

**South African marketing researchers' perceptions of neuromarketing and its utilisation
in a marketing research context**

by

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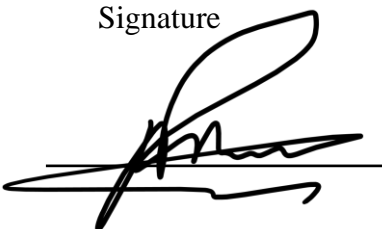
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I, **Marie' Roux**, hereby declare that this mini-dissertation is my original work except where references to other sources have been made, which have been acknowledged and properly cited. I further declare that the work I am submitting has not been previously submitted before for any degree or examination to any other university or tertiary institution for examination.

Signature



Date

16 October 2024

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Abstract

Our decision-making and behaviour as consumers are largely influenced by unconscious and subconscious mental processes. The willingness to act upon our desire to purchase products or services is inherently linked to various underlying neurocognitive and emotional factors driving our preferences and actions. At its core, neuromarketing is considered a field of research that scientifically investigates intrinsic consumer decision-making by employing a variety of neurophysiological techniques and theories. However, despite the potential of neuromarketing techniques to provide unique insights into consumer behaviour, its adoption by South African marketing research firms remains limited, resulting in a lack of extensive literature on the application of neuromarketing within South Africa. Thus, the purpose of this qualitative study was to explore the perceptions of South African marketing researchers about neuromarketing and its utilisation within a South African marketing research context. Employing an experiential research design, the researcher sought to understand how neuromarketing is perceived and applied by industry professionals in South Africa. Individual semi-structured interviews were conducted with 11 marketing researchers with experience working with or managing neuromarketing projects at South African marketing research firms. The transcripts were analysed using reflexive thematic analysis with four themes and 12 subthemes identified from the interview data. Overall, the findings revealed key insights concerning the potential and challenges of incorporating neuroscientific techniques and theories within an industry reliant on traditional marketing research methods. Regardless of the implications associated with integrating neuroscientific techniques in a developing country, most participants expressed positive perceptions about neuromarketing. This pertained to the potential of neuromarketing to serve as a complementary approach to traditional marketing research methods, offering a more comprehensive understanding of consumer behaviour. Consequently, this study contributed

to the existing body of literature on the application of neuromarketing in developing countries and addressed the gap in understanding both current and future applications of neuromarketing in South Africa.

Keywords: Neuromarketing, neuromarketing techniques, neuromarketing perceptions, unconscious and subconscious behaviour, South Africa

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Chapter 1: Introduction

1.1 Introduction

Most of our decisions arise from different functional neural circuits related to emotion, memory, and attention (Alsharif, Salleh, & Baharun, 2021; Shaw & Bagozzi, 2018). In the field of marketing research, understanding these unconscious and subconscious processes driving decision-making becomes important when implementing effective marketing strategies (Alsharif, Salleh, & Baharun, 2021; Gurgu et al., 2020). However, many traditional marketing research methods, such as surveys and interviews, utilise self-reported consumer responses (Bhardwaj et al., 2023; Biswas et al., 2022; Fortunato et al., 2014). Thus, these strategies may be less effective in capturing the underlying neurocognitive and emotional processes involved in consumer decision-making due to the presence of self-reported bias (Rawnaque et al., 2020; Royo-Vela & Varga, 2022). The limitations of traditional marketing techniques have encouraged marketing researchers to adopt more effective methods that explore consumers' unconscious and subconscious motivations to use or buy products (Alsharif, Salleh, & Baharun, 2021).

Neuromarketing refers to the application of neuroscientific theories and measurement techniques to analyse and gain insight into consumer behaviour, motivations, and decisions in response to marketing stimuli, which involves unconscious and subconscious thought processes (Bhardwaj et al., 2022; Daugherty & Hoffman, 2017; Lim, 2018). It is essential to acknowledge that both the terms *unconscious* and *subconscious* are used in neuromarketing research and investigated using neuromarketing techniques (Alsharif, Salleh, & Baharun, 2021; Bhardwaj et al., 2022; Lim, 2018; Shaari et al., 2019). As knowledge of neuroscientific technology increases, it is crucial to utilise this knowledge to enhance our understanding of human behaviour in a variety of contexts (Bočková et al., 2021). Recent research emphasises interdisciplinary fields in which the application of neuroscientific technology and concepts to

understand human behaviour remains limited, thus presenting opportunities for future research. This includes fields such as neurostrategy, that is, the use of neuroscientific principles to inform strategic management (Kaur, 2024), education (Martinez-Lincoln et al., 2024), and clinical research in which neuroscientific technologies such as eye-tracking combined with artificial intelligence could be explored in early diagnosis and intervention of psychological disorders (Kędras & Sobiecki, 2023). By recording neuronal activity with the use of non-invasive brain signal recording techniques, researchers can gain insight into the neurocognitive and emotional processes underlying unconscious and subconscious behaviour (Bhardwaj et al., 2022; Rawnaque et al., 2020).

1.2 Rationale

The implementation of neuroscientific methods in marketing research offers a valuable opportunity to generate objective data, which can serve as a supplementary resource alongside conventional marketing research techniques (Royo-Vela & Varga, 2022). However, marketing professionals' perceptions regarding the implementation of neuroscientific theories and techniques within a marketing domain are inconsistent (Banerjee, 2021; Cardoso et al. 2022). Specifically, different ethical ideologies towards technological advancements underlie individuals' perceptions of neuromarketing, which are further influenced by their knowledge of the subject, as well as whether they have experienced or utilised such technologies (Bakardjieva & Kimmel, 2017; Royo-Vela & Varga, 2022).

Furthermore, despite the benefits associated with neuromarketing, only a few companies have implemented and applied this marketing practice in South Africa (Biswas et al., 2022). This could be due to the expensive nature associated with the implementation of neuromarketing techniques as it includes the use of specialised neuroscientific technology and medical equipment, which developing countries do not necessarily have access to (Alsharif et al., 2023; De Oliveira & Giraldi, 2017). As a result, research regarding the

current perceptions of this marketing strategy within a South African context remains scarce and inconclusive (Biswas et al., 2022). However, as technological advancements increase, these innovations are becoming more affordable in developing countries such as South Africa (Rosoff, 2015). Thus, this research study intends to contribute to the current body of neuromarketing literature and address the gap regarding the perceptions and applications of neuromarketing in South Africa.

1.3 Research Aim and Objectives

The study aims to obtain insight into the present and future application of neuromarketing in South Africa by addressing the following research question: What perceptions do South African marketing researchers hold towards neuromarketing and its utilisation in the marketing research context? To achieve this aim and answer the research question, the following research objectives are outlined: a.) to explore South African marketing researchers' perceptions of neuromarketing, and b.) to explore South African marketing researchers' use of neuromarketing in a marketing research context.

1.4 Nature of Study

This qualitative research study was conducted within an experiential framework, which involves exploring perceptions and meanings as reflections of participants' internal states (Braun & Clarke, 2013). The researcher sought to obtain insights into the current and future state of neuromarketing within the South African marketing research industry by exploring the perceptions of South African marketing researchers who had experience working with these techniques. As a result, the researcher started by performing an online search for South African marketing research firms that either currently employ or have previously applied neuromarketing techniques within their marketing research practices. Following this identification, the researcher reached out to the CEOs of these firms through email and telephone to seek permission for recruiting their marketing researchers. A total of

11 marketing research professionals joined the study. Semi-structured interviews were conducted virtually with each participant to obtain qualitative data on their perceptions of the application of neuromarketing in South Africa. The interview transcripts were analysed within the context of reflexive thematic analysis, reflecting the researcher's active role in understanding patterns and themes within the qualitative data.

1.5 Defining Key Concepts

The following are key concepts defined for the purpose of the study:

Neuromarketing can be defined as a multidisciplinary field that combines neuroscience and cognitive psychology with marketing to investigate the unconscious and subconscious processes and physiological responses to marketing stimuli (Bhardwaj et al., 2022; Fortunato et al., 2014; Lim, 2018; Royo-Vela & Varga, 2022).

Neuromarketing techniques refer to the neuroscientific methods and tools used to collect data on consumer unconscious and subconscious behaviour in neuromarketing research (Fortunato et al., 2014). This includes brain-monitoring tools, such as electroencephalography, magnetoencephalography, steady-state topography, functional magnetic resonance imaging, and position emission tomography tools, as well as devices that record neural activity outside the brain, such as electrocardiogram, eye-tracking, facial electromyography and coding, and galvanic skin response devices (Fortunato et al., 2014; Lim, 2018).

Traditional or conventional marketing research techniques include research methods that depends on self-reported responses in which the participant is expected to describe his or her conscious thoughts, behaviour, or decisions (Alsharif, Salleh, & Baharun, 2021; Eroglu & Kucun, 2020; Royo-Vela & Varga, 2022). These techniques typically consist of interviews, surveys, focus groups, questionnaires, and observations and can be conducted using qualitative, quantitative, or mixed-methods approaches (Eroglu & Kucun, 2020).

Although modern definitions of unconscious processes are diverse, **the unconscious** can be defined as the absence of immediate awareness or mental processes taking place without the influence of conscious awareness (Thomson & Coates, 2021). **The subconscious** is defined as the part of the mind that is not currently in focal awareness but can affect thoughts, feelings, and behaviour, functioning below the level of conscious awareness (Hashim & Ramadhan, 2022).

1.6 Structure of Mini-Dissertation

This mini-dissertation consists of five chapters. The following indicates a brief summary of the remaining chapters.

1.6.1 Chapter 2 – Literature Review

This chapter provides an overview of the relevant literature in the field of neuromarketing and its application within a marketing research context. It also introduces neuromarketing by outlining its significance as a marketing strategy and tracing its historical development in research. It reviews the primary techniques used in neuromarketing while introducing the neuropsychological processes driving consumer behaviour. Finally, the chapter explores recent literature on the perceptions of neuromarketing and concludes by discussing the implications of applying neuromarketing in developing countries.

1.6.2 Chapter 3 – Research Methodology

Chapter three provides a detailed description of the methodological procedures used in this study. Specifically, this chapter considers the study design and methodological framework underlying the research strategy. It also describes the recruitment and sampling processes, data collection, and analysis phases, and concludes with a discussion on trustworthiness as well as the ethical considerations in the study.

1.6.3 Chapter 4 – Results

This chapter presents an overview of the main findings obtained from this research study. Detailed accounts of each theme and subtheme are provided, supported by verbatim quotations from the transcripts.

1.6.4 Chapter 5 – Discussion and Conclusion

The final chapter discusses and interprets the research findings in relation to the existing neuromarketing literature while contextualising the results within the scope of the research aim and objectives. The chapter also addresses the study's limitations and offers recommendations for future research.

1.7 Conclusion

Chapter 1 introduced the context and rationale for conducting neuromarketing research in South Africa, followed by a short description of the research aim and objectives, the nature of the study, and key concepts. The following chapter will detail the literature reviewed within the context of neuromarketing in South Africa.

Chapter 2: Literature Review

2.1 Introduction

This chapter aims to introduce the concept of neuromarketing by firstly providing a brief overview of its importance as a marketing strategy as well as the history and development of the practice of neuromarketing in a marketing research context. Subsequently, the chapter also summarises the main techniques and tools used in the field of neuromarketing. To conceptualise this phenomenon and its applications for consumer research, chapter two further describes the neuropsychological processes involved in consumer behaviour and decision-making by emphasising three main processes namely, attention, memory, and emotion. Finally, chapter two aims to provide a synthesis of the current perceptions of the application of neuromarketing by considering the factors involved in influencing such perceptions. This chapter concludes by providing a brief overview of the application of neuromarketing as well as the challenges and implications associated with implementing neuromarketing techniques in developing countries.

2.2 Neuromarketing and its Significance as a Marketing Strategy

Researchers contended that unconscious and subconscious mental processes largely influence consumer decision-making and behaviour (Alsharif, Salleh, & Baharun, 2021; Biswas et al., 2022). Specifically, research has indicated that most human decision-making underlying purchasing behaviour is made by unconscious processing (Bhardwaj et al., 2023; Biswas et al., 2022; Singh, 2020). Different functional neural processes related to neurocognitive and emotional processing play a significant role in driving the ability of consumers to act upon their desire to buy products or services (Alsharif, Salleh, & Baharun, 2021; Shaw & Bagozzi, 2018). Investigating the neural correlates of consumer behaviour, motivations, and preferences may thus provide valuable insights to implement more effective marketing strategies.

With the rapid development of neuroscientific technology over recent years along with the growing need to obtain more accurate consumer data, neuromarketing has become an area of interest for both academics and marketing researchers (Rawnaque et al., 2020; Royo-Vela & Varga, 2022; Shaw & Bagozzi, 2018). Neuromarketing is a relatively young discipline that involves the use of neuroscientific theories and techniques to explore, measure, and analyse the neurocognitive and emotional processes in response to a marketing stimulus to gain insight into consumers' preferences and decisions (Alsharif, Salleh, Baharun, & Yusoff, 2021; Bhardwaj et al., 2023; Thomas, 2017). As a result, the term neuromarketing is often approached as a multidisciplinary field resulting from a convergence between neuroscience and marketing (Fortunato et al., 2014; Lim, 2018). Following the contributions of neuromarketing in the academic and marketing spheres, many definitions of the concept have been developed (Royo-Vela & Varga, 2022). However, Lim (2018, p. 206) has provided a more comprehensive definition:

Neuromarketing is an interdisciplinary branch of knowledge that is predicated on the use of neuroscientific concepts, theories, and methods to study the brain and nervous system in the pursuit of understanding instinctive human behaviour, in terms of neurocognitions and emotions, conscious and unconscious, in response to a marketing stimulus (e.g., markets, marketing exchanges), whereby the knowledge resulting from a neuromarketing investigation contributes to the development and advancement of marketing theory and the planning and implementation of marketing strategies, with (e.g., to make a sale) and without (e.g., to influence behaviour for a social good) commercial marketing goals.

According to Bočková et al. (2021) and Fortunato et al. (2014), neuromarketing techniques allow for a considerable advantage over traditional marketing methods as these approaches provide access to less biased insights and more objective data. Traditional

marketing research techniques, which include surveys, focus groups, and personal interviews, are dependent on conscious, subjective reports and discount the role of unconscious and subconscious processes in driving decision-making (Alsharif, Salleh, Baharun, & Yusoff, 2021; Harris et al., 2018; Rawnaque et al., 2020). Specifically, traditional marketing research techniques rely on the measurement of consciously articulated responses to understand and analyse consumer behaviour in response to a marketing stimulus (Alsharif, Salleh, & Baharun, 2021; Royo-Vela & Varga, 2022). This gives rise to inaccurate data and less efficacious marketing strategies due to biased consumer responses (Alsharif, Salleh, Baharun, & Yusoff, 2021; Bhardwaj et al., 2023). In contrast, neuromarketing provides an opportunity to predict and obtain insights into consumer decision-making by exploring memory, emotional preferences, and attentional factors driving consumer behaviour (Lim, 2018).

Another advantage of neuromarketing techniques over traditional techniques relates to the speed and simultaneity of data collection (Fortunato et al., 2014). For instance, some neuromarketing techniques, such as electroencephalography (EEG) and magnetoencephalography (MEG), can measure consumer responses concurrently with exposure to marketing stimuli, which allows marketing researchers to determine which aspects of the marketing strategy needs to be included or discarded (Fortunato et al., 2014). As a result, the application of neuroscientific techniques in marketing research as an adjunctive resource to traditional marketing research techniques has presented an opportunity to provide a much broader and comprehensive understanding of consumer decision-making behaviour and mental processes (Royo-Vela & Varga, 2022).

2.3 A Brief History of Neuromarketing

In 2002, the term neuromarketing was first introduced by Ale Smidts, a professor at the Rotterdam School of Management at Erasmus University Rotterdam, who claimed that it was a novel strategy that studied the underlying cerebral mechanisms to gain insight into

consumers' behaviour to optimise marketing strategies (Alsharif, Salleh, & Baharun, 2021; Bhardwaj et al., 2023; Lim, 2018). At that time, two companies namely, Brighthouse and SalesBrain, became the first two corporations to provide neuromarketing research and consulting services (Aldayel et al., 2020; Iloka & Onyeke, 2020). However, the original ideas of applying neuroscientific concepts and techniques to marketing research dates to the 1970s and 1980s (Bočková et al., 2021; Levallois et al., 2019). During these decades, eye-tracking and pupillometry studies were prominent techniques in which pupil dilation was measured to analyse neurocognitive activity while participants were exposed to marketing stimuli, such as advertisements (Levallois et al., 2019). Similarly, in the 1980s, Rothschild et al. (1988) conducted studies using EEG devices to analyse information processing and hemispheric differences in consumers watching television commercials. In the late 1990s, researchers began to employ more advanced neuroscientific diagnostic devices for consumer and marketing research (De Oliveira & Giraldo, 2017). This milestone in the early application of neuromarketing is evident from the research conducted by Gerald Zaltman in the 1990s (De Oliveira, 2014; Levallois et al., 2019). Specifically, Zaltman (1997), a professor at Harvard University, used positron emission tomography (PET) scans to examine the influence of three different marketing stimuli on consumer trust, anxiety, and comfort. Subsequently, Zaltman along with Stephan Kosslyn, a cognitive neuroscientist at Harvard University, filed a patent for "Neuroimaging as a marketing tool" (Levallois et al., 2019).

