experienced in consideration of that tact that favors the brand identity of companies (p. 135).

So, in general, the sense of sight is considered the most important in marketing campaigns (Jiménez-Marín et al., 2019; Ortegón-Cortázar & Gómez, 2016). Visual stimuli have the immediate ability to capture consumers' attention, either through the use of colors, shapes, or visual patterns in advertisements (Fondevila-Gascón et al., 2023). In digital environments, visual stimuli become even more relevant due to the predominantly visual nature of screen interaction (Yugcha et al., 2020).

The ear is the second most important sense in sensory neuromarketing strategies. Auditory experiences, such as background music in stores or sound effects in advertisements, have the ability to evoke emotions and enhance the consumer experience (Rupini & Nandagopal, 2015). The right music in a shopping environment can significantly increase the amount of time consumers spend in a store, increasing the likelihood of purchase (Rosenlacher & Tichy, 2020).

Although smell, taste, and touch do not have the same universality as sight or hearing, these senses are fundamental in a face-to-face shopping context and in specific industries such as food or retail. The use of scents in clothing stores or coffee shops creates an emotional connection to the brand and evokes memories that increase consumer loyalty (Cuesta et al., 2020; Fornelli & Sánchez, 2016; Jang & Lee, 2019).

## 4.2. Context and industry: key factors in sensory selection

The impact of sensory neuromarketing cannot be considered in isolation, because:

Marketing managers are using different techniques to enhance the consumer experience through their senses. That is, the practice of traditional visual merchandising is being cannibalized by seduction merchandising, in which more than one sense is used to enhance the consumer's feeling at the point of sale (Marín-Dueñas & Gómez-Carmona, 2022, p. 27).

It is also necessary to take into account that its effectiveness varies significantly depending on the context in which it is applied and the industry to which it is directed (Yugcha et al., 2020). Throughout the literature review, it has been observed that both the shopping environment (physical or digital) and the nature of the sector decisively influence the choice of sensory stimuli used in marketing campaigns (Cristófol et al., 2024; Marín-Dueñas & Gómez-Carmona, 2021).

In physical retail spaces, the ability to interact with multiple senses provides a significant advantage for brands (Yugcha et al., 2020). In this context, multisensory strategies are more effective as they allow the activation of sight, hearing, smell, touch and, in certain areas, taste (Abdolmohamad et al., 2022). Retail stores and department stores typically use specific scents to create an atmosphere that enhances the customer experience. In addition, the visual arrangement of products and ambient music play a key role in guiding the consumer toward a favorable purchase decision (Cuesta et al., 2020).

In contrast, in digital environments, the sensory experience is mainly limited to sight and hearing. In fact, Yugcha et al. (2020) point out that "applying sensory marketing to an online purchase has its limitations because the five senses cannot be activated, but the interface can be customized to make it more attractive to users" (p. 147). Thus, brands must adapt to these limitations by designing attractive visual experiences and incorporating sound effects that hold the user's attention (Aljumaha et al., 2022). Despite these limitations, recent studies suggest that the intelligent use of visual stimuli, such as color and graphic composition, can compensate for the lack of olfactory or tactile stimuli and still have a significant impact on consumer perception (Fondevila-Gascón et al., 2023; Yugcha et al., 2020).

In addition, the industry in which sensory neuromarketing is implemented is also a determining factor in the selection of the senses that are stimulated. In sectors such as fashion and entertainment, visual stimuli predominate, since consumers value aesthetic characteristics and brand image (Cristófol et al., 2024; Marín-Dueñas & Gómez-Carmona, 2021; Marín-Dueñas & Gómez-Carmona, 2022). On the other hand, in the food or perfumery industry, taste and smell acquire greater relevance due to their direct influence on the perception of products and the purchase decision (Cuesta et al., 2020; Fornelli & Sánchez, 2016; Jang & Lee, 2019; Roopchund et al., 2016). In this sense, sensory adaptation to the expectations of the target audience becomes a key aspect for the success of marketing strategies (Aljumaha et al., 2022).

In this way, the effectiveness of sensory neuromarketing is closely linked to the context of use and the characteristics of the industry. Understanding these variations allows marketers to develop more personalized and effective strategies that maximize the sensory impact on consumer behavior.



### **4.3. Technical and psychological barriers in sensory stimulation**

Despite the benefits and potential of sensory neuromarketing, its implementation faces a number of technical and psychological barriers that limit its effectiveness in certain circumstances due to the inherent complexity of human behavior and the difficulties of current technologies to accurately measure and activate the senses in marketing contexts (Fahrur & Wijayanti, 2018).

