A Systematic Literature Review on Neuromarketing in Branding, Advertising and Consumer Behavior

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Abstract:- The concept of neuromarketing, utilizing neuroscience techniques to understand consumer behavior and preferences, is discussed extensively, including its advantages and disadvantages. The potential applications of neuromarketing in advertising, branding, consumer behavior, and user experience are explored, showcasing its ability to revolutionize how brands engage with customers. The article also underscores the importance of conducting systematic literature reviews to deepen understanding, identify research gaps, and address ethical considerations and limitations associated with neuromarketing. The time frame of the systematic literature review was for 18 years of publications from 2004 to 2022. We were able to examine deeply the possibilities of the future potential neuromarketing and the positive attitudes through consumer psychology and behaviour perspective as marketers will have a better understanding of consumer behaviour, attention and emotions. While the ethical difficulties and limitations should be covered in detail and discussed.

Keywords:- *Neuromarketing, Consumer Behaviour, user Experience, Real Eye, Eye Tracking, Advertising, Branding, SLR.*

I. INTRODUCTION

The brand strength approach to brand equity is based on the idea that brand equity is not something that can be easily measured. It requires looking into the reasons why a brand is popular with consumers and the actions that the company has taken to build up this strength. Keller (1993) mentioned that it also takes the consumer-based brand strength approach to brand equity, which means that brands need to be tested based on how well they meet certain needs of the target audience. These needs are important because they represent the value proposition of a given product or service. Brands need to have a strong value proposition if they want their brands to be popular with consumers and have high equity scores. The modern consumer is bombarded with brands, advertising and messaging, all vying for their attention. From the moment we wake up in the morning to the time we go to bed, we are exposed to an array of messages, promotions and products. It is easy to become overwhelmed and confused by the sheer volume of information that is available. However, understanding how brands, advertising and consumer behaviour interact can provide invaluable insights into how to effectively market to consumers. By understanding the psychology behind consumer decisions, marketers can gain a competitive edge and create a successful marketing strategy and understanding the interplay between brands, advertising and consumer behaviour is key to unlocking the secrets of successful marketing. Modern life is filled with advertising daily. Billboards, television advertising, and of course the internet all promote it. One of the most effective marketing tactics available has been recognized as it. The goal of advertising is to connect with potential customers, foster connections, raise awareness, and eventually boost revenue by promoting a business's goods and services or building consumer recognition for the company's brand. Richard W. Mizerski & Dennis White (1986) assumed that consumer emotions have a substantial impact on purchase and consumption decisions for a wide variety of items. and they mentioned an example in the candy and snack business, where consumer responses are a result of a significant number of emotionally charged circumstances that can be used in advertising strategy.They concluded that consumers may be taught to buy a brand while they are in emotional states they want to change or extend through the use of emotions. The concept of direct and indirect instigation of certain emotional states, as well as the use of emotions in a reinforcement paradigm, opens up several new prospects for advertisers. From the products we buy to the places we go, we often make decisions based on the brands we associate with. Advertising is the primary way that brands communicate with consumers, and it has a major impact on consumer behaviour. Through advertising, brands create an image that influences our purchasing decisions, and this can create lasting loyalty to a brand. Advertising also helps to inform consumers about the benefits of a product or service and can be used to promote new products or services. By understanding how brands, advertising and consumer behaviour are connected, businesses can create more effective strategies to attract and retain customers. In today's digital world, technology is revolutionizing the way businesses advertise. From using social media platforms to reach a large, worldwide audience, to using artificial intelligence to understand consumer preferences, technology is transforming the way businesses convey their messages. From facial recognition software to analytics-driven targeting, technology is allowing businesses to reach potential customers more effectively and efficiently. By embracing technology in their advertising strategies, businesses can gain a competitive edge in the marketplace and build a more successful presence. There is no doubt that technology is

changing the way companies advertise, and businesses need to stay up to date with the latest developments to ensure success. In recent years, neuromarketing has been gaining popularity and changing the way businesses advertise their products and services. Neuromarketing is the practice of using neuroscience and psychology to understand consumer behaviour and create more effective marketing strategies. It combines elements of psychology, sociology, and data science to uncover insights about consumer behaviour that traditional marketing research can't. As Neuromarketing research tools most used within the eye-tracking tests through Realeye 11,0 and gaze-recorder webcam-based software have recently been used to determine what visual elements or designs are the most effective. They also help marketers understand where people look when viewing an image or advertisement. - Eye tracking can be conducted through software that is integrated into websites or advertisements. Alternatively, it can be conducted in person with specialized equipment. Secondly, brain activity analysis helps determine how effective a marketing campaign is. It can also indicate the areas of an advertisement that are most effective as the Brain activity can only be measured in person. It requires specialized equipment that can detect electrical impulses in the brain. Thirdly, the automated facial coding tests measure the degree to which emotions are evoked by a marketing campaign. It can also indicate how effective the campaign is at engaging audiences and it is conducted through software that can be integrated into websites. Finally, The Voice response tests measure how likely people are to purchase a product or service. It also indicates how likely people are to recommend that product or service to others as can be conducted through software that is integrated into websites. It can also be conducted in person with specialized equipment.

