



NEUROMARKETING PRACTICES AND ETHICAL CHALLENGES IN CONSUMER DECISION-MAKING: A SOUTH AFRICAN PERSPECTIVE

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Article Information:

Article Type:
Research Article

Manuscript Received:
9 February 2026

Final Revision Received:
18 May 2026

Published Online:
31 August 2026

Keywords:
Neuromarketing,
consumer decision-
making, ethical marketing,
rural entrepreneurship,
South Africa

Neuromarketing has rapidly evolved into a scientific approach that integrates neuroscience and marketing to examine subconscious consumer responses and improve decision-making across advertising, branding, and packaging. Despite its global expansion, its ethical and practical application in emerging markets remains poorly understood. This study therefore explores how neuromarketing techniques are applied in 2025, critically assessing the ethical challenges associated with their use, and examining the feasibility of low-cost neuromarketing tools for small and rural enterprises within the South African context. A qualitative desk-based design was employed, using systematic content analysis of secondary literature published between 2020 and 2025. The findings reveal that neuromarketing has matured from experimental research into a mainstream marketing tool capable of decoding emotional and cognitive drivers of consumer behaviour. However, it also highlighted persistent ethical gaps related to neuro-data privacy, consent comprehension, and potential subconscious manipulation. In South Africa, the study found that affordable tools like EEG and eye-tracking offer potential for inclusive entrepreneurship, though their use is constrained by limited expertise and regulation. The study recommends establishing an ethical governance framework, strengthening policy oversight, and implementing capacity-building initiatives to ensure that neuromarketing advances innovation while safeguarding consumer autonomy and trust.

Cite this article: Phathiswa Zuma and Andriisha Beharry-Ramraj (2026). Neuromarketing Practices and Ethical Challenges in Consumer Decision-Making: A South African Perspective. *The Journal of Sustainable Development, Law and Policy*. Vol. 18:2. 117-148. DOI: 10.4314/jsdlp.v18i2.6.



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Publisher: Institute for Oil, Energy, Environment and Sustainable Development (OGEES Institute), Afe Babalola University, Ado Ekiti, Nigeria.

1. INTRODUCTION

Neuromarketing, often referred to as consumer neuroscience, merges neuroscience and marketing to uncover the subconscious mechanisms that influence consumer decision-making in advertising, branding, and packaging. According to Bellman and Varan, this scientific integration enables marketers to measure how attention, emotion, and memory guide purchasing behaviour; dimensions that traditional self-reported methods fail to capture¹. Conventional tools, such as surveys and focus groups, often distort findings due to social desirability and recall bias, whereas neurophysiological techniques, such as electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and biometric tracking, provide direct, objective evidence of consumer engagement.² Furthermore, Alsharif and Mohd Isa explain that these technologies allow advertisers to design emotionally resonant content that strengthens brand recall and loyalty by revealing the neural responses that underpin preference formation.³

Neuromarketing has emerged as a transformative approach for decoding how consumers think, feel, and decide, integrating neuroscience with marketing to reveal subconscious drivers of behaviour. Ford explains that the field's strength lies in its ability to capture objective indicators of attention, emotion, and memory, dimensions that traditional self-reported methods cannot accurately measure.⁴ According to Bellman and Varan, these neurophysiological insights enable firms to optimise advertising

¹ S Bellman and D Varan, 'Neuromarketing: How to Choose the Right Measures' in *The Handbook of Communication Science and Biology* (2020) 254-265.

² PM Kaur, A Sharma and A Singh, 'Study of Neuromarketing with EEG Signals and Machine Learning Techniques' in SN Mohanty and others (eds), *Machine Learning for Healthcare Applications* (Springer 2020) 33-56.

³ AH Alsharif and SM Isa, 'Revolutionizing Consumer Insights: The Impact of fMRI in Neuromarketing Research' (2024) 10(1) *Future Business Journal* 79 <https://link.springer.com/article/10.1186/s43093-024-00371-z> accessed 2 October 2025.

⁴ DH Ford, *Humans as Self-Constructing Living Systems: A Developmental Perspective on Behavior and Personality* (Routledge 2019).

content, packaging design, and branding strategies to better connect with consumer emotions.⁵

However, Pettinari cautions that the same tools capable of revealing genuine consumer preferences may also be used to manipulate decision-making, blurring ethical boundaries between persuasion and exploitation.⁶ Ford also argues that as neuromarketing moves from experimental research to commercial application, its growing precision in targeting subconscious processes raises pressing ethical questions regarding autonomy, consent, and privacy.⁷ Samir and Sharma similarly caution that by focusing on “System 1” decision-making (fast, automatic, and emotional) neuromarketing risks crossing the boundary between persuasion and manipulation.⁸ These concerns are particularly acute in developing contexts where regulation and digital literacy remain limited. Ndlovu and Masuku highlight that South Africa’s Protection of Personal Information Act (POPIA) does not yet adequately address neuro-data, leaving vulnerable consumers exposed to misuse.⁹

In the South African context, neuromarketing remains a developing practice, shaped by economic inequality, limited digital access, and cultural diversity. Ndlovu and Masuku note that small and rural enterprises struggle to compete with established urban brands due to resource and knowledge constraints.¹⁰ However, as Mulibana and Tshikovhi observe, affordable technologies such as portable EEG and eye-tracking devices present new opportunities for local entrepreneurs to test consumer

⁵ Bellman and Varan (n 1).

⁶ L Pettinari, ‘From Tradition to Innovation: Neuromarketing and Communication Strategies in the Global Wine Market—The Lungarotti Case’ (2024).

⁷ Ford (n 4).

⁸ S Sarkar and N Sharma, ‘Neuro-Marketing in the Digital Era: A Review of Neurological and Behavioral Insights in Consumer Decision-Making’ (2026) 3 *Journal of Marketing & Social Research* 140-154.

⁹ C Ndlovu and MM Masuku, ‘The Efficacy of Agricultural Cooperatives Towards Enhancing Food Security in Rural Areas: Mbombela Local Municipality, Mpumalanga Province’ (2021) 21 *Technium Social Sciences Journal* 661.

¹⁰ Ibid.

responses and design culturally resonant branding strategies.¹¹ Similarly, Shemfe and Mbukanma highlight that ethical cues (such as “organic,” “locally produced,” or “heritage-based” labels) can evoke trust and emotional engagement among consumers.¹² Drawing from these insights, neuromarketing represents both an innovation in understanding consumer cognition and a potential mechanism for inclusive market participation, provided that its application remains transparent, context-sensitive, and ethically grounded.

Neuromarketing has advanced rapidly as a tool for decoding subconscious consumer behaviour, yet its practical and ethical application in emerging markets remains poorly understood. Bellman and Varan state that while it enhances marketing precision through tools like EEG and fMRI, its growing influence raises concerns about autonomy and transparency.¹³ Ramsøy argues that such techniques risk manipulating emotions without consumers’ awareness, creating moral and regulatory challenges.¹⁴ In South Africa, Ndlovu and Masuku observe that small and rural enterprises face barriers such as limited access to technology, low consumer literacy, and weak ethical oversight.¹⁵ Mulibana and Tshikovihi further explain that although affordable neuromarketing tools could help local entrepreneurs compete with established brands, the absence of clear governance frameworks increase the risk of data misuse and consumer exploitation.¹⁶ This lack of contextual understanding limits the responsible use of neuromarketing and threatens its potential to promote ethical, inclusive market growth.