One of the main technical challenges is the difficulty of integrating multiple sensory stimuli in controlled environments. The synergy between different senses can be complicated to manage due to the limitations of available technology, especially in digital environments where it is not possible to effectively stimulate all senses, which in turn reduces the ability to create a truly multisensory experience (Abdolmohamad et al., 2022).

Another technical barrier relates to the accuracy of measuring sensory responses. Although technologies such as electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) make it possible to monitor brain activity, these tools are not yet accurate enough to exactly predict consumer responses to certain stimuli. Interpreting the data is also complex because the response to a stimulus can be influenced by external factors that are difficult to isolate in a controlled experiment (Kumar & Kumar, 2020; Wala et al., 2019).

In the field of psychology, one of the most important barriers is sensory habituation, a phenomenon that refers to the decrease in an individual's response to a sensory stimulus after repeated exposure (Moreira et al., 2017). In the case of sensory marketing, if a consumer is constantly exposed to the same stimuli (e.g., a specific fragrance in a store), the emotional response is likely to decrease over time, negatively affecting the effectiveness of the strategy (Géci et al., 2017). In addition, individual differences in sensory perception pose a challenge. Not all consumers respond to the same stimuli in the same way (Rosenlacher & Tichy, 2020). Factors such as age, gender, culture, and prior experiences influence how sensory stimuli are perceived and therefore how they affect consumer behavior. This makes it difficult to develop universal sensory strategies that are effective all segments of the population (Kumar & Kumar, 2020).

Another aspect that acts as a psychological barrier is the perception of sensory neuromarketing as a manipulative tool. Some consumers may feel uncomfortable or distrust brands that use these techniques, perceiving them as an invasion of their personal space or as an attempt to influence their decisions in an unconscious way (De Garcillá, 2015). This perception can lead to a resistance towards the brand and, ultimately, a rejection of advertising campaigns that use sensory stimuli.

### **4.4. Multisensory strategies vs. monosensory strategies**

In the field of sensory neuromarketing, there is a debate about the comparative effectiveness of multisensory strategies versus those that focus on a single sense. While the former seek to activate multiple senses simultaneously to create a richer and more memorable experience, the latter focus on optimizing the stimulation of a single sense to create a direct and clear connection with the consumer. Both approaches have their advantages and challenges, which largely depend on the context and specific objectives of the campaign (Abdolmohamad et al., 2022).

Multisensory strategies are based on the premise that the more senses that are activated, the more immersive and effective the marketing experience will be (Rosenlacher & Tichy, 2020). By combining visual, auditory, olfactory, and/or tactile stimuli, the goal is to generate a stronger emotional response and retention in the consumer's memory. Several studies have shown that the synergy between multiple senses not only increases the positive perception of a brand or product but also strengthens consumer loyalty by creating an experience that is perceived as unique and personalized (Cuesta et al., 2020).

However, one of the challenges of multisensory strategies is the complexity of their implementation. Activating multiple senses in a coordinated way requires careful planning and considerable resources, both technological and logistical. Moreover, it is not always possible to apply a multisensory strategy in all contexts, especially in digital environments where technological limitations prevent the stimulation of senses such as smell, taste, and texture (Rupini & Nandagopal, 2015).

On the other hand, monosensory strategies focus on optimizing a single sense, usually vision or hearing, depending on the context. They are usually easier to implement and are particularly effective in environments where the activation of other senses is limited or unnecessary. Although they may seem less impactful than multisensory, their unidirectional approach is highly effective if properly designed (Yactayo-Moreno & Vargas-Merino, 2021). In the radio industry, your campaign focuses exclusively on auditory stimuli, and with a memorable soundtrack or the use of sound effects, it can be equally powerful in creating an emotional connection with the consumer. In the same way, it happens with advertising posters, whose colors, photographs, and lighting can create such a connection (Abdolmohamad et al., 2022; Fondevila-Gascón et al., 2023). However, the risk of monosensory strategies is the possible saturation or habituation of the consumer to a single stimulus (Fornelli & Sánchez 2016). If a campaign is based solely on visual stimuli, the consumer may quickly lose interest or fail to associate the stimulus with the brand in a meaningful way, reducing effectiveness in the long run. In this sense:

Sensory differentiation should be based on the component of innovation and the search for the uniqueness of the sensory stimulation so that it can be recognized by the consumer, either through a single sensory sense or through the integration of many. In fact, sensory differentiation is easier than traditional functional or utilitarian differentiation in marketing, because the attributes of the latter tend to be the same or very similar among competitors, requiring more effort on the part of the company. Therefore, the search for uniqueness involves systematic and creative work to identify and exploit specific sensory attributes not used by the competition, which that optimize the experience. Sensory favorability is defined as the search, identification and typing of positive and pleasant sensory attributes from the consumer's point of view. This phenomenon, due to the fact that the number of products offered has increased, has made it more difficult to decide which product to purchase, so permanent consumer research should be a strategic and mandatory aspect of companies to transform the information studied into competitive advantages that complement the value proposition. (Ortegón-Cortázar & Gómez-Rodríguez, 2016, p. 76)

In this line, it is recognized that multisensory strategies tend to be more effective in creating immersive and memorable experiences, especially in physical environments where multiple senses can be activated simultaneously. However, they require a greater

investment of resources and careful coordination to ensure that sensory stimuli complement each other. On the other hand, monosensory strategies, although simpler to implement, are effective in environments where the activation of multiple senses is not possible or necessary. Their success depends largely on the quality and design of the sensory stimulus used, as well as the brand's ability to hold the consumer's attention through a single sensory channel. Both have their place in sensory marketing, and the choice of which to use depends on the context, the resources available, and the specific objectives of the campaign. An appropriate combination of both can maximize the impact on consumer behavior and adapt to the needs and expectations of the market.

## 5. CONCLUSIONS

The present study has made it possible to analyze the influence of sensory neuromarketing on consumer behavior, to address the different senses that are activated in marketing campaigns, and to evaluate their effectiveness depending on the context and industry. By reviewing the existing literature, the objectives were achieved and a clear vision of the opportunities and challenges of this strategy was obtained. First, it was found that the senses most used in neuromarketing strategies are sight and hearing, due to their ability to capture the consumer's attention immediately. However, the integration of other senses such as smell, taste and touch has proven to be key in specific sectors such as retail or food, where these stimuli can create a deeper emotional connection with the brand.

Second, it has been shown that the effectiveness of sensory neuromarketing depends significantly on the context (physical or digital) and the industry in which it is applied. While multisensory strategies are more effective in physical environments, in digital environments sensory stimulation is mainly limited to sight and hearing. This difference forces marketers to adapt their sensory strategies to the channel being used to maximize their impact. Technical and psychological barriers that limit the implementation of sensory neuromarketing have also been identified. Technological limitations in accurately measuring sensory responses and possible consumer habituation to repeated stimuli are challenges that must be addressed to improve the effectiveness of these strategies. In addition, the perception of neuromarketing as a manipulative tool can create resistance in some consumers and negatively affect the relationship with the brand.

Finally, the comparative effectiveness of multisensory and monosensory strategies was evaluated. The former tends to be more effective in creating immersive and memorable experiences; however, the latter can be equally important if the chosen sense is properly optimized, as evidenced in certain sectors such as visual or auditory advertising.

### Practical recommendations

Based on the findings of this research, the following strategies are suggested to optimize the impact of sensory neuromarketing on consumer behavior: Adapt multisensory strategies to the digital environment since sensory neuromarketing is more effective in physical environments, the use of emerging technologies such as virtual reality and artificial intelligence to simulate sensory experiences on digital platforms is recommended. Tools such as 3D product testing or the incorporation of immersive sound can enhance consumer perception in online spaces. To prevent consumers from becoming accustomed to certain sensory stimuli and reduce their impact, brands should regularly vary the sensory elements used in their campaigns. Alternating colors, modifying scents,

and changing sound patterns can keep consumers interested and prolong the effectiveness of strategies. Personalize the sensory experience according to the target audience. Different audiences respond differently to sensory stimuli. It is recommended to conduct prior research to determine which senses predominate in each market segment, and then tailor strategies accordingly. For example, in the fashion industry, visual stimuli may be more relevant, while in the gastronomic industry, olfactory and taste marketing may be decisive. Incorporate measurement and data analysis in sensory campaigns. It is essential that companies implement analysis tools to measure the effectiveness of their sensory strategies. Technologies such as neuroscience applied to marketing, artificial intelligence and big data analysis can provide valuable information on how consumers respond to different sensory stimuli, allowing future campaigns to be optimized.

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