Another project that significantly influenced the publicity and development of neuromarketing was the study conducted by McClure et al. (2004) on the underlying neural correlates of consumer preference for two well-known soft drink brands using functional magnetic resonance imaging (fMRI) techniques. Since these contributions, there has been a growing interest among scholars and companies in implementing biometric and neuroscience techniques for marketing purposes (Del Mar Lozano Cortés & García García, 2017).

Furthermore, in 2012, the Neuromarketing Science and Business Association (NMSBA) was founded to refine the methodology as well as obtain greater international acceptance of neuromarketing (Royo-Vela & Verga, 2022). As a result, the NMSBA organised the first Neuromarketing World Forum to discuss neuromarketing research, consumer insights, as well as international standardisation and ethical guidelines (Gurgu et al., 2020).

Today, neuromarketing is an advancing discipline that continues to attract attention in both the academic and corporate domains (Bočková et al., 2021; Royo-Vela & Verga, 2022). As a result, there has been an increase in the number of publications across various marketing journals as well as companies employing neuromarketing techniques to implement more effective marketing strategies (Iloka & Onyeke, 2020).

2.4 Types of Neuromarketing Techniques

The techniques used in neuromarketing allow researchers to detect, measure, and record neural and metabolic activity in response to exposure to different stimuli (Ćosić, 2016; Fortunato et al., 2014; Lim, 2018). Subsequently, neurological representations of neural and metabolic activity can be generated to understand the underlying mechanisms of consumer decision-making (Gurgu et al., 2020; Lim, 2018). These techniques enable researchers to observe the neural processes underlying behaviour in real time (Lim, 2018). The most common neuroscientific techniques used in neuromarketing include electromagnetic devices, for instance, EEG, MEG and steady-state topography (SST), as well as tools that measure metabolic activity, such as fMRI and PET scans. This also includes techniques that detect external neuronal activity, such as electrocardiography (ECG), facial electromyography (fEMG), galvanic skin response (GSR), and eye-tracking (Ćosić, 2016; Fortunato et al., 2014; Gurgu et al., 2020; Lim, 2018; Rawnaque et al., 2020). Furthermore, these techniques have also been used together with artificial intelligence, big data, and virtual reality (Royo-Vela &

Verga, 2022). However, the discussion in the following section will only focus on the most common techniques currently applied in the field of neuromarketing.

2.4.1 Electromagnetic Devices

2.4.1.1 Electroencephalography. An EEG device measures and records electrical activity in the brain by using a band or helmet with electrodes placed on an individual's scalp (Bočková et al., 2021; Fortunato et al., 2014). Specifically, this device records changes in the electrical currents in the brain as brain waves (Lim, 2018). The employment of EEG devices has gained considerable attention in the marketing research domain, allowing researchers to investigate the underlying neurocognitive and emotional processes when participants are exposed to a marketing stimulus (Costa-Feito et al., 2023; Golnar-Nik et al., 2019). Additionally, EEG devices provide high temporal resolution for recording brief changes in electrical brain activity at relatively low costs (Lim, 2018). They are also more widely available compared to other brain-imaging devices (Byrne et al., 2022; Fortunato et al., 2014). Furthermore, EEG devices are non-invasive and their portability allows usage in different marketing environments (Bočková et al., 2021; Costa-Feito et al., 2023). However, despite featuring high temporal resolution, EEG techniques are characterised by relatively poor spatial resolution, limiting the recording to superficial electrical signals and brain activity in subcortical areas (Fortunato et al., 2014; Lim, 2018).

In marketing and consumer research, EEG devices are most often used to record underlying consumer responses in relation to branding, advertising, and pricing (Costa-Feito et al., 2023). For instance, in a study conducted by Golnar-Nik et al. (2019), consumer preferences and decision-making were investigated in response to a series of mobile phone advertisements using EEG tools. Specifically, the findings suggested that changes in EEG power, particularly in the centro-parietal and frontal regions, could be a good predictor of consumer decision-making.

Consumer responses are typically recorded using either EEG neural oscillations or event-related potential (ERP) components which are used to investigate neurocognitive or perceptual processes when an individual is exposed to a sensory stimulus (Bazzani et al., 2020; Byrne et al., 2022; Costa-Feito et al., 2023). The EEG neural oscillations, however, are divided into five frequency bands: delta, theta, alpha, beta, and gamma bands, which record the frequency of oscillations in brain activity and the voltage of electrical potential (Bazzani et al., 2020). Each band is also indicative of a specific behavioural state (Bazzani et al., 2020). By measuring specific brainwave patterns, researchers can also discern two affective states associated with positive and negative emotions (Barros et al., 2022). Emotional valence is frequently inferred by variations in frontal asymmetry, a measure of the difference in alpha power between the right and left frontal brain regions (Allen & Reznik, 2015). Specifically, high levels of right cortical activity are associated with negative stimuli and withdrawal behaviours, whereas increased left cortical activity has been linked to positive stimuli and approach behaviours (Barros et al., 2022).

Furthermore, the significance of using EEG techniques in consumer research is reflected in its ability to measure various neural correlates related to attention, memory, preferences, affect and emotion (Costa-Feito et al., 2023). This is illustrated by a case study using portable EEG to predict content recall (Barnett & Cerf, 2017). Particularly, the study found that commercials inducing high neural similarity among participants tend to be more memorable (Barnett & Cerf, 2017). As a result, EEG techniques have become one of the most frequently adopted neuroscientific methods used in marketing and consumer research (Bazzani et al., 2020).

2.4.1.2 Magnetoencephalography. A MEG device records changes in the magnetic field in the brain induced by electrochemical signals between neurons using a helmet with electromagnetic-sensitive detectors (Bočková et al., 2021; Fortunato et al., 2014; Rawnaque

et al., 2020). Similar to EEG devices, MEG techniques provide high temporal resolution for recording brief changes in neural activity when an individual is exposed to a marketing stimulus (Lim, 2018). Thus, as with EEG devices, MEG techniques allow marketing researchers to evaluate the value of a particular marketing stimulus (Lim, 2018). However, unlike EEG techniques, MEG devices provide better spatial resolution as the magnetic activity in the brain is less distorted by the skull (Bočková et al., 2021). As a result, these devices have been employed in studies evaluating the neural correlates driving intentional decision-making and selective attention (Moerel et al., 2024; Si, 2023). Specifically, by utilising MEG techniques, Moerel et al. (2024) revealed that attention enhances neural representations of stimuli in specific brain regions before decision-making. Similarly, Si (2023) revealed that brain activity prior to choice onset can predict neurocognitive intentions, indicating a distinct relationship between attention, decision processes, and stimulus processing.

Despite the advantages of employing these techniques in neuromarketing research, MEG devices are not portable, which significantly restricts their usage to laboratory settings as opposed to various marketplace environments (Lim, 2018). Another limitation of these devices relates to the high acquisition and setup costs due to the use of large hyper-sensitive magnetometers used to measure electromagnetic activity in the brain (Bočková et al., 2021; Fortunato et al., 2014). As a result, marketing researchers often prefer EEG devices rather than MEG techniques to investigate underlying consumer responses (Fortunato et al., 2014).

2.4.1.3 Steady-State Topography. Another technique that is often employed in neuromarketing to record brain activity is known as SST (Singh, 2020). Steady-state topography devices measure the variation in EEG activity while the participant is exposed to an audio-visual stimulus and performing a psychological task (Singh, 2020; Pradeep et al., 2022). A sinusoidal flicker is introduced in the participant's visual periphery to induce an

oscillatory brain electrical response, known as steady-state visually evoked potential (SSVEP) (Bojić et al., 2021). Subsequently, researchers use these tools to measure the speed of information processing as well as task-related variation in brain activity from SSVEP measurements (Bojić et al., 2021; Harris et al., 2018; Pradeep et al., 2022). Due to their high temporal resolution, SST devices are often employed to investigate consumer behaviour in response to television commercials (Harris et al., 2018). This is demonstrated by a study by Pynta et al. (2014) in which the effect of social media interaction during live television on viewer engagement was investigated. Interestingly, the findings indicated that rather than being a distraction, social media usage during television viewing significantly enhanced neural indicators of engagement with the television programme (Pynta et al., 2014). Consequently, SST usage has also become popular in areas related to brand communication, entertainment analysis, brand recall, and advertisement testing (Bojić et al., 2021; Hilderbrand, 2016). However, similar to EEG devices, SST tools have poor spatial resolution, thus limiting brain recording activity (Zhang et al., 2023).

2.4.2 Brain-Imaging Devices

2.4.2.1 Functional Magnetic Resonance Imaging. These brain-imaging devices record underlying consumer responses by measuring neural activity through the detection of changes in blood flow (Bakardjieva & Kimmel, 2017; Rawnaque et al., 2020; Ruanguttamanun, 2014). Specifically, by utilising the magnetic properties of oxygenated and deoxygenated blood, an fMRI detects blood oxygenation levels in the brain and correlates these levels with neural activity (Lim, 2018). This allows researchers to determine which parts of the brain are active, as certain brain areas will receive more oxygenated blood when an individual is exposed to different marketing stimuli (Ćosić, 2016; Ruanguttamanun, 2014). This device also provides high spatial resolution, enabling researchers to investigate deeper brain areas (Fortunato et al., 2014; Rawnaque et al., 2020).

Research has indicated the use of fMRI devices in marketing studies evaluating how frequently the brain engages the regions for emotion, memory, attention, and personal value when exposed to various marketing stimuli (Bakardjieva & Kimmel, 2017; Ruanguttamanun, 2014). Furthermore, fMRI devices have also been used in studies evaluating marketing topics related to brand recall, loyalty, and favourability (Al-Kwafi, 2016; Peiris et al., 2024; Shaw & Bagozzi, 2018). As an example, Al-Kwafi (2016) employed fMRI technology to investigate the neuropsychological processes underlying consumer attitudes and decision-making toward brand switching. The findings revealed that, for high-technology consumer brands, perceived usefulness is more significantly linked to increased activation in the ventromedial prefrontal cortex compared to pleasure-related judgments (Al-Kwafi, 2016). This brain region is integral to decision-making and reward processing (Kroker et al., 2022), suggesting that perceived usefulness plays a critical role in shaping consumers' attitudes toward transitioning to high-technology brands.

However, despite the value of employing these devices in marketing research, fMRI tools are expensive and the equipment is not portable, thus restricting its application to laboratory settings (Ćosić, 2016). Additionally, fMRI devices also provide low temporal resolution as opposed to electromagnetic devices such as EEG and MEG (Lim, 2018; Rawnaque et al., 2020). Nonetheless, fMRI tools are considered one of the most favourable neuroscientific methods to investigate consumer responses, decision-making, preferences, and choices (Alsharif, Salleh, & Baharun, 2021; Ćosić, 2016).

2.4.2.2 Position Emission Tomography. A PET scan is a brain-imaging technique used to investigate how certain metabolic substances and neurotransmitters that influence behaviour, such as glucose, serotonin, and dopamine, are accumulated and distributed in the brain (Ćosić, 2016). PET scans provide accurate data, significant diagnostic information, and mapping of neural activity (Berčík & Rybanská, 2017; Gani et al., 2015). However, PET

scans are considered invasive, as these techniques require participants to be injected with radioactive agents into their bloodstream which bind to certain substances in the brain that allow them to be measured (Ćosić, 2016; Bočková et al., 2021). As a result, PET scans are not frequently employed in the field of neuromarketing and consumer research (Bočková et al., 2021). These devices are also expensive, limiting the sample size and may lead to the generalisation of findings (Berčík & Rybanská, 2017). Thus, although PET scans are frequently cited as a neuroscientific technique in neuromarketing literature and have been widely applied in medical and attention-related research (Anderson et al., 2016; Fukai et al., 2019; Tian et al., 2014), there remains a notable scarcity of studies that specifically employ PET scans within the context of marketing research.

2.4.3 External Neural Activity Devices

2.4.3.1 Electrocardiogram. To measure and record the fluctuation in the electrical activity of the heart, researchers often employ an ECG device (Kalaganis et al., 2021). It is a standard device for measuring heart rate by sensors placed on the skin and allows marketing researchers to analyse real-time information about the emotional state of the participant (Antoniak, 2020; Micu et al., 2021). This is based on the fact that emotion influences heart rate (Berčík & Rybanská, 2017). The analysis of heart rate variability (HRV) is a well-known indicator of the relationship between neural and cardiac activity (Berčík & Rybanská, 2017). Specifically, HRV feedback provides valuable data concerning the arousal levels of the consumer, with high HRV levels indicating decreased arousal levels, and low HRV revealing increased arousal levels (Kalaganis et al., 2021).

The utilisation and effectiveness of ECG techniques in marketing research are illustrated in a study that investigated participants' emotional and physiological responses to television advertisements (Baraybar-Fernández et al., 2017). By measuring HRV as an indicator of autonomic nervous system activity, the study revealed that advertisements

evoking emotions, such as joy and anger, significantly altered heart rate, which is indicative of heightened emotional arousal (Baraybar-Fernández et al., 2017). Moreover, ECG devices are often used together with other neuroscientific devices, such as EEG, eye-tracking, and fEMG techniques (Antoniak, 2020). They are also considered cost-effective and less intrusive to participants, making ECG devices efficient and reliable for studying underlying consumer responses (Micu et al., 2021).

2.4.3.2 Eye-Tracking. Eye-tracking is a popular method for analysing visual attention by tracking eye movements or measuring pupil dilation, visualisation time, and gaze patterns (Ćosić, 2016; Fortunato et al., 2014; Rawnaque et al., 2020). As a result, these devices have captured the interests of marketing researchers and have provided new insights and perspectives within the field of neuromarketing (Dos Santos et al., 2015). In marketing research, eye-tracking methods are typically used to record and analyse gaze locations and patterns to understand consumer responses to various marketing stimuli (Lim, 2018). Such information provides key insights regarding consumer focus, preference, and interest to analyse marketing effectiveness (Berčík & Rybanská, 2017; Gheorghe et al., 2023; Lim, 2018).

There are various types of eye-tracking devices, including wearable, mobile, or stationary versions depending on the nature of the research being conducted (Berčík & Rybanská, 2017; Gheorghe et al., 2023). These devices use an optimal camera to detect the location of the pupil and cornea by using infrared light that induces corneal reflection (Lim, 2018). Some more advanced devices can measure head movement by recording the position of the head in three-dimensional space with respect to the camera (Ćosić, 2016; Dos Santos et al., 2015). However, eye-tracking devices are most frequently used to record consumer observation of specific stimuli at fixed points in photos or videos (Dos Santos et al., 2015).

In neuromarketing, eye-tracking devices are efficient tools for measuring consumer attention and engagement with various marketing stimuli (Micu et al., 2021). They are cost-effective, highly accessible, and provide valuable insights into consumer visual behaviour (Antoniak, 2020; Lim, 2018; Fortunato et al., 2014). As a result, marketing researchers have employed these techniques in different projects related to product design, product positioning, and marketing communication (Ćosić, 2016). For instance, in a study conducted by Zuschke (2020), eye-tracking was used to examine how consumers' visual attention affects their product choices, particularly as task complexity increases. Specifically, the study found that motivated participants were more likely to focus on attention-drawing products, while less motivated participants were influenced primarily by larger products, with visual attention affecting their choices even without conscious preference (Zuschke, 2020). In a similar study, Cholewa-Wójcik and Kawecka (2015) emphasised the role of eye-tracking in marketing communication and design by evaluating the influence of packaging elements on consumer attentional processes, which drive consumer behaviour and preferences. Particularly, the findings revealed that certain packaging elements garner significant resources of consumers' attention, indicating the influence of scheme elements of packaging effectiveness on consumers' behaviour.

2.4.3.3 Facial Electromyography and Facial Coding. Both observable and unobservable changes in facial expressions are important indicators of consumer behaviour (Berčík & Rybanská, 2017; Tirandazi et al., 2023). Both fEMG and facial coding techniques are used to evaluate the involuntary and voluntary movements of facial muscles (Micu et al., 2021). fEMG is a highly sensitive technique that registers movements by employing facial sensors that measure the electrical impulse caused by muscle contraction (Tirandazi et al., 2023; Wingenbach, 2022). Moreover, fEMG devices are able to distinguish between positive and negative affect by recording the activation of different muscle sites (Levit et al., 2023).