¹¹ L Mulibana and N Tshikovihi, ‘Rural Entrepreneurship and Innovation in BRICS Economies: Secondary Evidence from Rural Areas in South Africa’ (2024) 16(6) *Sustainability* 2408 <https://www.mdpi.com/2071-1050/16/6/2408> accessed 27 October 2025.

¹² OA Shemfe and I Mbukanma, ‘Exploring Neuromarketing Strategies Towards Boosting Consumer Engagement with Rural Agricultural Products: A Systematic Review’ (2025) 2(1) *Interdisciplinary Journal of Management Sciences* a02 <https://pubs.ufs.ac.za/index.php/ijms/article/view/1871> accessed 2 October 2025.

¹³ Bellman and Varan (n 1).

¹⁴ TZ Ramsøy, ‘Building a Foundation for Neuromarketing and Consumer Neuroscience Research: How Researchers Can Apply Academic Rigor to the Neuroscientific Study of Advertising Effects’ (2019) 59(3) *Journal of Advertising Research* 281.

¹⁵ Ndlovu and Masuku (n 9).

¹⁶ Mulibana and Tshikovihi (n 11).

The objectives of the study includes; to explore how neuromarketing methods are adopted in 2025 to influence consumer decision-making across advertising, branding, and packaging; to critically assess the associated ethical challenges relating to privacy, consent, and manipulation; to evaluate the applicability of affordable neuromarketing tools for small businesses and rural entrepreneurship in South Africa; and to develop practical recommendations and an ethical framework to guide the responsible and transparent use of neuromarketing techniques by marketers and policymakers.

This paper is divided into eight sections. Following the introductory section is the Conceptual framework section. The Literature review is detailed in the third section. The fourth section discusses the theoretical framework adopted for the purpose of this study. The fifth section gives a detailed analysis of the methodology for the study. The sixth section further describes the findings of the study. The discussion of findings is made in the seventh section. The eight section gives the conclusion of the study, the recommendation and future research for the study.

2.0 CONCEPTUAL FRAMEWORK

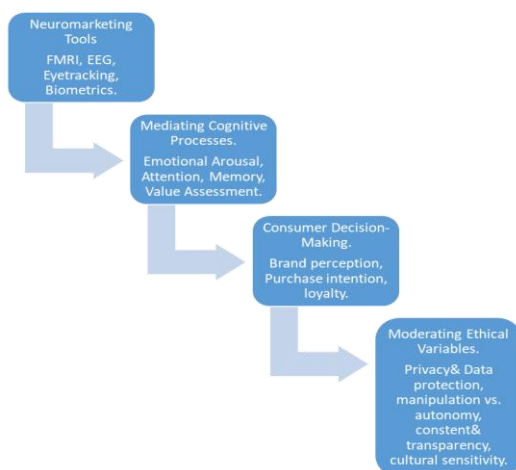


Figure 1: Conceptual Framework of Neuromarketing Processes and Ethical Moderation (Source: constructed by researchers)

This figure illustrates the conceptual flow of neuromarketing processes as applied in the study. It begins with neuromarketing tools such as fMRI, EEG, eye-tracking, and biometric measures, which capture neurophysiological responses. These tools mediate cognitive processes (including emotional arousal, attention, memory, and value assessment) that shape consumer responses to marketing stimuli. The resulting neural and psychological activations influence consumer decision-making, encompassing brand perception, purchase intention, and loyalty. Lastly, the model integrates ethical moderating variables such as privacy, data protection, manipulation versus autonomy, informed consent, and cultural sensitivity, which shape how neuromarketing insights are interpreted and applied. The framework therefore positions neuromarketing as a balance between technological precision in understanding subconscious drivers of behaviour and the ethical responsibility to safeguard consumer rights and dignity.

3.0 LITERATURE REVIEW

This literature review explores the evolution, methods, ethical debates, and theoretical foundations of neuromarketing as a rapidly advancing field that merges neuroscience and marketing to decode the subconscious processes influencing consumer decision-making. It begins by tracing the historical development of neuromarketing and its transition from laboratory research to mainstream marketing practice, highlighting how technologies such as fMRI, EEG, eye-tracking, and biometric measures have transformed the study of consumer behaviour. The review then examines the diverse applications of these tools across advertising, branding, and product design, emphasising their growing relevance in emerging markets like South Africa where they contribute to inclusive entrepreneurship and context-sensitive branding. It also analyses key ethical concerns, particularly issues of privacy, manipulation, and informed consent, that arise as firms gain access to intimate neurobiological data. Lastly, it presents the theoretical framework underpinning neuromarketing, grounded in decision neuroscience and dual-process models of cognition, which explain how emotional and rational systems jointly shape consumer choice. Overall, the review situates neuromarketing as both a scientific

innovation and a moral frontier, demanding careful consideration of its cognitive, methodological, and ethical implications.

3.1 The Rise of Neuromarketing in Consumer Research

Neuromarketing, or consumer neuroscience, combines marketing inquiry with neuroscience to explore how consumers unconsciously respond to advertising, branding, and product design. The field emerged to address the shortcomings of traditional methods such as surveys, interviews, and focus groups, which are prone to bias and often fail to capture the automatic, subconscious processes guiding consumer choice.¹⁷ By employing neurophysiological tools, researchers now have access to objective measures of attention, emotion, and memory, which better explain why consumers behave the way they do. The roots of neuromarketing stretch back to experimental psychology and early neuroscience applications in the 1970s and 1980s, when EEG was first used to study attention and media effects.¹⁸ However, neuromarketing as a formal field took shape in the early 2000s with landmark studies such as McClure's fMRI "Pepsi Challenge," which demonstrated that consumer preference was strongly influenced by brand labels rather than objective taste. When participants drank Coca-Cola, their brain activity activated regions tied to memory and emotional meaning, overriding sensory input.¹⁹ This provided striking evidence that marketing operates at a subconscious level.

From this foundation, the neuromarketing "toolbox" expanded to include EEG, fMRI, eye-tracking, galvanic skin response, facial expression coding, and heart-rate monitoring. These methods have been applied to a range of contexts. Bellman and Varan report that EEG and biometrics have been used to identify emotionally resonant moments in television advertisements. In their study of 118 adverts, heightened physiological responses correlated with stronger recall and market performance.²⁰

¹⁷ Bellman and Varan (n 1).

¹⁸ A Ali and others, 'EEG Signals Based Choice Classification for Neuromarketing Applications' in *A Fusion of Artificial Intelligence and Internet of Things for Emerging Cyber Systems* (2021) 371.

¹⁹ Ibid.

²⁰ Ibid.