II. LITERATURE REVIEW

Neuromarketing has become a significant component of branding and advertising. It is a cutting-edge technique that has been created to learn more about consumer behavior and responses to marketing campaigns and initiatives. This comprehensive study of the research will offer an understanding of how neuromarketing is being used in branding and advertising. It will examine current studies, examine trends and techniques now in use, and give a thorough understanding of the industry. Additionally, a comprehensive examination of the effects and potential of neuromarketing in branding and advertising will be provided. The analysis of the research will assist in understanding how neuromarketing may be used to offer insights into consumer behavior and preferences as well as techniques for enhancing the efficiency of marketing efforts. Finally, this SLR will serve as a priceless tool for comprehending the state of neuromarketing today and its possible applications in branding and advertising.

➤ *Overview on Neuromarketing and it's Definitions*
Babiloni (2012) defined the most commonly used definition of consumer neuroscience, also known as neuromarketing, is that it is a field of study that applies neuroscience approaches to assess and understand how people interact concerning marketing and advertising. Kenning and Linzmajer (2012) described neuromarketing as a subfield of consumer neuroscience that developed out of interest in neuroeconomics' cutting-edge methods. Consumer neuroscience examines problems with consumption and marketing by utilizing methods and research from neuroscience. Consumer neuroscience is a brand-new multidisciplinary field that combines psychology, neurology, and economics to study how advertising and marketing strategies affect the brain physiologically. Khushaba et al. (2014) have undertaken research that has demonstrated that it is possible to predict customer behavior by determining the most frequent decision-making stages that customers will utilize in a specific situation.

➤ *Overview of Neuroscientific Tools and the Neuromarketing Research Tools*
Kenning et al., 2007a; Boz et al., 2017; Stasi et al., 2018) In their studies, they have hypothesized that the various metrics employed by consumer neuroscience tools can be broadly categorized into two groups: neurophysiological tools and physiological tools. The electrocardiogram (ECG), electrodermal activity (EDA), the facial muscles' fEMG, eye-trackers (ET), and voice pitch analysis are a few physiological tools or techniques that can measure both voluntary and involuntary reflexes. These reflexes consist of focusing on and following visual cues or movements of the mimetic facial muscles (facial expressions). Brain activity is measured and recorded using neurophysiological equipment (or procedures) to investigate consumer behavior. Electroencephalography (EEG), positron emissiontomography (PET), magneto encephalography (MEG), functional magnetic resonance imaging (fMRI), and transcranial magnetic stimulation are examples of neurophysiological instruments(TMS). Typically, these tools are categorized based on the metrics they use. Common metrics include eye tracking, facial coding, brain activity, voice recognition, and physiological responses. Each sort of evaluation can provide illuminating details about how individuals react to various stimuli in terms of their ideas, feelings, and deeds. Brain activity can reveal how much a person remembers about a product or service. Eye tracking, for example, can reveal which sections of an advertisement or website receive the greatest attention through examining the eye gazes, fixations and facial coding analysis.

➤ *Overview of the Neuromarketing Role in Advertising and Consumer Behavior*
In their research paper, Nazarova, R., and Lazizovich, T. K., (2019) they have classified neuromarketing as a strategy for influencing consumer behaviour in the contemporary world where neuromarketing is applied in domains like marketing as the first requirement for developing a strong brand is for the business to communicate closely with consumers on all levels of consumer perception. The feelings and emotions that customers experience when interacting with a company's brand or product can be identified thanks to neuromarketing

techniques. Second, product innovation and design. Neuromarketing has tools at its disposal that allow it to gauge how customers respond to new product developments (for example, an updated design). Such reactions can be characterized as emotionally charged, instinctively occurring, and defying the marketer's logical forecasts. The effectiveness of advertising was the third usage as people are frequently unaware of their reactionsince advertising has an impact on their subconscious. The ability to observe how this occurs by using neuromarketing. Fourth, the effect on the choice to buy for example when a person purchases the influence of various aspects (for example, the ambience in a store), and frequently it cannot be explained logically. Neuromarketing investigates exactly what influences a consumer's purchasing choice. The Fifth usage was online commerce within the ability to successfully establish, manage, and grow an online business while gently influencing users' online behavior is made possible through neuromarketing. Lastly, when it comes to entertaining Interests, attitudes, and preferences of modern consumers are primarily influenced by their interactions with current types of entertainment. Neuromarketing examines into the specific effectsthese factors have on our behavior.