As a result, these devices are primarily used to investigate consumers' emotional responses and are thus considered significant tools for evaluating consumers' preferences and emotional engagement with different marketing stimuli at a relatively low cost (Antoniak, 2020). For instance, a study conducted by Liu et al. (2018) used facial fEMG techniques to investigate the influence of product appearance on consumers' emotions. The results indicated that higher activity in the zygomaticus major muscle was associated with positive feelings when participants viewed aesthetically pleasing product images, while increased activity in the corrugator supercilii muscle suggested negative feelings toward less appealing designs (Liu et al., 2018).

Although applying fEMG in marketing research is associated with various advantages relating to increased objectivity, high sensitivity, as well as high temporal frequency, these devices are often considered restrictive (Lim, 2018; Wingenbach, 2022). Specifically, the application of fEMG devices involves the placement of lengthy facial electrodes which may limit participants' movements and alter their natural facial expressions (Levit et al., 2023; Wingenbach, 2022). However, it is important to acknowledge that due to technological advancement, more convenient wearable devices have been developed that allow new approaches for marketing researchers to record facial muscle activation (Levit et al., 2023).

In contrast, facial coding is considered a less intrusive and more cost-effective neuromarketing technique that uses a camera to capture and analyse facial micromovements (Micu et al., 2021). They are also frequently employed in advertisement testing for registering consumer micro-expressions, which are analysed and attributed to specific emotional states (Dragoi et al., 2021; Micu et al., 2021). Furthermore, facial coding devices are often used in combination with GSR and EEG techniques, as indicated by Saffaryazdi et al. (2022). Specifically, the study demonstrated that facial coding techniques, combined with

EEG and other physiological signals, provide a more reliable method for detecting genuine emotions compared to traditional macro-expression analysis (Saffaryazdi et al., 2022).

2.4.3.4 Galvanic Skin Response. Galvanic skin response, also known as electrodermal response or electrodermal activity is a relatively inexpensive method that measures subtle changes in skin conductance after being subjected to different marketing stimuli (Antoniak, 2020; Lim, 2018). These devices register alterations in the electrical conductivity of the skin in response to changes in sweat gland activity and allow marketing researchers to determine which marketing stimuli are physiologically arousing (Kalaganis et al., 2021; Micu et al., 2021; Tirandazi et al., 2023). Although regarded as a highly sensitive and convenient measure, GSR devices are often used as complementary methods to other techniques such as fEMG or EEG (Rawnaque et al., 2020; Royo-Vela & Varga, 2022). This relates to the fact that GSR devices only provide information about the degree of arousal rather than the type of emotional reaction, as both positive and negative emotions can evoke increased arousal levels (Kalaganis et al., 2021). For example, Goncalves et al. (2023) demonstrated the application of GSR tools alongside other neuromarketing techniques, such as eye-tracking and facial coding, to assess consumers' physiological responses, including attention, emotional arousal, and decision-making, during exposure to different branding advertisements. In particular, the findings revealed that video commercials are more successful than image advertisements in capturing consumer attention and generating greater emotional arousal (Goncalves et al., 2023).

2.5 Neuropsychological Processes Driving Consumer Behaviour

Decision-making and subsequent behaviour occur through a complex system of neuronal processes (Shaw et al., 2018). To understand and predict consumer behaviour, it is essential to explore these underlying neuropsychological processes driving decision-making and behaviour through neuroscientific technology. In this regard, researchers have proposed

neural processes related to attention, memory, and emotion (Ćosić, 2016; Endo & Roque, 2017; Shaw et al., 2018).

2.5.1 Attention

Attention is an innate process that involves the selective concentration of specific stimuli and the disregard of irrelevant stimuli (Shaw et al., 2018). Two types of attentional mechanisms are identified, namely, bottom-up and top-down attention (Anderson et al., 2018; Ćosić, 2016; Katsuki & Constantinidis, 2014; Shaw et al., 2018). Top-down attention involves actively looking for something and is driven by current tasks and internal motivations (Anderson et al., 2018; Shaw et al., 2018). In contrast, bottom-up processing is an automatic response modulated by environmental salient stimuli, such as movement, colour, and brightness (Ćosić, 2016; Katsuki & Constantinidis, 2014). Bottom-up processing is particularly important in marketing research, as certain things automatically draw our attention and simply by altering a product's visual appeal, consumers are more inclined to notice and purchase it (Ćosić, 2016).

The success of an advertisement is largely influenced by its ability to capture the attention of consumers based on their interests and values, which in turn, creates a consumption desire resulting in purchasing behaviour (Endo & Roque, 2017; Kardes et al., 2014). This is especially relevant in the current information age in which consumers are exposed to an abundance of marketing stimuli (Bell et al., 2022). Following attentional focus, exposure to multiple stimuli may affect consumers' emotional states and subsequently, their decision-making (Guerreiro et al., 2015; LeBlanc et al., 2015). Thus, the role of attention in marketing is important to implement effective marketing strategies.

Attention can be measured using eye-tracking devices, which specifically measure eye movements and pupil dilation (Ćosić, 2016; Lim, 2018). EEG devices can also be used to measure the attention levels of consumers by detecting the changes in electrical activity in the

form of brain waves (Lim, 2018; Sethi et al., 2018). For instance, increases in attentional focus are indicated by a decrease in fronto-central alpha wave power as well as an increase in theta power (Shestyuk et al., 2019). Similarly, fMRI tools can be used to measure attention by indicating the activation of brain regions associated with attentional processing (Ruanguttamanun, 2014).

2.5.2 Memory

Memory is another fundamental mechanism of the comprehensive neural system modulating decision-making (Zhao et al., 2021). It is a neural process that entails the encoding, storing, and retrieval of information and can be categorised into working memory and long-term memory (Shaw et al., 2018; Zlotnik & Vansintjan, 2019). Working memory refers to the capacity to store limited information in a relatively short time (Nursey & Phelps, 2016). When consumers are actively exposed to a particular marketing stimulus, they tend to represent it in their working memory to reflect their current thoughts at the time of exposure (Endo & Roque, 2017). In contrast, long-term memory involves the ability to store information over longer periods of days, months, or years (Cowan, 2017; Nursey & Phelps, 2016). Long-term memory can further be divided into declarative and nondeclarative forms of memory (Squire & Dede, 2015). Declarative or explicit memory refers to memories of events (episodic memory) or facts (semantic memory), whereas nondeclarative or implicit memory involves memory associated with priming, conditioning, and skill learning (Moya et al., 2020; Raslau et al., 2014). After marketing information is represented in the working memory, it will trigger past knowledge stored in the long-term memory if such marketing information is meaningful to the consumer (Endo & Roque, 2017). Subsequently, working and long-term memory influence consumer behaviour, decision-making, and judgement as consumers store recent and past information about products, events, or brands (Ahmed, et al., 2015; Endo & Roque, 2017).

Consumers' memory of a specific brand or product creates the foundation for future interactions between the consumer and the company (Hornig & Hsu, 2021). As a result, investigating memory processes can provide valuable insights into factors that affect consumer decision-making, including product or service experience, brand recall, and awareness (Bojić et al., 2021). Neuromarketing techniques that are used to measure memory include fMRI devices (Ćosić, 2016; Shestyuk et al., 2019). An fMRI device consists of an MRI scanner to detect fluctuations in blood flow, allowing researchers to map brain activity in different brain regions (Lim, 2018). When exposed to a marketing stimulus, an fMRI can thus be used to detect activation in brain areas associated with memory, such as the hippocampus and dorsolateral prefrontal cortex (Ćosić, 2016). Other neuromarketing tools that can be used to measure memory include EEG devices and SST tools (Harris et al., 2018). Specifically, the effectiveness of a marketing stimulus being encoded and recalled can be indicated by an EEG as increased gamma and theta brainwave activity over the fronto-central brain regions (Shestyuk et al., 2019).

2.5.3 Emotion

The role of emotions in shaping consumer behaviour is also a fundamental principle utilised in the field of neuromarketing (Gurgu et al., 2020). Emotions can be defined as “relatively brief responses involving physiological, experiential, and behavioural activity generated by either an environmental or an internal stimulus” (Schmidt & Schulz, 2007, p. 475). Subjective and instinctive feelings directly influence decision-making, as well as post-decision appraisal (Ćosić, 2016; Shaw et al., 2018). Specifically, consumers may use their emotions as a cue to make purchasing decisions or combine their emotional understanding with neurocognitions to assess a specific stimulus (Hasford et al., 2015). Research also indicates that emotions play a significant role in influencing the formation of other neuropsychological processes important for decision-making (LeBlanc et al., 2015). For

instance, emotions triggered by a particular experience can increase memory encoding and thus make the experience of the product, advertisement, or brand more memorable (LeBlanc et al., 2015).

Two factors can be used to characterise emotional experience: arousal, which indicates how exciting or soothing the emotional experience is, and valence, which indicates whether the experience is positive or negative (Moya et al., 2020). Changes in arousal levels are indicated by variations in physiological reactions, such as elevated heart rate, dilated pupils, and increased activity of the sweat glands (Moya et al., 2020). Several neuromarketing techniques can be used to detect these changes in physiological reactions in response to marketing stimuli (Alsharif, Salleh, Baharun, & Yusoff, 2021; Lim, 2018, Liu et al., 2021). As indicated, fEMG devices are used to record facial muscle movements, which can be used to detect conscious and unconscious emotional expressions (Lim, 2018). ECG and GSR devices also monitor internal emotional states by measuring the electrical activity of the heart and changes in skin conduction respectively (Alsharif, Salleh, Baharun, & Yusoff, 2021).

2.6 General Perceptions of Neuromarketing

Among the general population, the concept of neuromarketing has given rise to a variety of opinions, perceptions, and attitudes toward the implementation of neuroscientific technology within a marketing research domain (Bakardjieva & Kimmel, 2017). As with many emerging fourth-industrial revolution (4-IR) technology trends, the introduction of neuromarketing has generated both excitement and controversy related to the ethical use of neuroscientific tools for research and marketing practices (Fortunato et al., 2014). Research has demonstrated that such inconsistency in individual perceptions of the application of neuromarketing may be influenced by misconceptions associated with suspicions and fear of neuromarketing techniques being able to influence consumer choice, as well as a general lack

of knowledge related to the use of neuromarketing techniques (Daugherty & Hoffman, 2017; Flores et al., 2014; Stanton et al., 2017). These misconceptions are rooted in the belief that neuromarketing influences consumers to purchase goods even though research indicates that neuromarketing only assists in monitoring brain activity and not influencing it directly (Berčík, 2017; Nadanyiova, 2017). Such claims of neuromarketing's ability to push a so-called *buy button* are often fuelled by misinformation spread on online media (Devaru, 2018).

However, international research trends suggest that a high degree of experience and knowledge of neuromarketing predicts favourable perceptions about the implementation of neuromarketing techniques (Bakardjieva & Kimmel, 2017). This is illustrated by a study conducted by Hamed et al. (2013) in which the attitudes of neuromarketing were explored among three groups of participants, each group with a Master's degree in sports management, neuroscience, and marketing respectively. Among the three groups, neuroscience professionals had the most favourable perceptions and attitudes toward neuromarketing, as they were more familiar with the application of neuromarketing techniques (Hamed et al., 2013). Additionally, Banerjee (2021) found that individuals with a higher degree of knowledge and awareness of neuromarketing are also more inclined to participate in neuromarketing studies. In contrast, research indicates that a lack of awareness and unfamiliarity with the techniques are associated with misconceptions as well as ethical concerns relating to the trustworthiness of neuromarketing methods (Bakardjieva & Kimmel, 2017). Subsequently, fear of possible manipulation and misuse of participant data is illustrated in individuals' unwillingness to participate in neuromarketing studies (Nadanyiova, 2017).

Another factor that might influence an individual's perception of neuromarketing relates to his or her general attitude towards technology (Wiederhold, 2020). According to Wiederhold (2020), when individuals are more accepting of new technologies and perceive

them as a valuable source of opportunities, they are more likely to have a positive perception towards neuromarketing in a marketing research context.

2.7 Neuromarketing in Developing Countries

Neuromarketing has opened new doors for marketing researchers to understand and analyse unconscious and subconscious consumer behaviour and desires (Jordão et al., 2017). Subsequently, the neuromarketing field has progressed in developed countries with the United States and the United Kingdom having acquired a high concentration of neuromarketing companies since its introduction (Biswas et al., 2022). However, despite its benefits and potential to improve marketing research, neuromarketing remains a relatively new concept in developing countries (Gani et al., 2018). Only a few companies in developing countries have started incorporating neuroscientific tools and theories in the advertising and marketing research domain, including companies in South Africa, China, and India (Biswas et al., 2022). Specifically, Alsharif et al. (2023) and Crespo-Pereira et al. (2020) suggested several factors that may account for the lack of neuromarketing companies in developing countries as well as their hesitancy to introduce neuroscientific techniques in marketing research practices. This includes the cost associated with employing neuromarketing tools and conducting research, ethical concerns and implications, as well as a lack of knowledge and expertise (Alsharif et al., 2023; Crespo-Pereira et al., 2020).

2.7.1 Financial Implications

One of the issues hindering the implementation of neuromarketing in developing countries is the high costs associated with incorporating and maintaining neuromarketing tools to conduct marketing research (Biswas et al., 2022). As neuromarketing involves the use of specialised neuroscientific technology and medical equipment, companies in developing countries do not always have the necessary funds to access such devices (Alsharif et al., 2023; De Oliveira & Giraldi, 2017). In addition to obtaining and accessing

neuromarketing tools, the construction of appropriate laboratory facilities, training of researchers, and hiring of experts to operate the equipment may present further challenges for developing countries to implement neuromarketing (Alsharif et al., 2023; Crespo-Pereira et al., 2020). However, with an increase in technological advancement and the introduction of devices specifically developed for commercial purposes, the costs of neuromarketing tools have started to decrease over time. (Crespo-Pereira et al., 2020; Rosoff, 2015). Furthermore, neuromarketing devices that measure external processes are generally more affordable than devices that measure internal processes such as an fMRI (Gill & Singh, 2020). Market researchers can thus consider incorporating more affordable devices such as eye trackers or portable EEG devices to complement traditional market research techniques (Aldayel et al., 2020; Iloka & Anukwe, 2020).

2.7.2 Ethical Implications

Since its emergence, neuromarketing has generated many ethical concerns regarding its implementation in marketing research in both developed and developing countries (Biswas et al., 2022; Luna-Nevarez, 2021). As neuromarketing involves the use of neuroscientific and medical tools to investigate consumer behaviour, some of the main ethical concerns specifically relate to the invasion of privacy of individual thought processes, possible threats to autonomy, issues related to the confidentiality of data, as well as possible manipulations of vulnerable groups. (Bakardjieva & Kimmel, 2017; Flores et al., 2014; Fortunato et al., 2014).

Particularly, research indicates that neuromarketing raises questions concerning the invasion of mental privacy and confidentiality (Ienca & Andorno, 2017; Ulman et al., 2015). Despite the benefits associated with investigating consumers' unconscious and subconscious thought processes, there remain ethical concerns regarding the use of functional neuroimaging tools to investigate personal brain data as well as the disclosure and use of such data in the commercial and marketing spheres (Ienca & Andorno, 2017; Stanton et al., 2017).

This also relates to the disclosure of personal health information and the findings of pathological brain conditions (Bočková et al., 2021; Stanton et al., 2017). Investigating brain activity and individual thought processes is thus often perceived as an incursion of both individual privacy and autonomy by uncovering intimate thoughts and emotions as well as influencing consumers' control over their purchasing decisions (Ducu, 2017; Ulman et al., 2015). Furthermore, the use of vulnerable individuals and groups is another matter of ethical concern that has been reviewed both in neuromarketing and research ethics literature (Ducu, 2017; Isa et al., 2019; Ulman et al., 2015). The protection of these groups, such as children and individuals with mental health conditions, is crucial as these individuals are much more susceptible to being influenced, manipulated, or deceived (Isa et al., 2019). In addition, Hensel et al. (2017) and Pop et al. (2014) highlighted the importance of fully disclosing the procedures, goals, and potential risks to participants, especially considering that neuromarketing researchers are collecting consumers' biological information.

Developing and implementing a guiding code of ethics are thus essential steps for marketing researchers in both developed and developing countries when incorporating neuromarketing techniques in their research endeavours (Daugherty & Hoffman, 2017). As a result, in 2014, the NMSBA developed and published a code of ethics specifically on the application of neuroscience techniques in business and research practices (Royo-Vela & Verga, 2022). This code of ethics outlines ethical standards of integrity, transparency, credibility, consent, privacy, and participant rights, as well as ethical guidelines pertaining to the publication and implementation of neuromarketing projects (*NMSBA Code of Ethics*, n.d.). In their research exploring various international neuromarketing companies' attitudes toward the ethical responsibilities involved in neuromarketing research, Pop et al. (2014) found that most of the companies strictly adhere to the NMSBA's guidelines and regulations. Additionally, many professional research organisations have developed their own guidelines

and corporate codes of conduct based on published literature that define the ethical standards for implementing neuromarketing techniques (Dierichsweiler, 2014). However, the degree of compliance and enforcement of these ethical principles by organisations and the government varies across countries, especially in developing countries (Biswas et al., 2022; Dierichsweiler, 2014).