Similarly, EEG studies have demonstrated that neural activity during movie trailers predicts box-office success across international markets, outperforming self-reported ratings.²¹ According to Kankaew, Nakpathom, Chnitphattana, Pitchayadejanant, and Kunnapapdeelert, EEG and eye-tracking have also been applied to test package redesigns, showing which colours, logos, and placement cues attract more visual attention on supermarket shelves.²²

Kaur and his colleagues assert that EEG responses to advertising jingles reveal sound patterns that enhance memorability, enabling data-driven audio branding strategies.²³ Furthermore, these authors note that combining EEG signals with machine learning algorithms allows researchers to classify consumer engagement and purchase intention with greater accuracy than traditional survey methods. This integration illustrates the direction of neuromarketing in 2025, where neurophysiological measurement is combined with computational analytics to generate scalable insights. Utriainen explains that biometric data such as gaze tracking and facial emotion coding have been used in online retail environments to redesign e-commerce websites, reducing cognitive overload and improving conversion rates.²⁴

Shemfe and Mbukanma describe how Ukrainian agri-businesses have employed neuromarketing to test label authenticity cues such as “organic” and “local origin,” which activated trust-related responses and helped counteract urban consumer bias against rural producers.²⁵ This example is particularly relevant for South Africa, where rural enterprises face similar branding challenges. Ford further notes that multinational corporations have integrated neuromarketing into advertising pre-tests during Super

²¹ Ibid

²² K Kankaew and others (eds), *Applying Business Intelligence and Innovation to Entrepreneurship* (IGI Global 2024) <https://delsuelib.com.ng/ebk/mgt/ent/2024%20Applying%20Business%20Intelligence%20and%20Innovation%20to%20Entrepreneurship.pdf#page=100> accessed 27 October 2025.

²³ Kaur, Sharma and Singh (n 2).

²⁴ T Utriainen, ‘Neuromarketing and Consumer Neuroscience – The Evolution and Current State of the Art: An Integrative Review’ (2020) <https://aaltodoc.aalto.fi/items/07e5f429-ac81-454f-8915-63bc8ff71ceb> accessed 3 October 2025.

²⁵ Shemfe and Mbukanma (n 12).

Bowl campaigns.²⁶ Using EEG and eye-tracking, marketers identified ad edits that maximised emotional peaks. The findings revealed that advertisements with strong story arcs and emotionally resonant “surprise” elements triggered greater physiological responses and were more likely to go viral. Such evidence underscores neuromarketing’s commercial impact: identifying unconscious attention spikes allows marketers to refine content before costly airtime purchases.

These developments demonstrate that neuromarketing has moved beyond laboratories into mainstream marketing practice. Advances in portable EEG devices and cloud-based eye-tracking systems have further democratised the field. Affordable consumer-grade EEG headsets such as Emotiv or NeuroSky now enable smaller firms to experiment with neuromarketing, though with less precision than clinical devices.²⁷ In emerging markets like South Africa, this accessibility opens opportunities for small and medium-sized enterprises to apply neuromarketing insights without the prohibitive costs of large-scale lab testing.

South African scholarship has begun to highlight neuromarketing’s potential to strengthen rural entrepreneurship. Mulibana and Tshikovihi argue that rural producers face entrenched bias favouring urban brands and lack resources to invest in traditional marketing campaigns.²⁸ Portable EEG and low-cost eye-tracking tools, however, enable cooperatives to test packaging and branding strategies to determine which cues resonate most with consumers. Labels emphasising “organic” or “locally produced” have been shown to trigger trust-related neural responses, helping to close the perception gap between rural and urban products. Ndlovu and Masuku add that small-scale farmers can benefit from neuromarketing insights into subconscious consumer motivations, including the appeal of authenticity and heritage narratives.²⁹

Researchers at the University of the Free State (UFS) also emphasise that emotional storytelling rooted in cultural heritage, such as highlighting Zulu or Xhosa farming traditions, can build empathy and loyalty among

²⁶ Ford (n 4).

²⁷ Utriainen (n 24).

²⁸ Mulibana and Tshikovihi (n 11).

²⁹ Ndlovu and Masuku (n 9).

consumers.³⁰ Neuromarketing validates this through evidence of heightened emotional arousal when consumers are exposed to authentic cultural branding. Therefore, South African enterprises can use neuroscience to compete not only on product quality but also on emotional and cultural connections.

However, the literature also identifies persistent challenges. Ramsøy cautions that methodological inconsistencies limit comparability across studies.³¹ For instance, one study may interpret heightened frontal EEG asymmetry as “positive engagement,” while another interprets similar signals differently, creating conceptual confusion. Furthermore, the link between neural signals and long-term consumer behaviour remains underexplored. Utriainen observes that the predictive validity of neuromarketing findings varies widely depending on research context, underscoring the need for standardised protocols and replication.³²

Despite these methodological tensions, scholars concur that neuromarketing represents a paradigm shift in understanding consumer behaviour. Bellman and Varan state that what began as experimental neuroimaging has evolved into a global field applying neuroscience to advertising, branding, packaging, and digital environments.³³ Kaur and his colleagues affirm that combining neurophysiological and computational tools has made consumer insight more precise and predictive.³⁴ Ford agrees that by decoding subconscious responses, marketers can create emotionally engaging content that drives loyalty and purchase decisions.³⁵

The literatures reviewed illustrate that neuromarketing enhances marketing effectiveness by revealing subconscious drivers of choice. Case studies from film trailers, jingles, packaging, and large-scale advertising demonstrate how emotional and cognitive data can inform creative strategy.³⁶ South African contributions add that neuromarketing is not

³⁰ Ibid.

³¹ Ramsøy (n 14).

³² Utriainen (n 24).

³³ Bellman and Varan (n 1).

³⁴ Kaur, Sharma and Singh (n 2).

³⁵ Ford (n 4).

³⁶ Bellman and Varan (n 1); Kankaew and others (n 22).

only a tool for corporate advantage but also a mechanism for inclusive innovation. When adapted to local contexts, it can empower rural entrepreneurs and small producers to build brands grounded in authenticity and emotional resonance.³⁷ Nevertheless, Ramsoy and Utriainen remind that methodological and ethical questions remain unresolved.³⁸ Therefore, the 2025 neuromarketing landscape reflects both scientific advancement and ongoing debate about its validity and responsible application.

3.2 Tools of the Trade: Neuromarketing Methods in 2025

Neuromarketing research in 2025 relies on an integrated toolkit of neuroscience-based techniques designed to capture the subconscious processes that shape consumer behaviour.³⁹ Unlike traditional surveys or focus groups, which depend on self-reporting, these methods reveal what people truly notice, feel, and evaluate during encounters with brands and advertisements. The most prominent tools include fMRI, eye-tracking technologies, EEG, and a wide range of biometric measures such as heart rate, skin conductance, and facial coding. Together, these techniques provide marketers with deeper and more reliable insights into consumer decision-making, though each carries distinct strengths and limitations.

3.2.1 Functional Magnetic Resonance Imaging

fMRI has played a pioneering role in neuromarketing because of its ability to capture high-resolution images of brain activity through blood-oxygenation changes. Its strength lies in detecting the neural underpinnings of valuation, memory, and emotional processing, particularly in deep-brain structures like the ventromedial prefrontal cortex and striatum.⁴⁰ Classic studies, such as the Pepsi versus Coke experiments, demonstrated that brand cues can override sensory preference by activating memory-related brain areas. More recently, fMRI

³⁷ Mulibana and Tshikovhi (n 11); Ndlovu and Masuku (n 9)

³⁸ Ramsøy (n 14); Utriainen (n 24).

³⁹ G Song and others, 'The Neuromarketing: Bridging Neuroscience and Marketing for Enhanced Consumer Engagement' (2025) *IEEE Access* <https://ieeexplore.ieee.org/abstract/document/10902389/> accessed 3 October 2025.

⁴⁰ Alsharif and Isa (n 3).

has been used to test willingness-to-pay thresholds, price sensitivity, and predictors of advertising success, making it highly valuable in assessing both product and communication strategies.