III. RESEARCH METHODOLOGY

Xiao Y and Watson M (2019) argued that a systematic literature review should be conducted in a category descriptive manner. This implies that a narrative review, textual narrative synthesis, meta-summary, metanarrative, and scope review are some of the different ways data can be selected, analyzed, and integrated into the review. Furthermore, a scoping review should be conducted to provide a comprehensive summary of what has been done, including the methodology, findings, variables, possibilities, and limitations of the research. Despite the lack of emphasis on the quality of the research, scoping reviews must remain thorough. The relevant articles containing Neuromarketing or advertising studies were then identified and sorted into categories such as Neuromarketing, consumer behaviour, branding, and advertising communication.
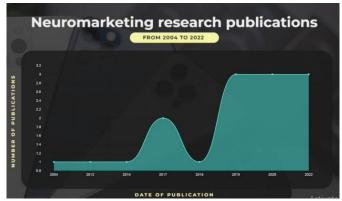
➤ *The Process: Planning, Scope, Searching and Assessing*
The purpose of this Systematic Literature Review (SLR) is to identify a comprehensive view of potential avenues for future research in the fields of neuromarketing, branding, consumer behaviour and advertising, to fill existing research gaps. An SLR is conducted utilizing four steps and Google Scholar, due to its broad selection of publications, was used for the SLR with a search range of 18 years, from 2004 to 2022. Following the initial brainstorming and literature search, the scope of the research was shaped to gain answerable research questions for the Systematic Literature Review (SLR) on Neuromarketing, Advertising, Branding and Consumer Behaviour. The four research questions that were developed from this process were: Q1: What academic research papers and case studies have been conducted in the area of neuromarketing, branding, advertising and consumer behavior?; Q2: What methodologies have been used to utilize the covered academic research in the SLR?; Q3:

What neuroscientific tools have been used to research neuromarketing through branding, consumer emotions and behavior?; and Q4: What research gaps have been found in neuromarketing, advertising, branding and consumer behavior? These research questions aimed to provide an understanding of the neuromarketing, consumer behaviour and Advertising landscape. The search process entailed perusing the databases with the keywords of neuromarketing and Advertising, neuromarketing, Branding, and Consumer Behavior. The ideas were chosen depending on the research questions and context outlined in the previous section. The search was conducted in Late November 2022, and the amount of time devoted to the search was dependent on the researcher's availability until an exhaustive search was achieved. The search revealed a total of 11,400 documents in Google Scholar. The assessment phase aims to evaluate and decrease the number of papers applicable to the subject analysis. Criteria have been set for inclusion and exclusion; these include the title, journals and abstracts being evaluated for meeting the following conditions: having the primary study relate to neuromarketing in advertising communication and consumer behaviour, having the research concern neuromarketing in branding and consumer behaviour, and the context study being in regards to consumer behaviours, decision-making and perception. After conducting a deep screening, 38 articles were initially identified as relevant documents. However, upon applying the exclusion criteria of only peer-reviewed journals or proceedings written in English and published after 2004, plus accounting for redundancy and re-putative articles, the number of articles was reduced to 15.

IV. DATA ANALYSIS AND RESULTS

➤ *Related Articles in Neuromarketing, Branding, Advertising and Consumer Behavior and Decision-Making*
Through the creation of a line graph demonstrating a systematic literature review for 15 articles in the time frame between 2004 and 2022, it is evident that the research into understanding, analyzing and examining the role of neuromarketing in advertising, branding and consumer behaviour has been ascending, with a noticeable peak occurring between 2019 and 2022. This is evident through the positive slope of the graph, implying a positive correlation between the variables.

Graph 1 A Scale of Neuromarkting Publications in Last 18 years

By drawing a table to represent our SLR articles identifying the author and article title, topic area and date of publication to show the collected data for answering RQ1 and showing the study's trend. There were 3 main topic areas in the context of advertising and branding that contribute to consumer behaviour & emotions, consumer preference and consumer decision-making through studied previous research between 2004 to 2022. We found that almost 46.6% of the articles were examining consumer behaviour and emotions in advertising, 40% were on consumer decision-making as a topic area and 13.3% of the studies were conducted on consumer preference.