Neuromarketing is a field that is constantly evolving and adapting to technological advancements (Royo-Vela & Verga, 2022). Thus, it is imperative for both academic and marketing researchers employing neuromarketing techniques to consider the ethical concerns based on the type of research, the participants, as well as the characteristics of the various tools used in their research endeavours (Hensel et al., 2017).

2.7.3 Knowledge and Expertise

The implementation and application of neuromarketing techniques require a certain degree of knowledge and expertise to operate neuroimaging and neurodiagnostic tools as well as to analyse and interpret data associated with neuroimages and biometric indicators (Alsharif et al., 2023; Baños-González et al., 2020; De Oliveira & Giraldo, 2017). This relates to the fact that neuromarketing often involves the use of specialised tools and software, which may be difficult for marketing researchers without the necessary skills to employ (Sosnowki, 2018; Stasi et al., 2018). For instance, neuroimaging devices such as fMRI tools require a technician with specialised knowledge to run scans and compile reports (Randolph & Raven, 2022). Furthermore, research findings conducted on the perceptions and perspectives of neuromarketing in developing countries such as Malaysia (Alsharif et al., 2023) and Bangladesh (Gani et al., 2018) confirmed that a lack of awareness, knowledge and access to experts serve as a significant challenge to companies in endorsing and using neuromarketing techniques.

2.8 Conclusion

This chapter presented an overview of the concept of neuromarketing by synthesising the current literature on the significance of neuromarketing as an adjunctive resource to traditional marketing techniques, the devices frequently employed in neuromarketing, the neuropsychological processes underlying consumer behaviour, and the current perceptions and attitudes toward neuromarketing. This chapter further introduced the phenomenon of neuromarketing as a relatively new concept in developing nations, such as South Africa as well as the challenges faced by marketing research companies in developing countries to implement neuromarketing techniques.

Chapter 3: Research Methodology

3.1 Introduction

This chapter discusses a detailed description of the methodological procedure to address the research question: What perceptions do South African marketing researchers hold towards neuromarketing and its utilisation in the marketing research context? The chapter introduces a brief outline of the research aims and objectives as well as a discussion of the study design and methodological framework grounding the research strategy. This is then proceeded by a comprehensive description of the recruitment and sampling procedures, followed by a systematic overview of the data collection and analysis phases. Finally, the chapter concludes with a discussion of the techniques employed to establish trustworthiness and an account of the ethical considerations embedded in the study procedures.

3.2 Research Aim and Objectives

Neuromarketing is a relatively young interdisciplinary field that presents an opportunity to better understand consumers' unconscious and subconscious desires and responses (Jez et al., 2020). While neuromarketing presents numerous advantages, its adoption by marketing research and advertising firms in South Africa remains limited, with only a few companies integrating neuroscientific techniques and theory into their marketing research practices (Biswas et al., 2022). As a result, literature on the application of neuromarketing in a South African marketing research context remains limited. To bridge this gap, the study aims to obtain insights from marketing researchers into the present and future applications of neuromarketing in South Africa. Thus, the research objectives are as follows: a.) to explore South African marketing researchers' perceptions of neuromarketing, and b.) to explore South African marketing researchers' use of neuromarketing in a marketing research context.

3.3 Study Design

3.3.1 Qualitative Research

The present study employed a qualitative research approach in which the perceptions of South African marketing researchers toward neuromarketing were explored. Qualitative research can be defined as a research approach that emphasises the meanings and motivations of personal experiences and social phenomena through various methods, including focus groups, interviews, and observations. (Aspers & Corte, 2019; Barrett & Twycross, 2018). Such studies aim to explore the perceptions, processes, and patterns of human behaviour that can be difficult to quantify (Tenny et al., 2017). As a result, qualitative researchers employ open-ended questions to invite a deeper understanding of the complexity of a particular research subject as opposed to predicting outcomes by using numerical data and measurement (Holton & Burnett, 2005; Tenny et al., 2017; Tomaszewski et al., 2020). The employment of a qualitative research approach was well suited since the study attempted to obtain an in-depth comprehension of the perceptions of South African marketing researchers. Furthermore, an experiential research design was employed. This is considered an appropriate research design as experiential research aims to gain new insights and understandings of participants' contextually situated perceptions and meanings of certain phenomena (Clarke & Braun, 2014).

3.3.2 Methodological Framework

This qualitative research study was further conducted using an experiential framework. Adopting an experiential framework involves exploring and validating the meanings, views, and perspectives expressed in the data (Braun & Clarke, 2013). Participants' interpretations, thoughts, and experiences are prioritised and focused on instead of being used as a foundation for evaluating something else (Braun & Clarke, 2013; Byrne,

2022). Experiential frameworks thus aim to ground research in participants' perspectives and accounts of the phenomenon (Clarke & Braun, 2014).

Experiential approaches are driven by a desire to understand and prioritise participants' own views and meanings by analysing participants' discourse as a reflection of their internal states (Byrne, 2022; Clarke & Braun, 2014). It involves a process of gathering such information and then structuring and interpreting what is reflected in the data (Braun & Clarke, 2013). This framework contrasts with adopting a critical framework, which involves employing an interrogative approach towards the meanings or perceptions revealed in the data, using them to study other phenomena and analysing discourse as if it were constitutive rather than reflective of participants' internal states (Braun & Clarke, 2013; Byrne, 2022). As a result, experiential frameworks aim to make sense of how a certain phenomenon is seen and experienced from the participants' perspectives (Clarke & Braun, 2014). The employment of an experiential framework was thus appropriate to explore the phenomenon of neuromarketing and its utilisation within a South African marketing research context through the conceptualisation of South African marketing researchers' perspectives.

3.3.3 Research Paradigm – Constructivism

The research study is situated within a constructivist perspective. The constructivist paradigm as a psychological theory emerged from the field of cognitive science, drawing on Jean Piaget's later work before the 1980s, as well as Lev Vygotsky's sociohistorical contributions and the theoretical advancements in learning and development by scholars such as Jerome Bruner and Howard Gardner (Fosnot & Perry, 1996). Constructivism emerged as a response to the traditional ways of acquiring knowledge through positivist thinking (Pilarska, 2021). In contrast to the positivist paradigm which emphasises a single, objective reality, the constructivist paradigm adheres to the idea that meaning is subjectively constructed from an individual's perspective (Adom et al., 2016; Schwandt, 1994). As such, constructivists

maintain a relativist position and highlight the existence of multiple, holistic realities (Pilarska, 2021; Ponterotto, 2005). Reality is thus subjective and influenced by the individual's experiences, perceptions, environment, and his or her interaction with the researcher, which is transactional and fundamental to capturing the individual's lived experience (Ponterotto, 2005). The decision to situate the research study within an experiential framework and adopt a qualitative research approach is rooted within the constructivist paradigm's assumptions that reality is constructed through the lens of an individual's subjective perceptions and experiences. As each participant holds their own perceptions of neuromarketing, exploring these through open inquiry becomes necessary to allow the participants to explain their unique understanding of neuromarketing and its utilisation within the South African marketing research context.

3.3.4 Role of the Researcher

Guided by an experiential framework, the research adopted an active and interpretive role in the research study. This involved engaging deeply with the data while prioritising the subjective experiences of the participants. In addition, the researcher also assumed a facilitator role in the study, conducting interviews with research participants, recording, transcribing, and reporting the findings. By continuously acknowledging her own perceptions and prior knowledge of neuromarketing, the researcher's active role in the research process impacted interaction with the participants, both enhancing deep engagement and informing probes and questions that reflect the researcher's current understanding of the topic.

3.3.5 Research Approach

The research approach in this study was primarily iterative and recursive, integrating elements of both inductive and deductive techniques at different stages of the research study. For instance, while an inductive and iterative approach was used during data analysis to allow themes to be constructed from the data and to enable the researcher to move between

different phases of analysis, prior literature on neuromarketing and its application provided an initial framework that informed the research question, objectives, and interview questions. During data collection, insights from previous research on the benefits, challenges, and implications of neuromarketing served as a reference point for identifying gaps or emerging nuances in participant responses. Although a review of previous literature influenced the researcher's understanding and construction of themes, the experiential nature of the research study enabled the study to be grounded in the participants' subjective experiences. Thus, this iterative engagement with literature and data facilitated nuanced insights into the participants' perceptions while situating the findings within recent literature.

3.4 Sampling and Recruitment

3.4.1 Sample

The target population for this research study was a South African marketing researcher population. Considering the experiential nature of this study as well as the chosen analysis method, the sample size ultimately depended on the number of participants available to provide adequate data and not on data saturation (Braun & Clarke, 2019a). Although data saturation is considered a key concept in thematic analysis research for determining sample size, Braun & Clarke (2019a) critiqued the use of data saturation in reflexive thematic analysis research. Although the concepts of data saturation are “coherent with the neo-positivist, discovery-oriented, meaning excavation project of coding reliability types of TA, they are not consistent with the values and assumptions of reflexive TA” (Braun & Clarke, 2019a, p. 201), as meaning in reflexive thematic analysis research is constructed from data and not something inherent in the data (Byrne, 2022).

Subsequently, a sample of 11 participants was recruited from two neuromarketing companies in South Africa, comprising eight participants from one company, one from the other, and two referrals from these companies. The sample represented a diverse mix of

expertise, professional backgrounds, and levels of experience within the field of neuromarketing. The sample consisted of six males and five females and spanned a broad age range from young adults (ages 20-30) to mature professionals (ages 40-60), reflecting varied career stages and perspectives. Among the younger participants, most were early-career professionals (P1, P2, P3, and P4) or interns (P6, P7) at the marketing research companies. P1, P2, P6, and P7 each had around one year of experience in neuromarketing at the time of the interview, whereas P3 had three years, and P4 had four months of experience. The rationale for including early career professionals and interns stemmed from pragmatic considerations. Specifically, the lack of neuromarketing companies in South Africa necessitated exploring the perspectives of these individuals who, while not having been involved in the neuromarketing industry for a long period, had the potential to provide unique insights on the applicability of neuromarketing in South Africa without being influenced by entrenched professional biases. Additionally, it was found that the interns at the neuromarketing company were regularly involved in the practical aspects of neuromarketing, frequently participating in fieldwork, which provided them with unique and valuable insights. The sample also included experienced mid- to senior-level professionals (P5, P8, P10, P9, and P11), who transitioned from traditional marketing to neuromarketing, including directors (P9, P11) and founders (P8, P10) of South African neuromarketing research firms. Although participants, such as P5 and P9, had approximately one (P9) to five years (P5) of experience in neuromarketing, P8, P10, and P11 reported having 10 years of experience or more in the field.

The following inclusion criteria were used to recruit this sample: firstly, participants must have been employed as professional marketing researchers from established marketing research companies in South Africa. Secondly, participants who are currently utilising or have utilised neuromarketing techniques or theories within a marketing domain were

included in the study. The rationale behind this was that participants must have gained knowledge and experience in the field of neuromarketing to ensure insightful discussions. Finally, as the interviews were conducted in English, participants were required to be proficient in the English language to eliminate any possible misconceptions during the interviews. No exclusion criteria related to age or gender were applied to the recruitment procedure. Furthermore, an important exclusion criterion specifically related to South African marketing companies that were aware of neuromarketing techniques in a marketing research context but had not yet implemented such techniques. Although these companies might have had some degree of knowledge, or acknowledge the value, of neuromarketing, they lacked the necessary experience with neuromarketing techniques to provide insights and perception of the application of neuromarketing in a South African marketing domain.

3.4.2 Recruitment Procedure and Sampling Method

Purposive sampling was carried out by intentionally selecting South African marketing research companies that are using or have utilised neuromarketing techniques or theories. Purposive sampling is defined as a non-probability sampling method that is employed to obtain participants who are most likely to provide a comprehensive understanding of the specific inquired topic (Campbell et al., 2020). Given the nature of the aims of the research project, the implementation of purposive sampling as a primary sampling technique is deemed appropriate to gain insight into the perceptions of marketing researchers who are or were involved in the field of neuromarketing.

Specifically, the target sample was identified by conducting an online web search on South African marketing research companies that are using or have utilised neuromarketing techniques or theories within a marketing domain. The researcher then approached the CEO of these marketing research companies via email and telephone for permission to recruit their marketing researchers. The aim and additional details of the research project were then

stipulated and thoroughly discussed. As the contact details of the CEOs and marketing researchers were freely available on the companies' public websites, the CEOs acted as gatekeepers and were thus able to share their marketing researchers' contact information with the researcher. After obtaining written permission from the CEO, participants were selected from the company based on the inclusion criteria as well as their willingness to participate in the study. This was on a voluntary basis and participants were not compelled to participate by the company management. This was indicated to the participants when initial contact was made with them via email and was emphasised in the participant information sheet (see Appendix B), which was included as an attachment in the email. After initial contact with the participants was made, a time, date, and place for each interview was scheduled as convenient for each participant.

Due to the novelty of neuromarketing in South Africa and the small number of professional neuromarketing companies identified through an online web search. Snowball sampling was used as an additional sampling strategy to acquire eligible participants within the current South African neuromarketing sphere. Snowball sampling is a non-probability sampling approach in which an initial participant is invited to propose or recruit other individuals who might be interested in participating in the study (Isaacs, 2014). As new participants are recruited, these recruits can refer the researcher to other potential participants (Waters, 2015). Current participants were thus requested to refer any other potential participants meeting the specific inclusion criteria. In this study, a total of two participants (P5 and P11) were recruited due to referrals from current participants employed at the recruited companies.

3.5 Data Collection

In qualitative research, it is important that the type of data collection method produces a detailed record of participants' actions and words, while also generating data appropriate to

answer the research question (Willig, 2022). As a result, individual semi-structured interviews were used to obtain insight into the perceptions of South African marketing researchers toward neuromarketing and its utilisation in a marketing research context. Semi-structured interviews are one of the most commonly used data collection methods in qualitative research and typically entail a conversation between the researcher and participant (DeJonckheere & Vaughn, 2019). This dialogue is guided by an interview protocol, which consists of a schematic presentation of questions, follow-up questions, comments, probes, and topics to be explored by the researcher (Jamshed, 2014). Thus, the approach enables the researcher to obtain open-ended data and investigate participants' thoughts, perceptions, opinions, and feelings pertaining to the research topic, as well as allow a sense of flexibility in the responses (DeJonckheere & Vaughn, 2019; McIntosh & Morse, 2015). Semi-structured interviews thus employ sufficient structure to ensure that key concepts of the research topic are addressed, while ensuring opportunities for participants to share their subjective knowledge and insights related to the research question (Barrett & Twycross, 2018; McIntosh & Morse, 2015).

For this study, all interviews were conducted virtually via Microsoft Teams at the convenience of the participants. A series of interview questions, probes, and prompts were prepared beforehand to direct the conversation towards the specific research question, as well as to allow the participants the freedom to provide subjective insights and explore underlying experiences related to the topic. That is, an interview guide (see Appendix A) was developed by considering the main aim and objectives of the study. Specifically, the interview guide consisted of a series of open-ended questions and potential probes directing the focus of conversation around the participants' perceptions of neuromarketing as well as their insights on the utilisation of neuromarketing within a marketing research context.

Prior to each interview, informed consent was obtained by emailing the consent forms to each participant. Participants were then required to sign and email the consent form to the

researcher. Proper rapport was established with each participant from the beginning of each interview by welcoming and thanking the participant for his or her time and contributions, providing an overview of the study, explaining its purpose, and outlining interview expectations. Participants were also asked for consent to be recorded during the interview as stipulated in the consent form and were allowed to ask questions pertaining to the nature, structure, or any other aspect of the interview or topic. Furthermore, any additional information concerning the purpose and aims of the research project was stipulated before the start of each interview. During these sessions of approximately 30 to 60 minutes each, the interviews were audio-recorded by the researcher. The researcher later transcribed these audio-recordings verbatim.

3.6 Data Analysis

The data obtained was analysed using reflexive thematic analysis. This technique is considered a flexible method as it facilitates the recognition and interpretation of theme patterns within qualitative data (Braun & Clarke, 2019b). Reflexive thematic analysis is considered a representation of the researcher's interpretive approach to data analysis (Byrne, 2022). Specifically, reflexive thematic analysis emphasises the researcher's active contribution to the data and advancing knowledge by incorporating the researcher's own understanding of the patterns of meaning as well as the researcher's prior experiences, values, and skills (Braun & Clarke, 2021a; Byrne, 2022). In this study, the researcher's active involvement ensured that the use of reflexive thematic analysis was a suitable analytic tool to obtain a comprehensive understanding of the topic of neuromarketing. For instance, the researcher approached the analysis with background knowledge of neuropsychological principles underlying neuromarketing as well as insights into the practicality and benefits of neuromarketing in a marketing research domain. This essentially contributed to the understanding of contextual factors involved in the research.