Despite these strengths, fMRI is expensive, requires controlled laboratory settings, and is limited in sample size and temporal resolution. As a result, it is used mainly by large corporations and academic research institutes, with findings often serving to validate more accessible tools like EEG and eye-tracking.⁴¹ Nevertheless, fMRI remains a cornerstone for theoretical advancements and continues to influence how neuromarketing defines and predicts consumer choice in 2025.

3.2.2 Eye-Tracking Technologies

Eye-tracking has become one of the most widely adopted tools due to its affordability and practical application in both online and offline environments. By measuring gaze direction, fixation, saccades, and pupil dilation, eye-tracking reveals where consumer attention is focused and how long it lingers. Research has demonstrated its utility across advertisements, packaging, and retail design. For example, advertisements that feature baby faces unconsciously guide viewers' attention toward product-related text, boosting recall.⁴² In retail spaces, eye-tracking has shown that consumers disproportionately focus on products at eye level or near entrances, guiding shelf design and placement strategies.⁴³

The rise of portable and wearable eye-tracking devices has enabled studies in real shopping environments, yielding more ecologically valid insights than laboratory-based methods. When combined with EEG or biometric indicators, eye-tracking produces richer insights by showing not just where attention goes but also how stimuli are processed emotionally.⁴⁴

⁴¹ Shemfe and Mbukanma (n 12).

⁴² BC Iloka and GI Anukwe, 'Review of Eye-Tracking: A Neuromarketing Technique' (2020) 3(4) *Neuroscience Research Notes* 29 <https://neuroscirn.org/ojs/index.php/nrnotes/article/view/61> accessed 3 October 2025.

⁴³ S Román, IP Riquelme and D Iacobucci, 'Fake or Credible? Antecedents and Consequences of Perceived Credibility in Exaggerated Online Reviews' (2023) 156 *Journal of Business Research* 113466.

⁴⁴ L Zhu and J Lv, 'Review of Studies on User Research Based on EEG and Eye Tracking' (2023) 13(11) *Applied Sciences* 6502.

However, eye-tracking alone cannot indicate emotional valence, as a consumer may fixate on a product out of confusion or dislike. Therefore, best practice is to use eye-tracking as part of a multimodal approach.

3.2.3 Electroencephalography

EEG has gained popularity as a practical alternative to fMRI, particularly because it offers excellent temporal resolution, capturing brain activity changes within milliseconds. This makes it highly effective for studying consumer responses to fast-moving advertisements, online interactions, and packaging visuals.⁴⁵ EEG is frequently used to measure emotional engagement, memory encoding, and levels of attention, with specific neural oscillations linked to approach–avoidance behaviours.

For example, research using EEG signals combined with machine learning models has demonstrated strong predictive power in identifying which advertisements will be remembered or drive purchase intentions.⁴⁶ Its portability and lower cost compared to fMRI make it especially attractive for marketing practitioners. However, EEG’s limited spatial resolution means it cannot precisely localise deeper brain activity. As with other methods, it is most effective when paired with complementary tools, providing both the “when” (EEG) and the “where” (fMRI) of consumer reactions.

In South Africa, affordable EEG headsets have been piloted to test television and radio advertisements. Findings revealed that peaks in neural engagement were strongly associated with brand recall, confirming that even low-cost EEG technologies can provide advertisers in emerging markets with reliable predictions of campaign effectiveness.⁴⁷

3.2.4 Biometric Measures

Biometric techniques such as skin conductance, heart rate variability, facial expression analysis, and wearable physiological sensors offer valuable ways to measure arousal and emotion during consumer interactions. These

⁴⁵ Shemfe and Mbukanma (n 12).

⁴⁶ Kaur, Sharma and Singh (n 2).

⁴⁷ Ibid

methods are particularly effective in applied settings, as they can be embedded in digital environments, retail spaces, or mobile devices. Heart rate, for instance, has been shown to be a reliable predictor of in-market advertising performance, while skin conductance reveals levels of physiological arousal associated with emotional engagement.⁴⁸

Recent studies by Shemfe and Mbukanma highlight how biometric data are increasingly integrated with AI-driven analytics to assess real-time consumer states.⁴⁹ For example, facial coding can detect micro-expressions indicating positive or negative sentiment towards advertisements, and galvanic skin response can highlight moments of peak arousal during video content. These insights help marketers refine both message design and delivery timing across platforms.

A South African example illustrates the local relevance of these methods. A rural cooperative in KwaZulu-Natal applied simple biometric tools such as facial recognition apps and heart-rate monitors during focus groups evaluating storytelling-based advertisements. Emotional peaks occurred when traditional cultural symbols and farming heritage were highlighted, showing how biometrics can refine authentic narratives that resonate with South African consumers.⁵⁰

3.2.5 The Integrated Toolkit

By 2025, neuromarketing no longer relies on any single tool but rather a multimodal approach. fMRI provides the deepest insights into brain valuation processes, EEG captures real-time emotional and attentional shifts, eye-tracking maps the allocation of visual attention, and biometrics reveal physiological arousal and sentiment.⁵¹ Together, they offer a holistic picture of how consumers perceive, evaluate, and act upon marketing stimuli.

Notably, the increasing affordability and portability of EEG, eye-tracking, and biometric devices allow smaller firms and entrepreneurs,

⁴⁸ Ford (n 4).

⁴⁹ Ibid

⁵⁰ Mulibana and Tshikovi (n 11).

⁵¹ Zhu and Lv (n 44).

particularly in South Africa, to leverage these insights in ways that were previously the domain of multinational corporations. This integration demonstrates that neuromarketing in 2025 is not only a scientific advancement but also a practical tool for inclusive market innovation, enabling both large and small enterprises to understand and ethically engage with the subconscious drivers of consumer decision-making.

3.3 Between Persuasion and Predation: Ethical Concerns in Neuromarketing

Neuromarketing's capacity to access subconscious processes has intensified ethical debates within marketing and neuroscience. While it offers valuable insights into emotion and decision-making, it simultaneously introduces moral and legal challenges. Three main ethical issues dominate current discourse: privacy and data protection, manipulation and autonomy, and the adequacy of consent and transparency mechanisms. Each issue reflects competing interpretations of consumer rights and corporate responsibility in 2025.

According to Ford and Ramsøy, neuro- and biometric data are among the most

sensitive forms of personal information because they can expose hidden emotional states, cognitive responses, and even predispositions.⁵² Kaur and his colleagues assert that the storage, reuse, and commercialisation of such data pose serious risks of profiling and secondary use beyond the original scope of consent.⁵³ These authors explain that the capacity of firms to aggregate neural data across contexts creates a surveillance risk that conventional privacy laws were never designed to manage. Alsharif and Mohd Isa concur that anonymisation and data minimisation are crucial but often poorly enforced in commercial practice.⁵⁴

In developing contexts like South Africa, Ndlovu and Masuku observe that the POPIA remains insufficient for regulating neuro-data, especially among rural producers and small enterprises lacking institutional

⁵² Ford (n 4); Ramsøy (n 14).

⁵³ Kaur, Sharma and Singh (n 2).