Table 1 Represent our SLR Articles

No	Author and Article title	Year	Topic Area
1)	McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M., & Montague, P. R. - Neural correlates of behavioral preference for culturally familiar drinks	2004	Consumer preference and Decision-Making
2)	Suomala, J., Palokangas, L., Leminen, S., Westerlund, M., Heinonen, J., & Numminen, J. - Neuromarketing: Understanding customers' subconscious responses to marketing.	2012	Consumer Behavior
3)	Balconi, M., Stumpo, B., & Leanza, F. - Advertising, brand and neuromarketing or how consumer brain works.	2014	Consumer Decision-Making
4)	Nyoni, T., & Bonga, W. G.-. Neuromarketing Methodologies: More Brain Scans or Brain Scams?	2017	Consumer Decision-Making
5)	Baraybar-Fernández, A., Baños-González, M., Barquero-Pérez, Ó., Goya-Esteban, R., & De-la-Morena-Gómez, A. - Evaluation of emotional responses to television advertising through neuromarketing.	2017	Consumer behavior and emotions in advertising
6)	Cuesta, U., Martínez-Martínez, L., & Niño, J. I. A case study in neuromarketing: Analysis of the influence of music on advertising effectivenes through eye-tracking, facial emotion and GSR.	2018	Consumer behavior and emotions in Advertising
7)	Shaari, N. A. S., Syafiq, M. M. J., Amin, M. K. M., & Mikami, O. -Electroencephalography (EEG) application in neuromarketing-exploring the subconscious mind.	2019	Consumer behavior and decision-making
8)	Oliveira, J. H. C. D., & Giraldi, J. D. M. E. - Neuromarketing and its implications for operations management: an experiment with two brands of beer.	2019	Consumer Behavior
9)	Golnar-Nik, P., Farashi, S., & Safari, M. S. - The application of EEG power for the prediction and interpretation of consumer decision-making: A neuromarketing study.	2019	Consumer Decision-Making
10)	Gill, R., & Singh, J. - A study of neuromarketing techniques for proposing cost effective information driven framework for decision making.	2020	Consumer Behavior and Decision-Making
11)	Baños-González, M., Baraybar-Fernández, A., & Rajas-Fernández, M. - The application of neuromarketing techniques in the spanish advertising industry: Weaknesses and opportunities for development.	2020	Consumer Behavior
12)	Singh, J., Goyal, G., & Gill, R. -. Use of neurometrics to choose optimal advertisement method for omnichannel business.	2020	Customer Preference, Consumer decision-making
13)	Naim, A. - Neuro-Marketing Techniques for Proposing Information Driven Framework for Decision Making.	2022	Consumer Decision-Making
14)	Ahmed, R. R., Streimikiene, D., Channar, Z. A., Soomro, H. A., Streimikis, J., & Kyriakopoulos, G. L. - The Neuromarketing Concept in Artificial Neural Networks: A Case of Forecasting and Simulation from the Advertising Industry.	2022	Predicted consumer buying behavior
15)	Martinez-Levy, A. C., Rossi, D., Cartocci, G., Mancini, M., Di Flumeri, G., Trettel, A., ... & Cherubino, P. Message framing, non-conscious perception and effectiveness in non-profit advertising. Contribution by neuromarketing research.	2022	Consumer emotions through advertising and predict a communication's performance

➤ *Methodologies has been used in Neuromarketing through Advertising, Branding and Consumer.*

Through the collected data of quantitative and qualitative methods of research. We found that most of the articles were quantitative with a percentage of 73.3% through conducting experiments and case studies by using neuroscientific tools like eye-tracking, facial code expressions, electroencephalography and functional magnetic resonance imaging on a specific number of participants to examine their impact on the consumer behaviour, emotions, preference and decision-making. While, on the other hand, almost 26.667% of the chosen articles were qualitative research through interviews and literature reviews for providing a better understanding of the adoption of neuroscientific tools in advertising, branding and marketing with some early limitations such as the lack and huge expenses of the techniques.