Within reflexive thematic analysis, the researcher becomes immersed in the data by continuously reading, reviewing, reflecting, and questioning emerging themes (Braun & Clarke, 2021a). The flexible nature of reflexive thematic analysis made this an appropriate technique, especially considering that neuromarketing is a relatively new concept in South Africa, resulting in a lack of previous literature (Biswas et al., 2022). Furthermore, reflexive thematic analysis is also appropriate for qualitative studies with small sample sizes, as sample size is not considered to be the only requirement for generating adequate data (Braun & Clarke, 2021a).

The analytic process of reflexive thematic analysis is considered an iterative and recursive procedure (Terry et al., 2017). However, Braun and Clarke (2021b) have identified six phases for data engagement, coding, and theme development. These phases are described as follows:

3.6.1 Phase 1: Data Familiarisation

The first stage of reflexive thematic analysis involves immersing oneself in the data to obtain a comprehensive overview of the depth and content of the data (Campbell et al., 2021; Riger & Sigurvinsdottir, 2016). Rather than merely absorbing the data, this process facilitates an entry point for active engagement with the transcripts and involves noticing patterns, asking questions, and developing preliminary analytic ideas (Terry et al., 2017). In this study, data familiarisation took place in two phases: firstly, following verbatim transcription of the audio-recorded interviews by the researcher herself, the researcher actively listened and re-listened to the audio recordings to obtain an overview of the content, while ensuring the accuracy of the transcripts. Secondly, the researcher read and re-read each transcript and summary notes made during each interview, while taking note of interesting trends and documenting initial thoughts. This initial engagement provided the researcher with an overall

sense of the data and facilitated the preliminary identification of themes and conceptualisation of meanings (Campbell et al., 2021).

3.6.2 Phase 2: Generation of Initial Codes

Following data familiarisation, the second stage of reflexive thematic analysis involves generating initial codes that serve as the building blocks for the process of theme development (Byrne, 2022). The aim of the coding process is to provide concise and descriptive or interpretive data points that could be relevant to the research questions (Byrne, 2022). Reflexive thematic analysis allows variation to occur through the coding process, as meaning can be explored at a semantic or a latent level (Braun & Clarke, 2022; Campbell et al., 2021). In other words, codes can be identified by considering the surface meaning of data (semantic level) or by exploring underlying meanings and assumptions that may construct the semantic level of the data (latent level) (Campbell et al., 2021). However, Braun and Clarke (2021a) argue that these codes are not preexisting and do not emerge from the data and emphasise the researcher's pivotal role in identifying and interpreting codes appropriate to answer the research question. As insights change and evolve during the coding process, codes can and should naturally evolve as well (Braun & Clarke, 2022).

3.6.3 Phase 3: Theme Development

In terms of theme development, a key aspect of reflexive thematic analysis is that themes are constructed relative to the perceptions of the participants throughout the coding process (Braun & Clarke, 2021a). This is in contrast to many approaches in which themes are at least partly developed prior to full data analysis (Terry et al., 2017). As a result, both coding and theme development are considered organic and interpretive processes (Terry et al., 2017).

Themes may be arranged in networks of related concepts or in a hierarchical structure with higher-order themes and subthemes (Riger & Sigurvinsdottir, 2016). Additionally,

themes may be distinctive but should complement each other to form a coherent picture of the data in relation to the research question (Byrne, 2022). The researcher reviewed the relationship among the codes generated in stage two and evaluated how the different codes could be organised and compiled into different themes and sub-themes based on shared meaning. Importantly, it is acknowledged that these themes were constructed by the researcher through active engagement with the data, influenced by the researcher's values, insights, perceptions, and interpretations (Braun & Clarke, 2021b).

3.6.4 Phase 4: Reviewing Themes

After a group of themes has been determined, these themes must be reviewed and adjusted (Riger & Sigurvinsdottir, 2016). While some themes may be integrated and organised into broader concepts or separated into different themes, others may not be pertinent to the research question (Riger & Sigurvinsdottir, 2016). In this analysis, the reviewing process took place at two levels. Firstly, the candidate themes were reviewed at the level of the coded data extracts (Campbell et al., 2021). Specifically, the researcher re-read all the data extracts that informed each theme and determined whether they formed a coherent pattern that reflected the central idea of each theme (Terry et al., 2017). Any mismatch among the data extracts or between the extracts and themes was carefully evaluated and refined. These themes were reworked and any data extract that did not adequately represent the theme were either moved to a different theme or eliminated from the code set.

Once a thematic map was developed, the researcher proceeded to the second level of the reviewing process. At this stage, the researcher re-read the entire data set to determine whether the themes captured the meaning of the data as a whole (Campbell et al., 2021). Specifically, the researcher evaluated whether the story told through the themes was appropriate to address the research question (Braun et al., 2016).

3.6.5 Phase 5: Defining and Naming Themes

In the fifth stage of the analysis, the researcher once again adopted an interpretive orientation and developed short theme definitions to clarify and refine the scope of each theme (Braun et al., 2016; Terry et al., 2017). This allowed the researcher to build an analytic narrative by providing depth and detail to the data (Braun et al., 2016). The researcher also provided clear and concise names that reflect the central idea of each theme and added them to the thematic map.

3.6.6 Phase 6: Producing the Report

Once the themes have been defined and the interrelationship between them has been established, the researcher can continue with the final analysis and report write-up (Riger & Sigurvinsdottir, 2016). However, it is important to acknowledge that the separation between phases five and six is not clearly distinct and thus requires an iterative approach (Byrne, 2022). As with the previous phases, the final write-up is intertwined with the entire analysis process (Braun et al., 2016). Specifically, the report write-up involves editing, compiling, and refining the existing analytic writing and ensuring that the analysis adequately answers the research question (Braun et al., 2016). This also entails providing data extracts that establish the foundation for a critical and compelling argument (Riger & Sigurvinsdottir, 2016). In the write-up, the researcher included data extracts for both analytic and illustrative purposes to provide a contextual basis for analytic claims, while distinctly illustrating key elements of the themes. This is evident in the following chapter.

3.7 Trustworthiness and Quality

For qualitative researchers to ensure the integrity of their research projects and to parallel the quantitative criteria of validity and reliability, it is essential to implement strategies that will improve the trustworthiness of the study (Anney, 2014). Trustworthiness refers to the conceptual soundness from which qualitative research can be evaluated

(Marshall & Rossman, 1995). Specifically, Lincoln and Guba (1985) introduced four criteria to establish trustworthiness and rigour in qualitative studies, which include ensuring credibility, transferability, dependability, as well as confirmability. In this study, trustworthiness was established by adhering to these four criteria through certain strategies, including prolonged engagement, peer debriefing, and providing an audit trail.

3.7.1 Credibility

Credibility can be defined as a construct that reflects the degree to which the findings are congruent with the multiple realities of the phenomenon (Lincoln and Guba, 1995). Credibility relates to the *fit* between the participants' perceptions and how the researcher represents them (Nowell et al., 2017). According to Lincoln and Guba (1985), credibility can be accomplished through different techniques, including peer debriefing, triangulation, and persistent observation. In relation to this study, credibility was established by peer debriefing, which involved providing detailed notes to another peer to confirm the generated codes and themes (Scharp et al., 2018). This also involved discussions with research supervisors. Thus, this method provided an external review of the research procedure as well as preliminary results and observations against the raw data (McGinley et al., 2021). Additionally, credibility was also established by prolonged, deliberative engagement with the data during the analysis procedure (Braun & Clarke, 2021a; Nowell et al., 2017).

3.7.2 Dependability

A study's dependability can be described as the stability of the data or findings over time and under varying circumstances (Elo et al., 2014). Establishing dependability in qualitative studies involves applying techniques to ensure the findings are consistent, despite changes in the research setting or participants during data collection and analysis (Janis, 2022). Dependability in this study was ensured by using an audit trail, which can be defined as a method whereby the researcher accounts for all research procedures and decisions to

demonstrate how the data were acquired, documented, and analysed (Anney, 2014). Specifically, this involved keeping records of the transcripts and observation notes and keeping a reflexive journal that describes the researcher's engagement with the decisions made during the research procedure (Anney, 2014; Stahl & King, 2020). This created a decision trail which the reader can follow to draw conclusions about the quality of the study based on the rationale provided (Hadi & Closs, 2016).

3.7.3 Transferability

Transferability relates to the extent to which the findings of qualitative research can be “transferred to other contexts or settings with other respondents” (Korstjens & Moser, 2018, p. 121). This is possible when the researcher provides a substantive description of the data, methodology, and research context, as well as purposefully selecting a specific category of participants to answer the research question (Anney, 2014). To establish transferability, a detailed description of the research context, framework, and procedures, including sampling, data collection, and analysis was provided. Thus, the entire research process was elucidated to allow readers to evaluate the applicability of the research findings to other settings, populations, and contexts (Hadi & Closs, 2016). Additionally, transferability was also established by using purposive sampling to select a specific group of South African marketing researchers who had experience in conducting research by utilising neuromarketing techniques or theories within a marketing domain.

3.7.4 Confirmability

The extent to which the findings of an inquiry could be corroborated by other researchers refers to a study's confirmability (Korstjens & Moser, 2018). It involves establishing that the results of the study are logically derived from the data and requires that the researcher provides evidence of how interpretations were made and conclusions were drawn (Nowell et al., 2017). Pertaining to this study, confirmability was established by

reflexive journaling, as well as an audit trail, elucidating the reasons for analytical and methodological decisions (Anney, 2014; Nowell et al., 2017).

3.7.5 Reflexivity

In addition to establishing trustworthiness by ensuring credibility, dependability, transferability, and confirmability, qualitative researchers must reflect on the potential influence of their experiences, perceptions, and knowledge on the study's findings and how the researcher's views and interests may introduce potential bias (Adler, 2022; Olmos-Vega et al., 2023). Reflexivity is a continuous process that involves acknowledging and embracing subjectivity throughout the course of the research project (Olmos-Vega et al., 2023). As a result, the researcher used a reflexive journal to self-consciously evaluate and document how personal perceptions, contexts, and subjectivity might have influenced the research findings and process. This process was especially important during the analytic phase of the study in which the researcher's insights and active role in developing codes and themes were key aspects of ensuring good quality analysis (Braun & Clarke, 2022).

3.8 Ethical Considerations

The protection of human participants by implementing and adhering to appropriate ethical guidelines is imperative in all research studies (Arifin, 2018). However, due to the in-depth nature of the research procedure, adhering to ethical principles is especially important in qualitative studies (Arifin, 2018). Ethical clearance was obtained from the Postgraduate Research Ethics Committee of the Faculty of Humanities of the University of Pretoria on 2 April 2024 (HUM035/1123). Furthermore, the companies contacted provided consent to approach their employees, inform them of the study and invite voluntary participation. It was clearly articulated to the companies and employees that no negative consequences would be associated with refusal to participate. All standard ethical procedures were maintained in this study. This included written informed consent, voluntary participation, and confidentiality.

Specifically, all participants were required to provide written informed consent after receiving a participant information sheet, which outlined the study's aim, objectives, rationale, procedure, potential benefits, and anticipated risks, and emphasised that participation was entirely voluntary. Participants were also provided with the opportunity to ask questions to address any ambiguity or concern regarding the study. Furthermore, participants were informed that participation was entirely voluntary and that they could withdraw at any time during the study procedure.

Confidentiality was maintained by assigning code names to each participant where no personal identifiers were used. As a result, any potential harm related to the disclosure of personal information was controlled and minimised. Additionally, any information related to the nature of the company that might potentially cause harm when disclosed was not included, especially considering that the focus was held on the participants' perceptions of neuromarketing. Furthermore, all collected data and additional information concerning the research project were stored electronically in password-protected files. All paper documents were converted to electronic documents and stored as password-protected files before being destroyed. Access to the original data was restricted to only the researcher and supervisors, accepting ownership and full responsibility for all data, thus ensuring confidentiality of all participants. All datasets are stored for a minimum period of 10 years as per University of Pretoria regulations.

3.9 Conclusion

This chapter provided a detailed and comprehensive description of the methodological and analytical procedures employed in the study. To address the research question and thoroughly explore participants' perceptions of neuromarketing, an experiential framework was used as a foundation to guide the sampling, data collection, and analysis procedures. Accordingly, a reflexive thematic analysis was conducted to explore how the phenomenon of

neuromarketing is perceived by South African marketing researchers. During this process, the researcher was consciously aware of incorporating personal perceptions, values, and knowledge within the analysis phase. A detailed account was presented of how trustworthiness was established by ensuring that the study and its findings were credible, dependable, transferable, and confirmable. Finally, the ethical implications and concerns associated with the study procedure were emphasised, followed by an acknowledgement of how these concerns were managed.

Chapter 4: Results

4.1 Introduction

In this chapter, the findings of the research study are presented as they relate to the research question: What perceptions do South African marketing researchers hold towards neuromarketing and its utilisation in the marketing research context? Four principal themes have been identified encapsulating the core concepts underlying the participants' views and perceptions across the 11 transcripts. From these themes, 12 corresponding subthemes have been identified as it became apparent that a hierarchy of meaning emerged within the initially constructed themes. To contextualise the findings within the broader context of the research question, this chapter provides a detailed account of each theme and subtheme supported by extracts from the transcripts. This also ensures that the researcher represents the original meaning of the data as accurately as possible. Furthermore, this chapter illustrates the relationship between the various themes and subthemes and reflects the researcher's interpretive approach to the analysis process.

4.1.1 Positionality and Reflexivity Statement

Throughout analysis and reporting, the researcher consistently drew upon her own preconceptions, views, and understanding of neuromarketing based on background knowledge of neuropsychological principles and acknowledges that this might have filtered through in the reporting process. As a BSc graduate in physiology, genetics, and psychology, the researcher was particularly mindful of how her educational background and personal interest in neuromarketing could have enabled her to identify nuanced themes and simultaneously, introduced bias in the analysis and reporting phases. For instance, the researcher's educational background and perceptions of neuromarketing might have led to over-emphasising findings that align with pre-existing knowledge and literature. Furthermore, the researcher's academic experience in the field of psychology prompted her

decision to adopt an experiential approach toward the reporting and analysis phases, viewing the research findings through the participants' subjective attitudes, and prior experiences and how these experiences have shaped their understanding and utilisation of neuromarketing.

However, the researcher acknowledges that viewing the research findings through the experiential lens might have created blind spots in the analysis by overlooking broader economic and systemic factors that, for instance, an economic perspective would have captured, such as cost-benefit analysis, market trends, and the impact of organisational policies on the adoption and utilisation of neuromarketing. Additionally, at 24 years of age, the researcher's young age and lack of experience in marketing research could have impacted her interpretation of participants' real-world experiences of neuromarketing.

4.2 Themes and Subthemes

Following data collection and the first phases of analysis, the researcher reordered the codes based on shared meaning among the codes, which reflected both the researcher's and the participants' understandings of the research questions in the construction and the reordering of the codes. The researcher then observed a pattern surfacing across the various codes and themes. As a result, the researcher organised the themes in a hierarchical structure consisting of higher-order themes and subthemes as indicated in Table 1 below.

Table 1

Themes and Corresponding Subthemes

	Themes	Subthemes
Theme 1	The role and impact of neuromarketing in South African marketing research	Conceptualisation of neuromarketing Strengths and benefits of neuromarketing Types of applications Tools, techniques and neuropsychological output
Theme 2	Challenges and limitations of neuromarketing	Technical challenges Awareness and market-related challenges Scepticism, concerns, and misconceptions
Theme 3	Ethical considerations	Upholding standard ethical procedures and neuromarketing guidelines Potential ethical concerns and challenges
Theme 4	Recommendations for implementation	Effective resourcing Neuromarketing as a complementary research approach Future implications of neuromarketing

4.3 Theme 1 – The Role and Impact of Neuromarketing in South African Marketing Research

The first theme encapsulates the participants' overall understanding of the underlying principles of neuromarketing and its associated characteristics. From this theme, four corresponding subthemes have been identified, namely: 1) conceptualisation of

neuromarketing, 2) strengths and benefits of neuromarketing, 3) types of applications, and 4) tools, techniques, and neuropsychological output.

4.3.1 Conceptualisation of Neuromarketing

Although the term *neuromarketing* was used across the transcripts to describe the use of neuroscientific theories and methods to understand consumer behaviour, several participants preferred to conceptualise this approach within the broader field of consumer neuroscience: *“We draw from quite a few different fields. Technically, they all fall under the behavioural sciences and they're kind of made up of consumer neuroscience”* (P8). This perception is further reflected in extracts such as: *“The other name that I actually prefer to use is consumer neuroscience”* (P5) and: *“I'm not a big fan of the word neuromarketing. And we are just thinking about the word, but actually it's even bigger, wider, broader”* (P11). From the transcripts, it became apparent that the participants expressed certain key elements that inform their conceptualisation of neuromarketing. This includes a strong emphasis on implicit response testing and the application of neuroscience or behavioural science approaches to marketing research with the aim of generating insights underlying consumer behaviour and decision-making. For instance, P1 described neuromarketing as *“the application of neuroscience techniques to answer consumer-related research questions to better understand how individuals react on a physiological level to various stimuli which could be advertisements, different products, different packaging”*. Similarly, P4 conceptualised neuromarketing as *“using neuroscience technology to help improve or understand how consumers behave as well as in response to material like marketing material or shopping behaviour”*, while P8 emphasised *“an element and an interest in the brain...that also aid companies in understanding the implicit subconscious response of the consumer to an experience”*. Subsequently, several participants indicated that the most significant

difference between neuromarketing and traditional techniques is the types of responses being tested and the data obtained:

I think the biggest difference is that traditional marketing houses use explicit data. We use implicit data, explicit data being things that I say, implicit data being what is happening without my words. You know, what is happening in my face and body, in my mind (P3).