⁵⁴ Alsharif and Isa (n 3).

safeguards.⁵⁵ This imbalance raises questions of data justice and fairness in access to technological protection. Therefore, as Ford, Kaur and his colleagues all highlight, privacy in neuromarketing is not only about individual consent but about systemic inequalities in data governance.⁵⁶

Another key debate centres on whether neuromarketing enhances or undermines human autonomy. Ford argues that because neuromarketing deliberately targets subconscious “System 1” processes (automatic, fast, and emotional) it blurs the line between persuasion and manipulation.⁵⁷ The strategies based on subconscious triggers may bypass rational reflection, leading individuals to make choices they would otherwise resist.⁵⁸ Conversely, Ramsøy maintains that understanding emotional responses can improve product fit and consumer satisfaction if used ethically. This reveals a deeper tension between marketing efficiency and moral responsibility.⁵⁹

Frontiers Neuroergonomics expands on this by suggesting that exploiting biases such as anchoring and affective framing may amount to behavioural coercion rather than persuasion. In South Africa, Mulibana and Tshikovihi warn that these risks are magnified among low-income and rural consumers who face structural disadvantages in information access.⁶⁰ Economic vulnerability combined with emotional targeting can transform marketing influence into manipulation. Therefore, as several authors argue,⁶¹ the ethical question is not whether persuasion occurs but whether consumers retain meaningful reflective choice. Scholars increasingly propose that applications involving high-stakes or vulnerable groups (such as children, patients, or financially insecure individuals) require stricter oversight to prevent subconscious exploitation.

⁵⁵ Ndlovu and Masuku (n 9).

⁵⁶ Ford (n 4); Kaur, Sharma and Singh (n 2).

⁵⁷ Ford (n 4).

⁵⁸ A Siddiqui and C Gupta, ‘Subconscious Mind and Decision-Making Ability Among Adults: An Intervention Study’ (2025) 13(1) *International Journal of Indian Psychology*.

⁵⁹ Ramsøy (n 14).

⁶⁰ Mulibana and Tshikovihi (n 11).

⁶¹ Ford (n 4).

Kostovski, Mladenović, and Milošević assert that conventional informed consent procedures are ill-equipped for neuromarketing contexts because participants rarely grasp what neural signals reveal or how data will be commercialised.⁶² The technical complexity of neuro-measures makes true comprehension difficult, leading to what Alsharif and Mohd Isa term “consent without understanding.”⁶³ These scholars explain that transparency failures are especially evident in field applications, where neurotracking and biometric tools are embedded in seemingly ordinary activities such as online shopping or social media engagement.

South African smallholders experimenting with low-cost neuromarketing tools may unintentionally collect community-level biometric data without formal consent structures. This raises ethical questions about collective privacy and community exposure in informal economies. Alsharif and Mohd Isa therefore advocate for layered consent processes and clear data-use disclosures to mitigate such risks.⁶⁴ Their view is echoed by Kaur and his colleagues, who emphasise the need for public-facing explanations of how neuromarketing data inform campaigns.⁶⁵ Transparency, they argue, is not merely a procedural formality but a moral obligation that legitimises data-driven persuasion.

The literature collectively portrays neuromarketing as a dual-use technology, capable of advancing both market efficiency and ethical risk. These scholars further explain that its power to match products with emotional needs can enhance consumer welfare, yet the same mechanisms can magnify inequalities in knowledge and control.⁶⁶ Scholars such as Ford and Ramsoy agree that governance, not prohibition, should define the ethical frontier.⁶⁷ However, they differ on the degree of intervention

⁶² J Kostovski, M Mladenović and O Milošević, ‘Neuromarketing Techniques and Ethical Challenges: A Neuroeconomic Perspective’ (2024) 26(1) *Quaestus Journal* 34 <https://www.quaestus.ro/wp-content/uploads/2024/01/Jelena-KOSTOVSKI.pdf> accessed 27 October 2025.

⁶³ Alsharif and Isa (n 3).

⁶⁴ Ibid.

⁶⁵ Kaur, Sharma and Singh (n 2).

⁶⁶ Ibid.

⁶⁷ Ford (n 4); Ramsøy (n 14).

required: while some advocate industry self-regulation, others call for enforceable legal standards to prevent abuse.

In the South African context, Ndlovu and Masuku emphasise that ethical neuromarketing must include local capacity-building and public awareness, given the limited institutional resources to monitor neuro-data use.⁶⁸ Mulibana and Tshikovhi add that without community-level literacy on biometric and neural ethics, rural entrepreneurs may unintentionally replicate exploitative data practices used by global firms.⁶⁹ Alsharif and Mohd Isa similarly contend that inclusive ethical frameworks are essential to ensure that neuromarketing's benefits, such as cultural resonance and authenticity, do not come at the expense of privacy or autonomy.⁷⁰

The ethical literature converges on a central tension: neuromarketing simultaneously illuminates and obscures human choice. Its scientific precision can deepen understanding of consumer motivation, yet its commercial deployment risks reducing individuals to predictable neural patterns. As Ford observes, the moral test of neuromarketing lies not in what it can reveal but in how that knowledge is used.⁷¹ Therefore, the 2025 debate centres on whether the pursuit of behavioural insight can coexist with the preservation of dignity, transparency, and fairness, a balance that remains unresolved but increasingly urgent in both global and South African contexts.

In sum, the literature demonstrates that neuromarketing has matured into a multidisciplinary and data-driven approach that deepens understanding of how consumers think, feel, and decide. Through an integrated toolkit of neurophysiological and biometric methods, it provides valuable insights into the emotional and cognitive mechanisms underlying brand perception, purchase intention, and loyalty. The field's application in global and South African contexts illustrates its potential to democratise marketing intelligence and empower smaller enterprises through accessible technologies. However, the literature also reveals persistent methodological and ethical challenges, particularly regarding data

⁶⁸ Ndlovu and Masuku (n 9).

⁶⁹ Mulibana and Tshikovhi (n 11).

⁷⁰ Alsharif and Isa (n 3).

⁷¹ Ford (n 4).

protection, informed consent, and the risk of manipulating subconscious processes. These tensions underscore that while neuromarketing enhances precision and predictive power in marketing research, its legitimacy depends on maintaining transparency, respect for autonomy, and equitable application. Ultimately, neuromarketing stands at the intersection of science and ethics, offering transformative opportunities for understanding consumer behaviour while calling for responsible governance to ensure its benefits are both effective and fair.

4.0 THEORETICAL FRAMEWORK

The Dual-process theory is adopted for the purpose of this study. The theory was proposed in the 1970s by early researchers such as; Peter Cathcart Wason, Jonathan St B. T. Evans and later by; Keith E. Stanovich, Steven A. Sloman. This theory assumes that humans have two types of thinking; the System 1 is unconscious, intuitive or automatic, while the System 2 is intentional, deliberate and well calculated.⁷²

Neuromarketing research operates at the intersection of neuroscience, psychology, and marketing, providing a scientific foundation for analysing how consumers make decisions. According to Ramsøy and Ford, decision neuroscience explains that choices are shaped by both conscious reasoning and subconscious affective processes within the brain's cortical and limbic systems.⁷³ These mechanisms are captured through the dual-process model, where System 1 governs intuitive, emotional reactions, while System 2 manages analytical reasoning. Kaur and colleagues assert that neuromarketing technologies such as EEG and biometric tracking are uniquely positioned to detect the rapid, subconscious responses of System 1 that traditional self-reported methods fail to measure.⁷⁴

Within this theoretical foundation, consumer behaviour is seen as a biopsychological process in which emotional arousal, attention, and memory encoding collectively drive preference and purchase intention. Alsharif and Mohd Isa and Haapalainen confirm that tools like fMRI and

⁷² J Carrier, 'Dual Process Theory: A Simple Summary' (*PeopleShift*, 15 April 2026) <https://peopleshift.com/dual-process-theory-a-simple-summary> accessed 11 June 2026.