Table 2 Represent our SLR Articles

No	Author and Article title	Year	Methodologies
1)	McClure, S. M., Li, J., Tomlin, D., Cypert, K. S., Montague, L. M., & Montague, P. R. - Neural correlatesof behavioral preference for culturally familiar drinks	2004	Quantitative
2)	Suomala, J., Palokangas, L., Leminen, S., Westerlund, M., Heinonen, J., & Numminen, J. - Neuromarketing: Understanding customers' subconscious responsesto marketing.	2012	Quantitative
3)	Balconi, M., Stumpo, B., & Leanza, F. - Advertising, brandand neuromarketing or how consumer brain works.	2014	Quantitative
4)	Nyoni, T., & Bonga, W. G.-. Neuromarketing Methodologies: More Brain Scans or Brain Scams?	2017	Qualitative
5)	Baraybar-Fernández, A.,Baños-González, M., Barquero-Pérez, Ó., Goya-Esteban,R., & De-la-Morena-Gómez, A. - Evaluation of emotional responses to television advertising through neuromarketing.	2017	Quantitative
6)	Cuesta, U., Martínez-Martínez, L.,& Niño, J. I. A case study in neuromarketing: Analysis of the influence of music on advertising effectivenes through eye-tracking,facial emotion and GSR.	2018	Quantitative
7)	Shaari, N. A. S., Syafiq, M. M. J., Amin, M. K. M., & Mikami, O. -Electroencephalography (EEG) application in neuromarketing-exploring thesubconscious mind.	2019	Quantitative
8)	Oliveira, J. H. C. D., & Giraldi, J. D. M. E. - Neuromarketing and itsimplications for operations management: an experiment with two brands of beer.	2019	Quantitative
9)	Golnar-Nik, P., Farashi, S., & Safari, M. S. - The application of EEG power for the prediction andinterpretation of consumer decision-making: A neuromarketing study.	2019	Quantitative
10)	Gill, R., & Singh, J. - A study of neuromarketing techniques for proposing cost effective information driven framework fordecision making.	2020	Qualitative
11)	Baños-González, M., Baraybar-Fernández, A., & Rajas-Fernández, M. - The application of neuromarketingtechniques in the spanish advertising industry: Weaknesses and opportunities for development.	2020	Qualitative
12)	Singh, J., Goyal, G., & Gill, R. -. Use of neurometrics to choose optimal advertisement method foromnichannel business.	2020	Quantitative
13)	Naim, A. - Neuro-Marketing Techniques for Proposing Information Driven Framework for Decision Making.	2022	Qualitative
14)	Ahmed, R. R., Streimikiene, D.,Channar, Z. A., Soomro, H. A., Streimikis, J., & Kyriakopoulos, G. L. - The Neuromarketing Concept in Artificial Neural Networks: A Case of Forecasting and Simulationfrom the Advertising Industry.	2022	Quantitative
15)	Martinez-Levy, A. C., Rossi, D., Cartocci, G., Mancini, M., Di Flumeri, G., Trettel, A., ... & Cherubino, P. Message framing, non-conscious perception and effectiveness in non-profit advertising. Contribution by neuromarketing research.	2022	Quantitative

> *Variables in Neuromarketing, Branding, Advertising and Consumer behaviorSelected Researches.*

• *Consumer Choice and Preference*

Michela Balconi, Frederic L., et al. (2014) explored the usage of EGG as a neuroscientific tool to provide consumer responses to explicit consumer preferences and its impact on the evaluation of consumer goods within a case study of selected 15 women of age 20 to 40 years old at university of Milan through watching 5 different commercial advertisements on a screen positioned 100 cm distance from their eyes and they were required to scale each advertisement on a rate from 1 to 6. Repeated measures ANOVA for analysing different measurements of the same attribute through a group of related dependent variables coherently with the EEG measurements and the frontal brain log-transformed asymmetry. They assumed that the results were positive when the consumer was exposed to engagement through rewarding advertisements which showed how the consumer brain works and

specifically EEG classified it as a great technique to explore valid consumer preferences in the case of consumer decision-making. Singh, J., Goyal, G., & Gill, R. (2020) conducted a study to evaluate omnichannel advertisement channels within a high-precision camera and the usage of a neuroscientific tool which was the galvanic skin response sensors through 40 participants watching a set of cosmetic advertisements to measure its effectiveness in recorded neuro-metric data and also through making a questionnaire for a sample of randomly 415 participants of age over or equal to 25 years old on 3 advertisements for dove, ponds and Detol to answer what was the major domain for the product in the advertisements and it was found that 34.5% did. While the GSR sensor was used to validate through the precision calculated when the facial analyzer works and based on their results, they have concluded that the values of GSR recorded through the product's social media pages have more variety of facial expressions than the advertisements but, they have also assumed the positive trend line of neuromarketing and the flexibility in measuring

the consumer emotive response and preference which helps also in the evaluation of the products, design and packaging.