As a result, these participants indicated that traditional marketing research approaches use explicit data which refers to information intentionally stated based on conscious perception and typically includes an individual's direct words. In contrast, neuromarketing approaches "tap into the subconscious for the implicit reactions of people" (P1). Specifically, implicit data refers to information based on "how people subconsciously perceive things and subconsciously react to them" (P1). Furthermore, a few participants also alluded to the fact that neuromarketing can be considered an "honest" (P10) approach to conducting marketing research with reference to its ability to provide objective, quantitative data based on physiological responses. This contrasts with traditional marketing research techniques which often utilise qualitative data and subjective responses from techniques such as focus groups and in-depth interviews as illustrated by the following extract:

So, traditional marketing agencies, for example, will run focus groups or conduct surveys, which is information that you gather from what a person tells you. So, focus groups that bring people together, the facilitator asks questions about what they're trying to find out, and people respond verbally. With neuromarketing, we don't ask for any verbal responses. It's all quantitative data since we are using tech to get quantitative data from your body (P2).

Consequently, the definitions of neuromarketing provided by several participants appeared relatively consistent with a strong focus on leveraging neuroscientific theories and

tools to assess the implicit response underlying consumer decision-making and responses to marketing material. Based on the descriptions of participants, neuromarketing can thus be characterised as an approach that enables marketing researchers to delve deep into exploring purchasing behaviour and evaluate the in-the-moment experience of a consumer.

4.3.2 Strengths and Benefits of Neuromarketing

The second subtheme illustrates the strengths and benefits of employing neuromarketing techniques compared to exclusively relying on traditional marketing research methods. As neuromarketing allows marketing researchers to tap into consumers' subconscious responses, several participants emphasised its ability to provide more accurate data thus, minimising the potential for bias: *"It's the implicit nature of it that obviously, gives you almost a more unbiased reflection of how a consumer might be feeling"* (P9). In this regard, P2 indicates:

Obviously, culture and your past and how you grew up play a role in how a person experienced something which I think is what traditional market research strategies tap into. So, how you are perceived, how your culture affects you. But through neuromarketing, we kind of strip that back and see exactly how you respond physiologically. So, I think that removes a lot of the cultural, social, and political biases that would come with traditional marketing strategies.

Similarly, P8 emphasised the prevalence of self-report and self-assessment bias in traditional marketing research techniques: *"...a lot of the data I thought was kind of tainted"*. In addition, some participants acknowledged the potential of neuromarketing to overcome language barriers: *"We are bypassing the language barriers"* (P11) and: *"...that's when neuromarketing has its major strength. It's not necessarily based on language and how you ask a question, but more on how they're actually reacting to it, to a stimulus or a different product"* (P1). Considering South Africa's unique language and cultural diversity, P1 and P3

further highlighted that marketing researchers may not always be able to obtain accurate answers from self-report measures as it is impractical to adapt each questionnaire or focus group to align with all language groups in South Africa: *“Given that we live in a country where there are eleven different official languages...it becomes really hard to cater all the questions to every single one of your respondents in the study”* (P1). As a result, by measuring individuals’ physiological responses to advertising or marketing stimuli, marketing researchers can move beyond these barriers and obtain comparable data across different demographics: *“Measuring what's happening in their body kind of bypasses that layer of wood. You know, you go beyond that, and you try to understand what they are actually experiencing”* (P3).

In contrast to traditional techniques, P4, P5, and P8 further described that with neuromarketing tools such as EEG and eye-tracking, they are able to capture data in real-time while consumers are exposed to a stimulus or experiencing, for instance, a shopper journey. Marketing researchers can thus *“assess the in-the-moment experience of a consumer”* (P8) and obtain immediate neurofeedback on how consumers interact with various stimuli: *“You are getting feedback immediately and in real-time that you just assess afterwards”* (P4). Furthermore, by observing and analysing emerging patterns in the data, P5 and P11 indicated that neuromarketing tools increase the possibility of accurately predicting future consumer behaviour and responses: *“If you have these real-time measures, you can start to see patterns emerge for how people behave when they're shopping, and when they engage with marketing materials”* (P5). Additionally, a few participants perceived neuromarketing as a technique that can provide insights faster than traditional marketing research methods, which often necessitate lengthy periods of data collection and analysis. As one participant describes: *“I think neuromarketing can obviously help with getting to the crux of the situation a bit quicker...instead of asking them 10 questions about something”* (P5). Similarly, P8 indicated:

“In most cases, it's quicker and it's just, it's great to...get rid of some of the ‘fluffery’ and get down to some facts and make decisions based on that”.

By providing access to subconscious information processing, a few participants emphasised that neuromarketing fills significant gaps left by traditional marketing research techniques, which rely on direct observation and questioning: *“I think it'll just add another piece of the puzzle. I think a gap in the human experience is what we're measuring”* (P2). Similarly, P9 described neuromarketing as *“an important piece of the puzzle”* that enables researchers to measure, analyse, and compare consumer responses objectively and thus gain insights not accessible by traditional research techniques. Subsequently, exploring implicit responses provides a comprehensive understanding of the key factors driving consumer behaviour and decisions:

The assessment of people's emotional states is also really important for marketers. I think it's kind of like the Holy Grail for anyone in marketing to really understand how people are responding...from an emotional perspective because emotions are one of the key driving forces behind our behaviour... (P8).

Thus, P8 underlined the importance of creating marketing experiences that emotionally resonate with consumers.

4.3.3 Types of Applications

This subtheme provides an overview of the applications of neuromarketing identified throughout the 11 transcripts. Some of the main types of marketing research in which neuromarketing techniques are often employed are illustrated in the following table supported by extracts from the transcripts:

Table 2

Quotations Relating to the Subtheme – Types of Neuromarketing Applications

Topic as discussed by the participants	Quotation
Communications testing	<p><i>“I suppose the biggest appetite and where the majority of our work comes from, is everything from communications testing” (P9).</i></p> <p><i>“We’ve done a lot of TV advertisement testing” (P1).</i></p> <p><i>“We recently did work...where we tested video advertisements to understand, using EEG how people’s levels of engagement changed throughout the ad” (P3).</i></p>
Shopper research	<p><i>“In terms of mobile [eye trackers], it’s mostly shopper research that we use them for” (P2).</i></p> <p><i>“We use it a lot in-store... to get an understanding of natural gaze paths” (P9).</i></p>
Product and package development	<p><i>“We do...a lot of packaging testing. So, to understand...which are the most from an emphasis point of view, visually salient?” (P8).</i></p> <p><i>“A lot of the A/B testing we do revolve around product testing and packaging testing. So, we’ll expose people to different packs on screen and that will tell us which package grabs more visual attention...” (P3).</i></p>
Brand implicit association testing	<p><i>“We usually use [rapid implicit testing] to get a good understanding of brand associations ...” (P2).</i></p> <p><i>“There’s also implicit association testing, IAT. So, implicit association testing is trying to understand what you associate with what” (P3).</i></p>
A/B testing or split testing	<p><i>“It involves...doing a lot of AB testing, understanding what product is engaging” (P3).</i></p> <p><i>“I mean, typically we generally do a lot of AB testing” (P8).</i></p>
User experience and interface (UX/UI) testing	<p><i>“[Neuromarketing] can also be used to understand user experience, the usability of a website or an application” (P6).</i></p> <p><i>“Another bucket is the user experience and user interface testing bucket which incorporates things like website testing and mobile application testing” (P8).</i></p>
Neuropricing	<p><i>“Another thing which we do...is we have a few clients we work with where they’re trying to decide the price of some of their products. So, we can’t tell you exactly what price you’re thinking of, but we can see if you’re having a positive or negative response, which gives a lot of insight” (P2).</i></p> <p><i>“So, you can also use it as a pricing strategy to be able to figure out whether people, from a pricing point of view, like or are comfortable because remember, pricing is not about cheap or expensive. It’s about whether people feel that they get value for their money” (P10).</i></p>
Bespoke research	<p><i>“And then, we’ve also done some bespoke projects...” (P1).</i></p> <p><i>“So, that also leaves like more bespoke projects that are a little bit unusual, but still a really interesting application of consumer neuroscience...” (P8).</i></p>

As indicated in Table 2 above, most participants emphasised that neuromarketing plays a significant role in the communications testing space which includes “*everything from TV, radio, outdoor print, press, any sort of broadcast media, digital, anywhere where we've got an advertising message being communicated to an audience kind of falls under the bucket of communications testing*” (P8). Moreover, P10 mentioned employing neuromarketing techniques such as electroencephalography (EEG) can be useful to “*measure the level of response in terms of how emotive the advert is towards [their] respondents or whoever's going to watch that*”. Similarly, P3 and P8 highlighted that by using techniques such as EEG, galvanic skin response (GSR) devices, facial coding devices, and eye trackers, marketing researchers can assess how consumers’ “*levels of engagement*” (P3), “*cognitive workload, approach motivation*” (P8), and attention change throughout the advertisement. This further indicates “*the moment-by-moment emotions and cognitive state of people as they're experiencing TV commercials*” (P8).

According to most participants, shopper research, which involves in-shopper experience assessment, is another research field in which neuromarketing tools such as eye-tracking have gained popularity. Specifically, the application of neuromarketing devices in shopper research has enabled researchers to gain “*a better understanding [of] natural shopper behaviour*” (P9). Furthermore, in the product and package developing phase, the findings revealed that neuromarketing also plays a significant role in providing insights into how consumers perceive and react to different products and packaging designs: “*A creative team might have...six different packaging designs that they're thinking about, and we would then be able to whittle that down for them and say...these are the top two performing from an implicit point of view*” (P9). Similarly, P8 reported:

So, [we are] looking at how a consumer experiences various attributes or aspects of a product including both the intrinsics and its extrinsics. When it's intrinsics, I'm talking

about sensory testing...across all the senses. Like, how does the product deliver on the overall experience to the consumer as well as...extrinsic things that communicate product benefits...

As indicated in Table 2, brand implicit association testing represents another category of consumer research reported by most participants. Specifically, the findings indicated that brand association testing evaluates consumer's underlying associations with a particular brand or product and often involves employing rapid implicit association testing which is discussed in the following subtheme. Additionally, A/B testing or split testing was also mentioned in the transcripts and *"revolves around product testing and packaging testing"* (P3). It involves *"comparing multiple product designs against each other, comparing different test profiles against each other or preparing two different TV ad edits against each other"* (P8) and then determining which version is more appealing.

Across the transcripts, nearly all the participants underscored the significance of utilising neuromarketing techniques in user experience and interface (UX/UI) testing, often including website and mobile application testing. As indicated by P6 and P9 participants, this involves *"trying to understand where people focus on in an advert or stimulus and how they experience, let's say a website or an app"* (P6) and evaluating *"the more implicit user pain points when someone's going through a website, where they potentially falling off the purchase funnel as opposed to getting to the very end and purchasing that product"* (P9). Thus, these participants acknowledged that by employing neuromarketing techniques such as *"eye-tracking and complementing that with facial coding"* (P8), marketing researchers can *"understand...user pain points or where people are getting frustrated or confused"* (P8).

Furthermore, other applications of neuromarketing techniques (see Table 2) included neuropricing, which P2 and P10 participants reported involves applying neuropsychological theories and tools to adjust product prices based on consumer emotion, as well as bespoke

research. In particular, most participants emphasised the significance of using neuromarketing approaches to provide tailored solutions to various research questions:

So, one thing that we actually take a lot of pride in is our bespoke products. So, a client will come to us with a problem or a hypothesis that they have about how their business or how their marketing is running, and we apply the correct tech to fit their needs (P2).

Comparably, P4 reported: *“There are things like bespoke things where if a client wanted to do something more specific, they could come up with like a research question and we can see how neuroscience technology would help...”*. Thus, these findings highlight the broad applications of neuromarketing as well as its potential *“to help different brands or companies understand their target market or their targeted group of consumers, understand their purchasing decisions and their purchasing behaviour”* (P7).

4.3.4 Tools, Techniques and Neuropsychological Output

In comparison with traditional marketing research techniques, neuromarketing approaches involve employing a variety of neuroscientific devices to obtain implicit readings on a consumer’s experience throughout the marketing journey or in response to a marketing stimulus. Across the 11 transcripts, it became apparent that EEG tools and devices that measure external neural activity were among the most common techniques employed in marketing research, especially eye-tracking: *“So, it’s very much about what the study paradigm calls for, but the most commonly used is eye-tracking or remote eye-tracking as well as the EEG and the GSR, the galvanic skin response”* (P9). Other participants agreed similar sentiments, for instance:

Our most commonly used ones are eye-tracking...you’ve got two different types of eye-tracking. We’ve got what’s called remote eye-tracking, which is an eye tracker

that is attached to a screen so you can show a digital stimulus and...a mobile eye tracker, which is...a set of glasses that you put on a respondent (P1).

As indicated, both remote and mobile eye trackers are common techniques used in neuromarketing research. A few participants further differentiated between these techniques by elaborating on their distinct applications. For instance, P2 indicated that remote eye trackers are typically utilised in studies involving screen-based testing related to “*product development*” or user experience testing, while P6 reported that mobile eye trackers are “*used more for in-store experiences*”. By utilising these techniques, marketing researchers can obtain valuable insights into visual attention and user engagement: “*From the eye tracker, we would mostly get visual attention. So, if someone's, for example walking to a store, we can see exactly what they look at. The eye tracker will also measure how much your eye is dilated*” (P2). Several participants further elaborated on the various metrics obtained from measuring consumers’ eye movements including “*blinking rates*” (P6), “*pupil dilation*” (P11), “*time of first fixation [and] fixation duration*” (P6):

So, also the time to fixation. So, the time it takes them to look at something, how quickly they actually look at something. So, the things that have the shortest time to fixation are the things that pop the most. And engagement we also measure by how long they look at, you know, what's the time frame that they look at, like pieces of the advertisement (P5).

Based on this data, most participants emphasised that they are able to generate “*gaze plots*” (P2, P9) and “*heat maps*” (P2, P5, P6, P9) which provide a quick visualisation of the overall distribution of gaze points and thus, indicate “*where the participants looked at the most*” (P9). Particularly, P5: “*So, what is the first thing that they look at and then how long did they look at specific elements? And based on that, you can generate these heat maps*” (P5). This is important as both gaze plots and heat maps can provide “*major insights*” (P2)

into “*natural...gaze...and...focal points*” (P9) of packing and products, which can assist “*companies...to enhance their products and...logos...*” (P5).

Nearly all the participants referred to other neuromarketing tools that measure external neural activity including GSR devices and facial coding software. GSR devices are typically used to measure the “*levels of activation of the sympathetic nervous system*” (P3) which allows for “*a quick emotional read*” (P9) on a participant’s response to a particular environment or stimulus. Specifically, by measuring the electrical conductance of the skin, this device is particularly useful for obtaining data on various emotional responses: “*So, anything from like an excitement level to like an avoidance response and, you know, anxiety, distress*” (P9). These devices are thus frequently employed in user experience testing and provide an indication of emotional intensity and arousal, which is revealed in extracts such as: “*It doesn't give us an indication of what emotion people are feeling, but it does...give an indication of emotional intensity*” (P8) and: “*So, it measures the amount of sweat that your fingers are producing, which is a very good indication of emotional arousal*” (P1).

Additionally, as revealed by P6 and P8, these tools also “*measure things like heart rate*” (P6) and are described as “*non-invasive [and] portable*” (P9), making them relatively easy to administer “*if you need to do either a lot of respondents or if you want a quicker read*” (P9).

Facial coding involves utilising a camera with sophisticated software to detect and analyse subtle facial expressions that align with different emotional states. “*So, it's a webcam that's been trained on a number of databases and that...analyses different facial expressions that have been correlated to different emotional states*” (P1). P3 and P8 also mentioned utilising facial electromyography devices, which “*measure muscle tension*” (P3) and involve placing “*electrodes on people's faces and then understand a bit more nuanced facial expression*” (P8). However, studies employing facial coding software may present challenges related to its reliance on techniques and stimuli eliciting clear facial responses:

So, if we're just asking someone to complete tasks on a computer, it really doesn't help. But if they're trying to navigate something or something that could cause stress or anger or happiness or laughter, then it's only really worth it (P2).