⁷³ Ramsøy (n 14); Ford (n 4).

⁷⁴ Kaur, Sharma and Singh (n 2).

EEG can empirically link neural activations to behavioural outcomes.⁷⁵ Ford extends this argument through the means–end chain model, which demonstrates how product attributes trigger emotional and personal values that directly influence buying decisions.⁷⁶ This model reinforces the neuro-cognitive pathway from stimulus to action by revealing how marketing stimuli activate brain areas responsible for value formation.

As neuromarketing advanced, computational models and machine learning enhanced its predictive precision. Kaur and colleagues explain that algorithms trained on EEG and biometric data can anticipate consumer engagement and recall, allowing marketing designs to align with neural markers of persuasion.⁷⁷ Similarly, Kostovski and colleagues contend that the integration of predictive analytics transforms neuromarketing from descriptive observation into a data-driven science of influence.⁷⁸ Ramsøy further conceptualise the consumer brain as a dynamic neural network in which each exposure to marketing stimuli reinforces associative links between emotion, cognition, and behaviour.⁷⁹

By 2025, this theoretical architecture is increasingly situated within ethical and socio-economic debates. Global expansion of neuromarketing has intensified scrutiny around privacy, manipulation, and consumer protection, especially in emerging economies. Mulibana and Tshikovihi argue that affordable tools such as portable EEG and eye-tracking can empower South African entrepreneurs to better understand consumer motivation.⁸⁰ However, Ndlovu, Masuku, Kostovski and his colleagues caution that weak data governance and limited consumer literacy may expose vulnerable groups to subconscious exploitation.⁸¹ Therefore, this study adopts a constructivist and behavioural-neuroscientific stance, recognising that decision-making arises through both affective and

⁷⁵ Alsharif and Isa (n 3); S Haapalainen, 'Neuromarketing and Consumer Decision-Making: Understanding Consumer Responses through Neuroscience Methods' (Master's thesis, Aalto University School of Business 2021) <https://aaltodoc.aalto.fi/bitstreams/9b4e64ad-5dba-43b3-82c3-7d0918189b25/download> accessed 27 October 2025.

⁷⁶ Ford (n 4).

⁷⁷ Kaur, Sharma and Singh (n 2).

⁷⁸ Kostovski, Mladenović and Milošević (n 62).

⁷⁹ Ramsøy (n 14).

⁸⁰ Mulibana and Tshikovihi (n 11).

⁸¹ Ndlovu and Masuku (n 9); Kostovski, Mladenović and Milošević (n 62).

cognitive mechanisms while emphasising ethical oversight in data use, consent, and transparency. As Mulibana and Tshikovhi assert, the legitimacy of neuromarketing depends on aligning scientific innovation with respect for autonomy and fairness.⁸²

5.0 METHODOLOGY

This study employed a qualitative desk-based research design grounded in a systematic content analysis to examine how neuromarketing influences consumer decision-making in 2025 and to assess its ethical implications. A qualitative approach was deemed appropriate as it allows for interpretive exploration of complex, socially embedded phenomena such as subconscious consumer behaviour, ethical dilemmas, and the socio-economic contextualisation of neuroscience in marketing.⁸³ The desk-based strategy enabled synthesis across a wide body of global literature where access to primary neurophysiological data was limited, facilitating the integration of diverse theoretical and empirical insights from multiple disciplines.

5.1 Materials and Methods

Data collection drew on secondary sources published between 2020 and 2025 to capture the most recent advancements in neuromarketing tools, such as EEG, fMRI, and biometric analytics, and the concurrent rise in ethical debates. Relevant studies were sourced from databases including ScienceDirect, SpringerLink, Taylor & Francis, ResearchGate, and IEEE Xplore, alongside institutional repositories such as Aalto University and Kherson State Agrarian University. Inclusion criteria focused on works examining neuromarketing technologies, ethical concerns (privacy, consent, manipulation), and contextual applications in South Africa or other developing economies. Studies lacking methodological rigour or contemporary relevance were excluded.

Data Analysis followed a three-stage content analysis process. First, data familiarisation involved systematic reading and summarisation of selected

⁸² Ibid.

⁸³ E Bell, B Harley and A Bryman, *Business Research Methods* (6th edn, Oxford University Press 2022).

texts. Second, coding and categorisation organised findings under four themes aligned with the research objectives: neuromarketing tools, consumer influence, ethical challenges, and South African contextual implications. Lastly, synthesis and interpretation involved critical comparison to identify convergences, contradictions, and emerging gaps. Triangulation across key studies, such as Ford, Haapalainen, as well as Kostovski and colleagues, enhanced reliability and validity.⁸⁴

Findings were presented thematically to ensure coherence between objectives, analysis, and interpretation. Since the study utilised publicly available secondary data, ethical clearance was not required; however, full citation practices were applied to maintain transparency, integrity, and scholarly rigour.

6.0 FINDINGS

The analysis of literature from 2020 to 2025 reveals that neuromarketing has transitioned from a niche scientific practice into a mainstream marketing approach influencing consumer decision-making across advertising, branding, and packaging. The literature consistently highlights that neuromarketing enhances marketers' capacity to decode subconscious emotional and cognitive processes while raising significant ethical questions about data privacy, consent, and manipulation. Furthermore, the review identifies that affordable neuromarketing tools are beginning to shape inclusive entrepreneurship in South Africa, although gaps in regulation and literacy persist. These findings directly align with the study's objectives by illuminating the dual role of neuromarketing, as both a powerful marketing innovation and an area requiring ethical governance and contextual adaptation.

6.1 Neuromarketing as a Strategic Tool in 2025

Neuromarketing has evolved into a powerful decision-making instrument that captures unconscious emotional and attentional responses

⁸⁴ Ford (n 4); Kostovski, Mladenović and Milošević (n 62); Haapalainen (n 75).

inaccessible through traditional marketing methods. Across the literature, tools such as EEG, fMRI, and eye-tracking are shown to identify neural and physiological markers of engagement, arousal, and recall. For example, EEG captures real-time brainwave changes that indicate consumer interest or aversion during advertising exposure, while fMRI maps brain regions associated with memory and value processing during brand interactions. Eye-tracking complements these findings by revealing which design elements (such as colour, logo placement, or imagery) draw and hold attention, thereby guiding effective packaging and advertising strategies. Collectively, these tools provide marketers with empirical data on how consumers emotionally and cognitively experience marketing stimuli, transforming how campaigns are designed and tested.

However, the literature also cautions that while neuromarketing increases marketing precision, its predictive validity depends on the integration of neurophysiological and behavioural data. This interdisciplinary blending of neuroscience, psychology, and analytics demands both technical expertise and ethical responsibility to prevent misuse of subconscious insights. Therefore, neuromarketing's strategic value lies not only in decoding consumer minds but also in ensuring that such knowledge is applied transparently and respectfully.

6.2 Ethical and Regulatory Challenges

A major finding is that neuromarketing's ethical landscape remains underdeveloped, particularly regarding data protection, autonomy, and informed consent. Despite its growing global use, existing legislation has not evolved at the same pace as the technology itself. In developed regions, data protection acts like the General Data Protection Regulation (GDPR) offer partial safeguards; however, these do not fully extend to neural or biometric data, which reveal highly personal emotional and cognitive states. The literature identifies three key ethical risks: first, the invasion of mental privacy through the collection of brain-based data that may expose intimate preferences; second, manipulation of autonomy by using subconscious cues to trigger impulsive buying; and third, consent without comprehension, as participants rarely understand the depth of information extracted from neural signals.