- *Consumer Behavior and Emotions*

Suomala, J., Palokangas, L., Leminen, S., Westerlund, M., Heinonen, J., & Numminen, J. (2012) used EEG and fMRI which were able to measure and record the electrical activity of the brain the blood flow and oxygen levels inside the brain where they have classified it as the best neuroscientific tools to be used in neuromarketing. Their research results through the five phases of the consultative selling process with a virtual customer journey illustrate the usability of neuroimaging at each step of customer engagement for the investigation of consumer behaviour and perception and the neuroimaging reveals brain activity, which can assist marketers in identifying and reducing unfavourable sensations in customers, including anxiety, uncertainty, danger, and risk, to increase customers' propensity to purchase. The advantage of neuroimaging is that it can accurately predict how customers will respond to marketing stimuli even with a limited sample size of test subjects. While the limitation of the research was the chosen brand (Nokia) which already has a strong value in Finland and the small groups of participants. Oliveira, J. H. C. D., & Giraldi, J. D. M. E. (2019) conducted an experiment between two different alcoholic beverages brands to measure visual attention within eye-tracking technique through advertisements which tried also to classify consumer loyalty and behaviour towards brand's equity to one brand over the others where it can improve weak brand or develop new ideas and marketing campaigns for a strong brand through better consumer experiences. While the limitations of the attention control mechanisms using the neuroscientific tool were not well answered, especially within the operation management and the visual attention of a strong brand on consumers has better value within associative effects.

Ahmed, R. R., Streimikiene, D., Channar, Z. A., Soomro, H. A., Streimikis, J., & Kyriakopoulos, G. L. (2022) examined 585 participants through a single advertisement for the predictive consumer behaviour using a neuroscientific tool which was fMRI but programmed and transformed through artificial intelligence and it's a neural network which it was cost-effective and unique. While stating that human behaviour is very complex within different stimuli and external factors far from the advertisement or brand effect. They assumed that the neural network has coincided with the human brain so it can also

be a very flexible technique for predicting consumer behaviour through advertising of specific brands.

- *Consumer Decision-Making*

Golnar-Nik, P., Farashi, S., & Safari, M. S. (2019) used EEG as a neuroscientific tool through different mobile phone brand advertisements to predict consumer preference and decision-making behaviour in shopping. Their results showed that 87% of high accuracy of the EEG sensors in predicting consumer decision-making behaviour and within the accuracy of 63% in distinguishing the preferences of like and dislike. They stated that more neuroscientific tools should be used once for more accurate results. Cuesta, U., Martínez-Martínez, L., & Niño, J. I. (2018) conducted an experiment using three different neuroscientific tools as galvanic skin response, facial code expression and eye-tracking by examining 19 women within watching a perfume brand advertisement. While 10 watched the advertisement silently with no music and the other 9 watched the other version with music. The results showed there that consumer emotion, joy and engagement were higher in the advertisement with music while there were not too many differences in consumer attention in both types of advertisements. They assumed the positive trend line of the usage of neuroscientific tools in the detection of consumer decision-making, emotions and even brand perception. Martinez-Levy, A. C., Rossi, D., Cartocci, G., Mancini, M., Di Flumeri, G., Trettel, A., ... & Cherubino, P. (2022) measured consumer emotions through non-profit organizations advertisements like Unicef which most of their advertisements would be for donations and awareness to the public sphere using eye tracker as Tobii pro-X2-30 screen-based of 30 Hz frequency and a galvanic skin response as neuromarketing techniques within 72 participants in Milan and Rome on a short advertisement trimmed clip from a documentary called Earth in Italian language. The research results show a great advantage over traditional marketing techniques for neuromarketing in the evaluation of framing the messages, perception, performance, and issues in real communication within the prediction of consumer emotion, engagement and perception.

- ➢ *Research Gaps in Neuromarketing on Advertising and Consumer beahvior*

The future studies and recommendations that have been suggested by previous researchers may fill in the gap in the future study of Neuromarketing and advertising communication.