Therefore, as P8 described: *“Facial coding is really good for more long format experiences to understand like user pain points or where people are getting frustrated or confused”*. Furthermore, P3 emphasised the fact that some facial expressions may be perceived differently based on culture and context and not all individuals elicit clear, expressive facial responses:

There are a lot of studies that will show you that facial expressions are not universal. In my culture, I smile when I'm happy. If I go halfway across the world to some random part of the world, that may not be their culture...so, there's that limitation. Also, humans don't always express how they're feeling.

The second critical group of neuromarketing techniques the findings revealed consists of brain monitoring devices such as EEG, functional magnetic resonance imaging (fMRI), and functional near-infrared spectroscopy (fNIRS). Despite their complexity, throughout the transcripts, several participants recounted the efficacy of these devices in measuring brain activity and blood flow and highlighted their use in communications testing. Specifically, these participants (P1, P5, P8, and P10) described an EEG as a device that measures brain waves or specifically, the electrical activity on the skull's surface area, thus indicating which parts of the brain are activated and revealing consumers' neurocognitive reactions to marketing stimuli such as advertisements: *“So, an EEG is looking at electrical activity on the surface area of the skull and that gives us an indication of certain brain sets that we're interested in”* (P8). This is also indicated in the following extracts: *“Then we've got EEG, which is an analysis of your brain waves in essence and the different physiological states that we can measure with that”* (P1) and: *“The second one that we use is an EEG machine, which*

is much more complex...and measures brain impulses” (P10). Using an EEG, several participants further stated that they were able to obtain insights related to “*decision-making*” (P5), “*cognitive engagement*” (P8), “*levels of workload*” (P3), that is, “*how cognitively taxing an experience was for [consumers]*” (P3), as well as “*approach motivation and withdrawal*” (P4) which is measured using an EEG-based metric known as Frontal Alpha Asymmetry. This is indicated by “*left versus right hemisphere activity. So, when people approach something, it's kind of like a positive valence, and if they kind of shy away from it, it gives a negative valence*” (P5).

Thus, as revealed, an important distinction of an EEG device from other external neural activity tools is its ability to detect positive and negative valence, that is, whether a consumer is experiencing positive emotions and feeling motivated towards something or experiencing negative feelings towards a stimulus. However, depending on marketing researchers’ knowledge and experience, a few participants emphasised that these devices can be quite “*complex*” (P10) and “*expensive*” (P11). P11 further indicated that when conducting consumer research, he preferred employing eye-tracking over EEG tools as he described eye-tracking as “*more reliable*” because “*the science is more concrete...behind eye-tracking*”. Additionally, although portable EEG headsets are available, P8 and P9 recommended that the use of EEG should be restricted to “*a more controlled environment*” (P9). Similarly, P8 stated: “*EEG is...really easy to use in a lab where we have a high degree of control, but as soon as we are out in a store environment or moving around...it is quite challenging*” (P8).

Functional near-infrared spectroscopy was another brain monitoring device mentioned by many participants that has gained popularity in the consumer neuroscience field. This device enables marketing researchers to “*measure the amount of blood flowing through different regions of your brain*” (P1) when consumers are exposed to a marketing stimulus. Subsequently, P8 and P3 revealed that fNIRS devices are particularly useful for detecting

neural activation during neurocognitive processing by using specialised “LEDs [that] look at blood flow” (P8): “You can tell how much blood is flowing through the frontal cortex. Then you understand that certain processes happen in the frontal cortex, so you can understand the degree to which those processes are engaged during an experience” (P3).

Across the transcripts, very few participants mentioned the use of an fMRI in marketing research. Specifically, P2 stated that although her company have access to an fMRI, they rarely employ it:

We have access to an fMRI, but we've very rarely used it. One, it's expensive [and] it is not mobile at all. In most of our studies, something is changing within the space. So that's probably a stimulus...or some kind of movement is involved and with fMRI, you have to be completely still.

Although not yet used in South Africa, P11 revealed that some international companies are developing more practical fMRI devices that could be used in more diverse settings: “There are some new fMRI...technologies [that] are more ecological. There are some companies that are trying to reduce you know, the dimension of this technology and [increase] the portability in order to be used in specific scenarios”.

The final category of neuromarketing techniques mentioned by most participants consists of approaches that do not involve the use of neuroscientific devices: “Then we also have a bunch of tools that aren't really hardware-based but are more software-based. So, there's a range of what's called implicit association tests that we leverage” (P8). As indicated by several participants (P1, P2, P3, P8, and P9), implicit association testing is frequently employed as a measure to understand underlying associations consumers may have with certain concepts, products, or brand attributes. For instance, P9 reported: “We use something called rapid implicit testing, which looks at the way in which a participant answers a question. So, they get given milliseconds to choose left or right...to understand underlying

brand associations...”. P1 further described rapid implicit association testing as a “*way that taps into [consumers’] subconscious response rather than their conscious response*” by presenting, for instance, a particular brand with different associations on a screen for a very short timeframe. Consumers then have little time to decide which concept they associate more with the particular brand. As a result, this allows marketing researchers to “*get a good understanding of brand associations or just to get a raw understanding of how someone feels or associates things with something*” (P2) without consumers having time to consciously think about their decisions.

4.4 Theme 2 – Challenges and Limitations of Neuromarketing

Across the transcripts, all participants elaborated on several important challenges marketing researchers face in implementing neuromarketing in South Africa. Theme two represents the various challenges and limitations of neuromarketing and is supported by three subthemes: 1) technical challenges, 2) awareness and market-related challenges, and 3) scepticism, concerns, and misconceptions.

4.4.1 Technical Challenges

In terms of the challenges associated with implementing neuromarketing, most participants elaborated on the financial implications of sourcing equipment such as EEG, eye trackers, and fNIRS devices. As indicated by the extracts in Table 3 below, these devices are quite expensive, especially brain monitoring technologies such as EEG devices. Moreover, P8 and P10 emphasised the fact that due to a lack of South African suppliers, “*most of this stuff you'll obviously have to outsource*” (P10) from international companies:

All the equipment generally comes from Europe and the States and all the software licenses. So, when you convert that into Rands, it is challenging. There aren't any South African suppliers that can provide the same sort of technology and software in a more cost-effective manner (P8).

Table 3

Quotations Relating to the Subtheme – Technical Challenges

Topic as discussed by the participants	Quotation
Financial Implications	<p><i>“I think the actual equipment itself is quite expensive” (P6).</i></p> <p><i>“It's very, very costly to implement and I think that's why there aren't that many companies in South Africa” (P7).</i></p> <p><i>“We also have access to functional magnetic resonance imaging technologies. Obviously, that's a very expensive, often prohibitive technology to use for commercial purposes” (P8).</i></p>
Complexity of the data	<p><i>“You know, it's not the type of thing that any layman can just pick up and start doing” (P3).</i></p> <p><i>“Obviously, analysing this is a bit difficult...” (P5).</i></p>
Need for a qualified team	<p><i>“I think the biggest takeaway is that you have to have a full scientific team behind this if you want to implement it successfully” (P1).</i></p> <p><i>“And that is an overall extra cost for the company, to hire specialised people and to train people to use it” (P7).</i></p> <p><i>“You need specific knowledge and training” (P3).</i></p>
<i>Lack of standardisation</i>	<p><i>“So, at the moment, it feels to me a bit like a soft science...there's definitely room for improvement in the methods and the study designs at least because at the moment, it's not really standardised” (P5).</i></p> <p><i>“There's no real kind of holding body or gold standard for the various technology and methodology that we leverage” (P8).</i></p>

A few participants also stated that another challenge faced by marketing researchers employing neuromarketing relates to the complexity of the data generated by neuromarketing techniques as well as subsequent analysis and interpretation. Furthermore, when neuromarketing techniques are used in addition to traditional research techniques, P1 revealed that judging the alignment between consumers' conscious answers and subconscious responses may be challenging: *"We see that they are reacting in one way, but they say something completely different. So, there's a bit of a...misalignment between their subconscious response and their conscious response..."*. Consequently, Table 3 above indicates that employee training and investing in a qualified team with sufficient device experience and knowledge of consumer neuroscience are critical factors to consider when implementing neuromarketing.

As the field is still evolving, a few participants (P5, P8, and P11) mentioned that the neuromarketing industry currently faces challenges related to a lack of standardisation of the methodology and study designs employed. P5 and P11 further stated that because neuromarketing is *"very industry-driven"* (P5), marketing researchers must adapt to client needs, which makes it *"extremely difficult to have a benchmark"* (P11). This also relates to the use of consistent metrics to generate comparable results across the industry. As indicated by some participants: *"The biggest hindrance of our applications is that people need to develop metrics"* (P2) and establish a *"common language. We should have a sort of standard that we are using"* (P11).

4.4.2 Awareness and Market-Related Challenges

In addition to technical challenges, both traditional marketing researchers' and clients' unawareness and lack of understanding of neuromarketing technology may present another critical barrier to implementing neuromarketing in South Africa: *"The awareness of it is not quite fully there yet. So, I think a lot of agencies don't even know it exists yet"* (P1). Due to

the novelty of the field and a general lack of education and knowledge of neuromarketing techniques, several participants indicated that South African marketing researchers are either unaware of the existence of such techniques or unwilling to invest in neuromarketing: *“But what I’ve seen is that because it’s still novel, certainly from big corporates, there’s anxiety around apportioning, you know, a part of your budget to it and not knowing what the outcome might be”* (P6). Subsequently, a few participants stated that since neuromarketing was first introduced, the uptake of these techniques by South African marketing research companies has been relatively slow, especially compared to other technology-driven methods such as artificial intelligence (AI). This perception is reflected in extracts such as: *“And I think a lot of...the more global clients. This is...the gold standard for a lot of their testing whereas in South Africa, I think we’re a little bit slow on the uptake”* (P8) and:

I don’t see it peaking in a short period of time. But I think it’ll take a bit of time for it to have its place in the marketing and advertising space because what happened now is AI has taken over and now the excitement is all around AI ... (P10).

While predominantly prevalent and considered quite *“mature”* (P9) in developed countries such as the United States and the United Kingdom, neuromarketing is perceived as *“still in its infancy”* (P1, P9) in South Africa. Consequently, although a few South African companies have begun utilising some neuromarketing techniques, some participants mentioned that there is *“only” “one”* (P8, P2) *“full-service applied neuroscience consultancy in Africa”* (P9).

Specifically, this is represented by the following extracts: *“We’re the only ones in Africa who do this”* (P8) and: *“We have a very small number of peers in the world, which I think is limiting. We’re the only pure neuromarketing firm in Africa. So, I think a lot of people don’t know about us”* (P2). Consequently, this presents further challenges associated with limited market awareness and increases these companies' responsibility to educate South African marketing research companies about the benefits of implementing neuromarketing: *“The*

other thing is because it's so new, they just don't really understand it very well. So, it is up to the companies to pitch this and to make people aware of it” (P5).

4.4.3 Scepticism, Concerns, and Misconceptions

Most participants indicated that since the introduction of neuromarketing, various misconceptions, concerns, and scepticism about the potential of these techniques have emerged within the South African marketing research domain. For instance, many participants reflected on a common misconception of neuromarketing associated with *“reading their minds”* (P2, P5) and *“automatically knowing what they think”* (P1), which is *“definitely not true”* (P2). P2 also revealed: *“We can't tell you exactly what price you're thinking of, but we can see if you're having a positive or negative response which gives a lot of insight”* (P2).

Subsequently, as P1 noted, a lack of understanding among marketing research firms and clients about neuromarketing techniques' capacity to access consumers' subconscious responses may heighten their concerns and scepticism: *“I think consumers' and agencies' perception of tapping into the subconscious is something that still needs to be eased out a little bit because I think people sometimes are a bit uncomfortable with it”*.

Another common misconception, especially among clients, relates to the costs of utilising neuromarketing techniques to generate consumer insights. Although purchasing these tools is expensive, several participants reported that utilising neuromarketing research services is generally priced similarly to traditional research services: *“What I would say is that there is a misconception that neuromarketing is very expensive...it's very competitive with normal research methodologies”* (P9). Moreover, the findings revealed that this misconception is often associated with the perceived complexity of employing medical or brain-imaging equipment and measuring neural activity to understand consumer behaviour: As this creates underlying concerns among current or potential clients, researchers may be

sceptical about investing in neuromarketing: *“Also, because of how our tech looks and the brain kind of seems, I don't know, premium in some areas...people are quite afraid to approach neuromarketing”* (P2).

Furthermore, it also became apparent that scepticism of neuromarketing may arise from marketing researchers' commitment and reliance on traditional research techniques. Specifically, some participants indicated that since some marketing research houses have been conducting traditional research for an extended period, researchers may be wary of introducing a novel technique without sufficient knowledge or experience as revealed by P5: *“I think a lot of companies are very wary of non-traditional market research just because it's not been around that long”* and P3: *“Traditional marketing houses have been doing things a certain way for the last 20 years. The chances are no one working in the company is going to be able to just pick up neuromarketing and do it”*. Additionally, P8 also perceived South African marketing researchers as generally *“quite stuck in their ways, a bit risk-averse and maybe not willing to try something new”*.

Apart from recounting a few misconceptions and scepticism of neuromarketing, participants had varying perceptions about whether consumers or marketing researchers are generally concerned or fearful of these techniques. This may relate to their own personal experience with marketing researchers or research respondents exposed to neuromarketing. For instance, a few participants (P6, P7, and P8) described some individuals as being *“intrigued and quite fascinated”* (P6). Particularly, P8 reported that *“the brain is just a very interesting subject matter for anyone you know, and how you respond to stuff. So, I think there's a lot of interest”*. However, other participants including P3, P4, P5, and P11 reported that some individuals may be quite fearful of neuromarketing: *“People might have a fear of doing it. Too often I've heard people ask, it's not going to do anything to my brain or it's not going to do anything to me?”* (P4). Specifically, as described by these participants, this may

relate to a lack of understanding of neuromarketing techniques, a reliance on traditional marketing research techniques, and misconceptions of mind reading. For instance, P3 stated: *"It's a very heavy-heart science and people obviously are afraid of things that they don't understand"*. Similarly, P5 reflected on his experience while working with marketing research respondents at a neuromarketing firm: *"I actually had a participant who withdrew eventually. Because she was so stressed out about this whole process. And this was just putting an EEG cap on her... it freaked her out too much because it's all this technology"*. As a result, participants reported both interest and concerns about neuromarketing techniques.

4.5 Theme 3 – Ethical Considerations

Theme three represents the ethical norms and implications associated with conducting neuromarketing research. More specifically, this theme is divided into two subthemes, representing participants' perceptions on different aspects of the ethical considerations of neuromarketing: 1) upholding standard ethical procedures and neuromarketing guidelines and 2) potential ethical concerns and challenges.

4.5.1 Upholding Standard Ethical Procedures and Neuromarketing Guidelines

In addition to upholding standard ethical procedures such as obtaining informed consent and ensuring confidentiality and voluntary participation, most participants mentioned that thoroughly *"briefing participants [and] educating people before they interact with the tech"* (P2) is essential. Thus, *"being transparent"* (P10) and ensuring that marketing research respondents *"understand what it is that's being tested"* (P10) and *"what data is being collected, how it's collected... and...the implications of it"* (P1) are crucial in maintaining ethical standards in neuromarketing. As a result, these participants also stressed the importance of explaining the type of measurements and only collecting physiological data relevant to the particular research study. Only obtaining measurements that are required to answer the research question and thus, *"not test[ing] beyond anything else"* (P10) was

considered a crucial ethical consideration: *“We only take the data that we need. It's not like we hook you up to everything for every study, because we just want to receive data. I think a huge thing is just to measure what you need”* (P2). Furthermore, some participants acknowledged the need for proper facilitation, that is, *“constantly checking up on the [neuromarketing research respondents]”* (P6) and ensuring that they are comfortable throughout the research process: *“I think the most important thing and as a scientist, you sometimes forget this, but you need to make sure your participants are comfortable”* (P5). Comparably, P3 also stated: *“We have to be very careful that the experiences we set up do not cause a negative impact...”*.

The secure storage of physiological data was another significant ethical consideration mentioned by a few participants. Particularly, these participants emphasised the importance of upholding strict data storage and management practices while adhering to data protection laws such as the Protection of Personal Information (POPI) Act: *“We are very much bound by the POPI Act...you know, and the way in which you store data, get rid of data. All of those kinds of things, you know, we are bound by the very same laws”* (P9). This relates to the fact that biological data is considered highly sensitive information:

We're collecting personal data from people and not only their verbal responses but physiological data, which is very private to that person. So, like their heart rate, the way their brains respond to different scenarios, their emotional responses...So, we are very strict in how we store that data (P1).

P5 further stressed the importance of proper data storage as *“these responses are things, you know, EEG brain activity, that's all actually protected information in a way because it's your biological, it's your, kind of your yeah, your biological footprint or ID, I would say”*.