In the South African context, these risks are amplified by uneven digital literacy and limited institutional oversight. The POPIA, though progressive, does not explicitly address neuro-data. This legal gap increases the risk of exploitation where consumers, particularly in rural or low-income settings, may be unknowingly subjected to subconscious influence. The literature therefore calls for an ethical framework that ensures transparency in data handling, protects consumer dignity, and establishes accountability for marketers and researchers. Without such safeguards, neuromarketing risks crossing the line from persuasion to predation.

6.3 Applicability of Neuromarketing in the South African Context

The literature reveals a growing but uneven adoption of neuromarketing within South Africa. Many of the neuromarketing vendors and companies within the country are at the thriving stages.⁸⁵ Some of the neuromarketing organizations in South Africa are TrendER and HeadSpace Neuromarketing both located in Johannesburg. The founders of HeadSpace Neuromarketing – John Lawrence and Gary Sudwarts have explained that the advantage of the EEG for instance is that it has permitted the organization to measure the responses of the consumers to commercials, rather than relying on the consumers' calls after an exposure.⁸⁶ Larger corporations, such as retail and food brands, have begun integrating neurophysiological testing into product and advertising development, using emotional and biometric data to refine brand messaging and store experiences. In contrast, small businesses and rural entrepreneurs face both opportunities and barriers. Affordable, portable technologies (like simplified EEG headsets, gaze-tracking software, and mobile biometric sensors) are increasingly accessible, allowing small enterprises to explore local consumer preferences without the prohibitive costs of laboratory testing. Rural cooperatives in KwaZulu-Natal and

⁸⁵ B Ananna and others, 'An Overview of Neuromarketing Research in Developing Countries: Prospects and Challenges' in *Proceedings of the 2nd International Conference on Computing Advancements (ICCA 2022)* (ACM 2022) <https://doi.org/10.1145/3542954.3542977> accessed 9 June 2026.

⁸⁶ Daily Research News, 'HeadSpace Neuromarketing Launches in South Africa' (2012) <https://www.mrweb.com/drno/printable/pn15898.htm> accessed 9 June 2026.

Limpopo have used such tools to test packaging aesthetics and storytelling techniques for organic and heritage-based products. These initiatives demonstrate the transformative potential of neuromarketing in promoting authentic, culturally resonant branding that connects with consumers on an emotional level.

Yet, the same literature warns that without ethical guidance, such practices could unintentionally mirror exploitative global marketing trends. Limited technical expertise and weak ethical oversight in small enterprises increase the likelihood of data misuse or consumer manipulation. Thus, while neuromarketing can empower small businesses and rural entrepreneurs to compete more effectively, its sustainability depends on ethical training, community literacy, and regulatory inclusion. Academic-industry collaboration and public policy are critical to ensure that neuromarketing in South Africa evolves as a tool for empowerment rather than exploitation.

6.4 Synthesis of Key Findings and Implications

Table 1: Synthesis of Key Findings and Their Implications for Neuromarketing Practice and Policy

Theme	Evidence from Literature	Implications
Technological evolution	EEG, fMRI, eye-tracking, and biometrics enable real-time emotional and cognitive insight. ⁸⁷	Enhances marketing accuracy and emotional resonance.
Ethical challenges	Issues of privacy, autonomy, and informed consent are under-regulated in emerging markets. ⁸⁸	Necessitates ethical frameworks and consumer education.

⁸⁷ Ford (n 4); Alsharif and Isa (n 3).

⁸⁸ Ramsøy (n 14); Kostovski, Mladenović and Milošević (n 62).

South African application	Emerging use of low-cost neuromarketing tools by rural entrepreneurs. ⁸⁹	Promotes inclusive innovation but needs policy oversight.
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(Source: constructed by researchers)

Table 1 summarises the key findings derived from the reviewed literature, linking major themes to their supporting evidence and practical implications. It highlights three central areas, technological evolution, ethical challenges, and South African application, each reflecting how neuromarketing methods, ethical concerns, and contextual factors interact. Collectively, these findings illustrate that while neuromarketing technologies enhance marketing precision and emotional resonance, their ethical use requires regulatory oversight, consumer education, and policy frameworks to ensure inclusive and responsible adoption in both global and local contexts.

The reviewed literature aligns closely with the study's research objectives, highlighting four interrelated insights. First, neuromarketing methods (EEG, fMRI, eye-tracking, and biometrics) are transforming how advertising, branding, and packaging are designed by providing objective, real-time insight into subconscious decision-making. Second, ethical challenges (privacy breaches, manipulation of autonomy, and inadequate consent) pose substantial risks that demand immediate regulatory attention. Third, the South African experience underscores the promise of affordable neuromarketing tools in supporting inclusive entrepreneurship, though their benefits are constrained by limited access to expertise and ethical infrastructure. Finally, the synthesis calls for a structured ethical framework and capacity-building initiatives to guide marketers, entrepreneurs, and policymakers in ensuring transparency, accountability, and cultural sensitivity.

Overall, the findings confirm that neuromarketing stands at a critical intersection between innovation and ethics. It has revolutionised the way marketers understand consumer behaviour by translating subconscious

⁸⁹ Mulibana and Tshikovihi (n 11).

responses into actionable insights for advertising, branding, and packaging. However, its power to influence emotions and choices also raises urgent ethical questions about privacy, consent, and manipulation, especially in contexts where legal and educational systems are still developing. In South Africa, neuromarketing presents an opportunity to democratise access to advanced marketing science, giving rural and small businesses tools once reserved for large corporations. Yet, its long-term legitimacy depends on embedding ethical standards that protect both consumers and communities. Therefore, neuromarketing's future lies not only in technological advancement but in fostering a balanced ecosystem where innovation, responsibility, and transparency coexist to serve both business growth and societal trust.

7.0 DISCUSSION OF FINDINGS

The synthesis of the reviewed literature reveals that neuromarketing in 2025 has fundamentally reshaped how consumer decision-making is analysed, offering unprecedented precision in decoding subconscious drivers of choice. Across global and South African contexts, technologies such as EEG, fMRI, eye-tracking, and biometric measures have advanced from experimental research tools to essential components of marketing strategy. Their integration enables marketers to measure emotional arousal, attention, and memory encoding, dimensions that traditional surveys fail to capture.⁹⁰ This suggests that neuromarketing has become an indispensable strategic mechanism for identifying what truly influences consumer engagement, recall, and loyalty. However, while scholars like Ford and Alsharif and Mohd Isa celebrate these technologies for enhancing marketing effectiveness,⁹¹ others such as Ramsøy caution that their predictive validity remains context-dependent, as the interpretation of neural data is not yet fully standardised.⁹² This indicates that neuromarketing's scientific promise must be tempered by methodological rigour and critical reflection.

⁹⁰ Bellman and Varan (n 1).

⁹¹ Ford (n 4); Alsharif and Isa (n 3).

⁹² Ramsøy (n 14).