Table 3 Represent our SLR Articles

No	Author and Article title	Year	Recommendations and Future Research
1)	Suomala, J., Palokangas, L., Leminen, S., Westerlund, M., Heinonen, J., & Numminen, J. - Neuromarketing: Understanding customers' subconscious responsesto marketing.	2012	They concludedthat the results and the methodology can be used not only for evaluating the purchaseprocess but also for testing new product and serviceconceptsand applications, especially in the high-tech industry.Their publication recommended future researchsubjects in neuromarketing.
2)	Balconi, M., Stumpo, B., & Leanza, F. - Advertising, brandand neuromarketing or how consumer brain works.	2014	Their resultsshowed that EEG measurements andthe preferenceranking has strongcoherence and suggested for future researches tofocus more aboutthe importance of EEG

			as a neuroscientific tool for detecting the consumer response for decision-making to the goods.
3)	Nyoni, T., & Bonga, W. G.-. Neuromarketing Methodologies: More Brain Scans or Brain Scams?	2017	They believed thatin Neuromarketingwhere marketerscan simply targetthat magic spot inthe consumer'sbrain but, it cannot be a replacement ofthe traditionalmarketing tools and strategies. While, companies shouldbe more encouraged for this transformation in a professional way and awareness to the ethical issues.
4)	Baraybar-Fernández, A.,Baños-González, M.,Barquero-Pérez, Ó., Goya-Esteban,R., & De-la-Morena-Gómez, A. - Evaluation of emotional responses to television advertising through neuromarketing.	2017	They mentionedthe positive trendline of theneuroscientific tools efficiency in marketing and advertising. While,the limitations ofthe high expensesandmeasurementscosts But theyrecommended that researchers shouldchase the excitingexperiments or theconsumer behaviorand preference withdoing more examinations.
5)	Shaari, N. A. S., Syafiq, M. M. J., Amin, M. K. M., & Mikami, O. - Electroencephalography (EEG) application in neuromarketing-exploring thesubconscious mind.	2019	They stated thatLarge surveys might becomeoutdated since sofew respondents can accurately assess the value of marketing products. However,the topic of neuromarketing is still in its infancy as there are many variables that need to be investigated,such as the enormous 10 billion neural activitie.
6)	Golnar-Nik, P., Farashi, S., & Safari, M. S. - The application of EEG power for the prediction and interpretation of consumer decision-making: A neuromarketing study.	2019	They mentionedthat only a small number of research have focused on the Impact of advertisement content on the brain data-based decision-making process.Theirresults could serveas a foundation forfurther researchinto how the brainprocesses the contents ofadvertisements through larger sample sizes and other data collection techniques, likefMRI, may also beemployed.
7)	Baños-González, M., Baraybar-Fernández, A., & Rajas-Fernández, M. - The application of neuromarketing techniques in the Spanish advertising industry: Weaknesses and opportunities for development.	2020	They recommendedthat However, itwould be wise to carry out further research to Examine the limitations and the issues it claims,some of which are as serious as thelack of standardized measures of thediversity oftechnologies, and if the perception theindustry has ofthese methods issupported by theavailability ofdifferent providers.When considering research designs for market.
8)	Martinez-Levy, A. C., Rossi, D.,Cartocci, G., Mancini, M., Di Flumeri, G., Trettel, A., ... & Cherubino, P. Message framing,non-conscious perception and effectiveness in non-profit advertising. Contribution by neuromarketing research.	2020	The recommendedthat to find a set ofneurophysiological indicators that canforecast the effectiveness of communication, additional researchshould concentrateon various sorts ofcharity initiatives.Additionally, it's important to pinpoint thedemographic groups that can be more or less amenable to receiving such communications, paying particularattention to age andgender disparities. Regarding the theoretical implications, thiswill improve the outcomes in particular segmentcases and revealany variations. In terms ofmanagement consequences,itwould be beneficialto target particularcampaigns associated with certain segments inorder to reducepositioning expenses. Thesesubjects are setaside for upcoming development.

V. CONCLUSION

The use of an SLR for neuromarketing can provide a number of benefits. It can help to identify gaps in existing research and uncover potential areas of further exploration.It can also provide reliable, valid data that can be used to inform future research. An SLR can also help to develop hypotheses and guide future research.The use of an SLR can also help to ensure the accuracy of research findings. By synthesizing and analyzing data, an SLR can help to identify any inaccuracies or inconsistencies in the data. This can help to ensure that the research is reliable and valid.

While the use of an SLR for neuromarketing can provide a number of benefits, it is important to consider the potential limitations of this approach. One limitation is that an SLR is limited by the availability of data. If data is not available for a particular topic, it is not possible to conduct an SLR for that topic. Another limitation is that an SLR is limited by the quality of the data. Poor-quality data may lead to inaccurate or incomplete results. Finally, an SLR is limited by the number of studies available. If there are not enough studies available for a particular topic, it may not be possible to conduct an SLR for that topic.

The 4 main research questions are the focus of SLR research. Based on the SLR, the results in the context sectors of advertising communication and neuromarketing have been discussed. In the 15 articles included in this review, the application of neuroscience to marketing and advertising in particular has been discussed. In general, neuroscientific approaches used in marketing and advertising communication are still in their infancy and lack the research that is necessary to keep up with the industrial revolution 3.0 while taking into account the high measurement costs of those instruments. The method of data extraction has been thoroughly applied and explained. The author thinks that this SLR contributes to the development of neuroscientific tools for marketing and advertising communication. Anyone wishing to do academic or industrial research on neuromarketing, branding, or advertising may utilize the study as a starting point.

➢ *Possibilities and Advantages*

Neuromarketing has several advantages over traditional methods of marketing research. First, neuromarketing offers a more holistic understanding of consumer behavior by taking into account both conscious and unconscious responses. By using brain imaging and eye-tracking, neuromarketing can provide insights into the subconscious and emotional responses of consumers, which can be used to craft more effective marketing strategies. Second, neuromarketing is more cost-effective than traditional methods of marketing research. By using neuroscience techniques, neuromarketing can provide insights into consumer behavior at a fraction of the cost of traditional marketing research. Finally, neuromarketing can be used to gain insights into consumer behavior, emotions and preferences in real-time, allowing marketers to make quick and effective decisions. Neuromarketing can also be used to measure the effectiveness of different types of advertising and branding. By using neuroscience techniques, marketers can measure the impact of different types of advertising and branding on the brain and how this impacts a consumer's decision-making process. This can be used to identify which types of advertising and branding are most effective and which types are less effective. Finally, neuromarketing can be used to measure the impact of different types of marketing on consumer emotions and attitudes. By using neuroscience techniques, marketers can measure the impact of different types of marketing on the brain and how this impacts a consumer's emotions and attitudes. This can be used to create more effective marketing strategies that will have a greater impact on consumers.

➢ *Limitations and Challenges*

However, neuromarketing also has some disadvantages. First, there is still a lack of consensus on the best methods for using neuromarketing techniques. This can lead to confusion and misinterpretation of results. Second, neuromarketing data can be difficult to interpret, as the data is often complex and nuanced. Finally, neuromarketing data can be difficult to replicate, as it is based on individual responses and not on generalization trends. The following clearly expresses the limitations: The precision of some

measurements, like those of brain activity, can be fairly good. Other methods, such as face coding, are less accurate, which can make comparing various measurements challenging. In the absence of uniformity, there isn't a set of accepted practices because the neuromarketing sector is still rather young. As a result, the outcomes differ depending on the company we pick and employ. The High prices and significant costs. While many of the neuromarketing techniques are reasonably priced, some are very pricey. When preparing a marketing campaign, these expenses should be taken into account. Lack of long-term data since some neuromarketing metrics, such brain activity, only provide information about a campaign's efficacy at a specific point in time, making the data only useful during the campaign. and lastly It is extremely complex to interpret data, such as the data obtained using neuromarketing approaches. Although it offers useful information, it might be challenging for marketers to understand. As a result, using the data to make judgments can be challenging.

➢ *Recommendations for Future Research*

In order to maximize the potential of neuromarketing, there are several recommendations for future work and research. First, there should be a greater emphasis on developing best practices for using neuromarketing techniques. Recently, Eye-tracking on the webcam based on Real-eye software 11.0 on higher frequencies and affordable prices has recently become available, especially for academic purposes. This technology combines insights from eye-tracking, emotion recognition, and declarative surveys in one tool, allowing participants to take the test at home or in a sterile lab environment. The option to filter results using tags that you can establish on your own like tag by the survey answers, or the ability to compare results for different target groups by simply filtering them, such as the perception of an advertisement by men and women or by people of different ages, and It's easy to see the climax and whether one exists or changes the perception of an advertisement. It is possible for someone to have intentionally provided a false response, refuse to acknowledge it (as in the ad), or not be aware that they did. This style of inquiry allows us to reply on a behavioural level rather than a declarative one. Additionally, it allows us to save money before the campaign begins, allowing us to devote more money to the ads that receive the best ratings. With the new software that allows for eye-tracking, surveys, and facial expression coding using a web camera based, the entire inquiry may be finished in a single day. Results are made available as soon as a participant completes the assignment. This will help ensure that the data collected is accurate and that the results are interpreted correctly. Second, there should be a greater emphasis on replicating neuromarketing data in order to validate the results and ensure that the data is generalizable. Finally, there should be a greater emphasis on understanding the ethical implications of neuromarketing research, as this has the potential to have a significant impact on consumer behavior, emotions and attitudes.

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