The literature clearly demonstrates that the most significant shift in contemporary marketing lies in the fusion of neuroscience and data analytics to produce evidence-based insights into advertising, branding, and packaging effectiveness. EEG, for instance, allows real-time tracking of neural engagement during exposure to advertisements, while eye-tracking identifies which visual elements capture sustained attention. These capabilities enable marketers to refine creative content to align with authentic consumer emotions, rather than speculative intuition.⁹³ Drawing from this, neuromarketing's growing influence on brand strategy can be seen as a response to market saturation and consumer fatigue, where emotional resonance and authenticity have become decisive factors in consumer choice. Yet, this same technological precision also deepens the ethical dilemma of manipulation. As Ford argues, targeting subconscious "System 1" processes risks bypassing rational reflection, thereby transforming persuasive marketing into covert behavioural engineering.⁹⁴ This tension highlights the fragile boundary between consumer empowerment and exploitation, an issue that defines the moral frontier of neuromarketing practice.

Ethical discourse within the literature reveals a pronounced concern about the inadequacy of existing legal frameworks to protect neural privacy and informed consent. Scholars such as Kaur and Kostovski and their colleagues emphasise that neuro-data, unlike conventional personal information, exposes deep layers of human emotion, preference, and intention.⁹⁵ The storage, commercialisation, and secondary use of such sensitive data challenge the assumptions of current data protection regimes. In South Africa, Ndlovu and Masuku warn that the POPIA lacks the specificity to regulate biometric and neural data, leaving consumers (particularly those in rural or low-income communities) vulnerable to unconsented data capture and behavioural manipulation.⁹⁶ This suggests that while neuromarketing's expansion presents opportunities for inclusive innovation, it simultaneously amplifies pre-existing inequalities in digital literacy and consumer protection. Moreover, the literature

⁹³ Kankaew and others (n 22); Shemfe and Mbukanma (n 12).

⁹⁴ Ford (n 4).

⁹⁵ Kaur, Sharma and Singh (n 2); Kostovski, Mladenović and Milošević (n 62).

⁹⁶ Ndlovu and Masuku (n 9).

diverges on whether industry self-regulation is sufficient. While Ramsøy supports governance through professional ethics, others such as Alsharif and Mohd Isa advocate for enforceable legal standards and layered consent mechanisms to safeguard human dignity.⁹⁷

From a developmental perspective, the South African case provides valuable insights into neuromarketing's contextual potential and limitations. Studies by Mulibana and Tshikovihi reveal that rural cooperatives and small enterprises are beginning to adopt affordable EEG headsets and eye-tracking tools to test packaging designs and storytelling-based branding for organic products.⁹⁸ This development signifies a democratization of marketing science, enabling entrepreneurs who were once excluded from formal consumer research to access actionable insights. Yet, the same accessibility introduces new ethical complexities, as community-level biometric data are sometimes collected without clear consent frameworks. This reflects a broader dilemma where technological inclusion without ethical literacy risks replicating exploitative models of global marketing under the guise of innovation. Therefore, capacity building in neuroethics, public education, and institutional oversight must evolve in tandem with technological uptake.

Collectively, these findings imply that neuromarketing's future legitimacy depends on reconciling its scientific precision with moral responsibility. The field's contribution to advertising and branding is undeniable, it allows businesses to align marketing stimuli with authentic consumer emotions and thereby enhance engagement and loyalty. However, without ethical safeguards, such alignment can devolve into manipulation that erodes trust and autonomy. Drawing from the reviewed evidence, a responsible neuromarketing framework should therefore prioritise three principles: transparency in data collection and usage, cultural and contextual sensitivity in marketing application, and equitable access to both tools and knowledge. This framework would empower marketers

⁹⁷ Ramsøy (n 14); Alsharif and Isa (n 3).

⁹⁸ Mulibana and Tshikovihi (n 11).

and policymakers to ensure that neuromarketing evolves as a tool for empowerment, not coercion.

In summary, neuromarketing in 2025 embodies a paradox: it is both a frontier of scientific innovation and a crucible of ethical contention. While it has redefined how emotions and cognition shape consumer behaviour across advertising, branding, and packaging, its growing influence necessitates a corresponding evolution in ethical governance. The South African experience exemplifies this dual reality, demonstrating both the inclusivity potential of affordable neuromarketing tools and the dangers of regulatory lag. Thus, neuromarketing's impact will ultimately depend on how effectively marketers, scholars, and policymakers negotiate the balance between innovation and integrity, ensuring that the study of the brain in commerce serves humanity as much as it serves the market

8.0 RECOMMENDATIONS

Drawing from the findings and discussion, it is recommended that marketers, policymakers, and academic institutions collaborate to establish a comprehensive ethical framework that governs the collection, analysis, and use of neuro-data in marketing practice. Such a framework should prioritise transparency, informed consent, and consumer autonomy while ensuring compliance with national data protection laws and international best practices. There is also a need for capacity building among small businesses and rural entrepreneurs to equip them with the technical and ethical knowledge required to apply neuromarketing responsibly. Public-private partnerships can play a key role in providing training, access to affordable neuromarketing tools, and oversight mechanisms that prevent exploitation and data misuse. Furthermore, academic institutions should integrate neuromarketing ethics into business and marketing curricula to promote awareness among future practitioners. Lastly, policymakers should strengthen South Africa's regulatory landscape by explicitly including neuro-data within privacy legislation to protect vulnerable consumers and promote responsible innovation that balances commercial growth with societal trust and dignity.

8.1 Future Research

Future research should deepen empirical understanding of how neuromarketing techniques influence real consumer decision-making in diverse socio-economic and cultural contexts, particularly within developing economies. There is a need for longitudinal studies that examine whether neural and biometric responses translate into sustained behavioural outcomes such as brand loyalty, ethical consumption, and trust. Future studies should also explore the balance between innovation and consumer protection by testing practical ethical frameworks that integrate neuroscience with marketing governance. In the South African context, research should investigate how small businesses and rural entrepreneurs can ethically adopt affordable neuromarketing tools while preserving data integrity and community trust. Further comparative studies between developed and emerging markets would provide insight into how regulatory, cultural, and digital literacy factors shape responsible neuromarketing practice. Ultimately, advancing interdisciplinary research between marketing, psychology, neuroscience, and law will be crucial to building a globally inclusive and ethically grounded foundation for the future of neuromarketing.

9.0 CONCLUSION

This study concludes that neuromarketing has become a transformative force in modern marketing, redefining how consumer decision-making is understood across advertising, branding, and packaging. By integrating neuroscience, psychology, and data analytics, neuromarketing reveals the subconscious drivers of emotion, attention, and memory that shape consumer preferences, insights that traditional methods could not capture. The findings show that technologies such as EEG, fMRI, and eye-tracking have evolved into indispensable tools for marketers seeking to design more emotionally resonant and effective campaigns. However, the study also exposes a critical tension between innovation and ethics: the same tools that enhance marketing precision also pose risks of privacy invasion, manipulation, and uninformed consent. In South Africa, while affordable neuromarketing tools offer unprecedented opportunities for small businesses and rural entrepreneurs, the lack of robust ethical and legal safeguards leaves vulnerable communities exposed to potential

exploitation. Therefore, neuromarketing's legitimacy and sustainability depend on establishing an ethical governance framework that balances commercial advancement with social responsibility. This study underscores that the future of neuromarketing lies not merely in technological sophistication but in its ability to uphold transparency, autonomy, and fairness, ensuring that understanding the consumer mind becomes a means of empowerment rather than control.