These various guidelines, as proposed by the South African Market Research Association (SAMRA) and the Neuromarketing Science and Business Association

(NMSBA), form the foundation of the ethical framework followed by the participants' companies: *"We abide by the ethics and standards that are put forward by the Neuromarketing Science and Business Association [and] we also follow just the general marketing research guidelines that are set up by SAMRA"* (P8). Thus, in addition to adhering to local ethical standards, P8 mentioned rigorously following global ethical practices, highlighting the importance of the NMSBA in guiding ethical neuromarketing practices in an otherwise loosely regulated industry.

4.5.2 Potential Ethical Concerns and Challenges

Although the findings mentioned upholding ethical standards as proposed by SAMRA and the NMSBA, P8 and P5 highlighted that implementing standard ethical practices related to the management, storage, and protection of biometric data is *"still a very grey area at the moment"* (P5). More specifically, these participants indicated that there is debate within the industry about the extent to which physiological and neurological data can be used for commercial purposes, the period of data storage, and ownership of identifiable and non-identifiable biometric data:

The whole realm of biometrics is still a bit of a grey area in terms of that data, in terms of who owns it and you know, is the biometric data yours or can it be mine and to what extent? So yeah, it is a bit of a murky space for our industry... (P8).

Furthermore, P11 and P6 raised concerns regarding the potential for *"manipulating the research or the results to fit the answer that a company specifically wants"*, especially considering the possibility of client loss when obtaining negative or contradictory research results using neuromarketing techniques. As a result, these participants acknowledged the importance of data integrity and maintaining transparency in research findings. Additionally, a few participants also expressed concerns about the influence of neuromarketing on vulnerable populations and using these research techniques to promote harmful products such

as alcohol and tobacco: *“I think you have to be careful about what is being researched and how it's being researched and not promoting things to people through neuromarketing and in terms of, say like smoking and things like that”* (P4). Similarly, P3 stated:

Especially in South Africa, in the low-income socioeconomic bracket...there's such a high rate of alcoholism and domestic abuse...that come from alcohol consumption. The last thing you want to be involved in is manipulating people from that space to drink more alcohol.

Consequently, the findings emphasised the importance of developing and adhering to standard ethical practices, especially considering the limited number of local and international ethics bodies across the neuromarketing industry.

4.6 Theme 4 – Recommendations for Implementation

The final theme discusses key recommendations marketing researchers should consider when implementing neuromarketing within a South African marketing research context. These recommendations are represented by the following subthemes: 1) effective resourcing, 2) neuromarketing as a complementary research approach, and 3) future implications of neuromarketing.

4.6.1 Effective Resourcing

This subtheme highlights the participants' recommendations for obtaining the necessary resources when incorporating neuromarketing. As indicated in the extracts in Table 4, when implementing neuromarketing techniques, several participants emphasised the importance of investing in good-quality technology that aligns with the company's budget. Although neuromarketing devices such as EEG technology can be expensive, P2 and P11 underlined the significance of providing scalable solutions and accurate conclusions by investing in good-quality technology.

Table 4

Quotations Relating to the Subtheme – Effective Resourcing

Topic as discussed by the participants	Quotation
Investing in accessible and good-quality technology	<p><i>“I think go with what the company can afford in terms of quality of the tech” (P2).</i></p> <p><i>“Eye-tracking is all the rage. It's very much the most accessible piece of tech...it's certainly not a bad place to start” (P9).</i></p> <p><i>“Definitely start small with an eye tracker...just to understand the tech more...and then I think after a while the company can implement the bigger and more expensive equipment like the EEG” (P6).</i></p> <p><i>“I think the quality is important. Maybe the most high quality, no...because then we are speaking about...expensive tools” (P11).</i></p>
Ensuring that neuromarketing is beneficial for a company and its clients	<p><i>“Do your market research...to get a feel for what companies expect and what they would be willing to pay if it's feasible” (P5).</i></p> <p><i>“You'd probably need to first check with your clients like listen...we're thinking of going into neuromarketing...is that something you'd even want?” (P7).</i></p>
Building a diverse team	<p><i>“It's a multidisciplinary approach, so you should have people from business, from neuroscience, from psychiatry and psychology” (P5).</i></p> <p><i>“We're a very diverse team and I think that diversity is critical” (P9).</i></p> <p><i>“What we've done here...we've sort of split our team in two. We've got a science team and we've got a marketing team” (P1).</i></p>
Networking, collaborating, and forming partnerships with industry experts	<p><i>“Try to collaborate. I think it's extremely important because nobody can be good at everything...” (P11).</i></p> <p><i>“It's always good to chat with people that's been in the business for a bit...they can give a unique perspective on how this works [and] what kind of challenges there are” (P5).</i></p> <p><i>“Partnering with a neuromarketing company, I think is a good start...” (P6).</i></p>

However, several participants (P1, P6, P9, and P10) suggested investing in more accessible and practical tools, especially devices that measure external neural activity:

I think for any new marketing firm to come into this, I would start with the basics...being like eye-tracking, galvanic skin response...things that have been substantiated by academics and scientific papers, and...as you grow more confident in using those basics, you will start to dive into the other things (P1).

Similarly, P10 also suggested: *“I think you need to take it one step at a time...start by showing, your client where people tend to look the most on your ads...and then, get them to the next step of EEG...”*. Thus, P1 as well as P6 and P10 further indicated that as marketing research firms successfully implement and become confident with certain techniques, they can then consider incorporating a variety of different external reflexes or brain monitoring devices. Nevertheless, P5 and P7 suggested that in addition to educating clients about neuromarketing, marketing research firms need to ensure that implementing these techniques is advantageous for both the company and its clients. Specifically, P7 suggested asking: *“Is it actually beneficial for whatever research you are conducting? Would your clients actually be interested in implementing the eye-tracking technology into research that you could conduct for them?”*.

Another key recommendation as mentioned by most participants, involves building a diverse team within the company. Given that neuromarketing is regarded as a *“multidisciplinary approach”* (P5) to marketing research, several participants suggested incorporating team members with diverse experiences, knowledge, and backgrounds. This includes individuals with expertise in marketing as well as scientific knowledge:

I think it's also about building the right team and really finding the right resources. And you need people who know both the neuroscience and how to understand

neurofeedback data...on the one hand. And then you also need people who are marketing savvy...because we're kind of the marriage of those two worlds (P8).

Subsequently, these participants emphasised that the interdisciplinary nature of neuromarketing necessitates a marketing and research team able to work effectively across a broad area of expertise:

There's a lot of different specialities that come to the floor to make this a...rich environment, but it's absolutely critical that you also have the likes of a project manager, of a marketing team, you know, all of those kinds of things that make a business successful. You can't just have the engine, so to speak (P9).

Regarding the acquisition of equipment or expertise, half of the participants also recommended that networking, collaborating, and forming partnerships with individuals or companies experienced in neuromarketing can be advantageous for marketing research firms looking to adopt neuromarketing techniques: *“I also think partnering...with other companies that have experience in neuromarketing...will definitely help them at least understand how the equipment is used or how the data will look at the end”* (P6). As indicated in Table 4 above, these companies can provide a unique perspective on the processes and operations of a neuromarketing firm as well as the type of challenges neuromarketing researchers may encounter. Interestingly, it became evident that instead of investing in neuromarketing devices, establishing long-term partnerships with companies or individuals already utilising neuromarketing techniques may be more cost-effective and practical: *“I think absolutely companies need to invest in neuromarketing, but I don't know that they need to have their own devices. They can make use of consultancies like us”* (P9). Similarly, P3 reported:

I can say that we partner with a lot of other marketing firms and...most of them see us as the sort of neuromarketing experts... so, it makes sense for us to sort of

collaborate. Especially in the space where capital cost is high and you need specific knowledge and training.

4.6.2 Neuromarketing as a Complementary Research Approach

The integration of neuromarketing techniques with traditional marketing research methods was recommended throughout the transcripts. Most participants highlighted the strengths of utilising both explicit and implicit data as this provides a “*more holistic approach to answering research questions*” (P6). Therefore, by “*having both of those answers*” (P3), “*so both the kind of rational feedback as well as subconscious or implicit feedback*” (P8), these participants revealed that neuromarketing could complement traditional marketing research techniques, making the data “*more robust*” (P9) and providing a “*wealth of depth and insight into the overall consumer experience*” (P8). Furthermore, P5 stated that neuromarketing will not be able to replace traditional marketing research, as these techniques play a significant role in understanding consumers’ perceptions and experiences:

“Neuromarketing will still be complementary. I don't think traditional market research will ever really go away because there's definitely room for qualitative research in any science, any discipline”. It also became apparent that “*both fields have their limitations*” (P9) and by integrating neuromarketing as a supplementary method alongside conventional marketing research techniques, researchers can address existing gaps in the field of marketing research.

A few participants reported a notable trend involving the increased utilisation of AI in both traditional marketing research methods and neuromarketing practices. This integration is essential for enhancing predictability, efficiency, and convenience in marketing research: “*So, a big trend in our industry is obviously like the integration of AI and how that can improve what we do and how we do it*” (P8). In particular, P8 indicated that AI technology has already been integrated into eye-tracking systems and software applications: “*We also have artificial intelligence-driven eye-tracking which is like a predictive tool that uses saliency as a way to*

try and understand and predict visual attention". Additionally, P5 expressed confidence that AI would soon be incorporated into neuromarketing techniques: *"I wouldn't be surprised if soon they start using some kind of, they already use AI in facial recognition but if they start using it a lot more, kind of doing real-time AI recognition while doing EEG"*. As a result, implementing neuromarketing as a complementary approach to traditional marketing research approaches as well as integrating technology-driven methods such as AI were key recommendations to drive growth within market research.

4.6.3 Future Implications of Neuromarketing

Across the transcripts, several participants expressed positive perceptions regarding the growth and development of neuromarketing in South Africa. Although a few participants claimed that the field *"still has a long way to go"* (P8), some participants emphasised an increased utilisation of neuromarketing by South African marketing research companies as indicated in the extracts by P2 and P5 in Table 5 below. Moreover, it was indicated that as the field evolves, participants are progressively integrating innovative methods and tools while applying academic research within the commercial sector. Specifically, P8 expressed the importance of remaining current with contemporary research methodologies and integrating emerging practices and technologies to ensure that researchers derive effective and accurate conclusions:

We're always incorporating new methodologies, new technologies, you know, academic papers are being published every day with new ways of doing things. So, it's just about building those into your processes and making sure that you're current and using the best possible methodologies that are out there.

P9 further emphasised the significance of *"being curious"* and *"open-minded"* to new opportunities possible with neuromarketing technology.

Table 5
Quotations Relating to the Subtheme – Future Implications of Neuromarketing

Topic as discussed by the participants	Quotations
Growth and increased utilisation of neuromarketing in South Africa	<p><i>“I think people are probably going to be using this a lot more as time goes by” (P5).</i></p> <p><i>“I think within South Africa, we're making huge strides in the department” (P2).</i></p>
Diverse application of neuromarketing	<p><i>“We're looking at doing a neuroarchitecture pilot at the moment to better understand people's true felt experiences of particular spaces...” (P9).</i></p> <p><i>“There's a myriad of applications. I think the marketing aspect is only the beginning. I think applied neuroscience has huge potential to revolutionise a number of sectors and industries” (P8).</i></p>
Implicit testing across diverse populations	<p><i>“I think it will definitely give an opportunity to have more information about the Southern part of the world and those in maybe less developed countries as well. Because...there's not a lot of information, most of it is coming from the West...” (P6).</i></p> <p><i>“I think a lot of the typical research that is applied to marketing in general hasn't even been done on a South African cohort population and at an implicit level. So, I think the benefit of doing...is huge...” (P1).</i></p>
Need for standardisation	<p><i>“The other thing is there's not really a standardised process, you know. It would have been ideal if you had a paradigm you could just apply...” (P5).</i></p> <p><i>“I think the best approach is having a common language. We should have some sort of standards that we are using. Otherwise, it becomes a mess” (P11).</i></p>

As illustrated in Table 5 above, the application of neuromarketing techniques beyond marketing research was another key implication mentioned frequently by the participants. In particular, P1, P8, and P9 emphasised the potential of neuromarketing to be applied to

different fields and industries, including “*applying it to solve challenges within healthcare [and]...sport*” (P8). Notably, several participants referred to the application of neuromarketing in “*architecture*” (P1, P8, P9, P11), commonly known as “*neuroarchitecture*” (P1, P9), which involves “*how do people perceive a space? [and] how do you design a space that elicits the responses you need...?*” (P1).

The findings further revealed that a few participants perceived the growth of neuromarketing in South Africa as presenting a substantial opportunity for implicit testing across diverse populations, especially considering the country’s rich cultural and linguistic diversity. This relates to the fact that since neuromarketing is predominantly employed by international marketing research firms, the data is often not representative of African populations:

I think one thing I find very interesting about doing more neuromarketing in South Africa is that...a lot of science and research is very Western-based. And even with neuromarketing, I mean, all of our competitors are in the US and Europe and in terms of targeting the correct sample, I think it's really, really important to do research in South Africa and Africa (P2).

Although neuromarketing has seen widespread application, a few participants have noted that the standardisation of its methodologies and ethical principles remains a critical area for future exploration and refinement: “*What is the future? I think...we need to create a system and we need to create...a common language. We need to work together. We need to create a sort of network*” (P11).

4.7 Conclusion

Chapter four summarised the research findings from the reflexive thematic analysis. Specifically, four themes and 12 subthemes were identified to represent the participants’ perceptions of neuromarketing and its utilisation in a South African marketing research

context. The findings revealed a comprehensive understanding of neuromarketing as well as the various strengths and benefits associated with applying neuropsychological principles and technology within marketing research. However, the findings also revealed several challenges including technical challenges, awareness and market-related challenges, as well as ongoing scepticism, concerns, and misconceptions of neuromarketing. Ethical considerations also emerged as a key theme, highlighting the importance of upholding standard ethical principles and acknowledging potential concerns, specifically related to ethical challenges around privacy and managing physiological data. The chapter then concluded with key recommendations marketing researchers should consider when implementing neuromarketing within a South African marketing research context.

Chapter 5: Discussion

5.1 Introduction

This chapter presents a discussion and interpretation of the research findings in light of current neuromarketing literature. The chapter further conceptualises the research results within the frame of the study's research aim and objectives, considering the participants' perceptions of neuromarketing and its utilisation in a South African marketing research context. Specifically, the chapter elaborates on three key discussion points: 1.) the role and impact of neuromarketing in South African marketing research, 2.) challenges and ethical implications of neuromarketing, and 3.) future directions and strategic recommendations for implementing neuromarketing. Subsequently, the limitations of the current study are addressed, followed by a brief discussion of recommendations for future research and a personal reflection. The study then concludes with a summary of the main findings from this study.

5.2 The Role and Impact of Neuromarketing in South African Marketing Research

5.2.1 Understanding Neuromarketing and its Significance as a Marketing Strategy

Based on current literature, neuromarketing is described as a relatively young interdisciplinary field that involves the use of neuroscientific tools and theories to evaluate the neurocognitive and emotional processes in response to a marketing stimulus to gain insight into consumers' behaviour, preferences and decisions (Alsharif, Salleh, Baharun, & Yusoff, 2021; Bhardwaj et al., 2023; Lim, 2018; Thomas, 2017). The findings of the current study revealed an overall consensus with the current international literature. Specifically, neuromarketing was conceptualised as a novel approach that leverages neuroscientific techniques to assess the implicit responses underlying consumer decision-making and physiological reactions to marketing material. However, the results showed that there is a broader contextualisation of neuromarketing within the domains of consumer neuroscience,

emphasising that neuromarketing draws from various fields, including consumer psychology and behavioural economics. Furthermore, the implementation of neuromarketing in South African marketing research firms presents several key distinctions and advantages compared to exclusively depending on traditional marketing research techniques. Similar to several international studies' and reviews' differentiation of neuromarketing and traditional marketing research methods (Harris et al., 2018; Rawnaque et al., 2020; Royo-Vela & Varga, 2022), the findings indicated an overarching perception that, while conventional techniques, such as surveys and focus groups, provide access to explicit insights dependent on conscious perception, neuromarketing approaches measure consumers' neuropsychological and physiological responses to experiences or stimuli. By collecting and analysing implicit physiological responses, neuromarketing techniques provide access to less biased insights and objective data (Bočková et al., 2021; Fortunato et al., 2014). Likewise, as indicated under the subtheme, "strengths and benefits of neuromarketing", a common perception held by South African marketing researchers relates to the potential of neuromarketing to decrease self-report and self-assessment bias in the data. In addition, it was suggested that by measuring individuals' physiological responses to marketing stimuli, marketing researchers may overcome certain language barriers. This perception is concurrent with a qualitative study conducted by Isabella et al. (2015) exploring the implications of implementing neurophysiological tools by marketing researchers in Latin American countries. Specifically, it was revealed that employing neurophysiological tools in a marketing research context may be beneficial, as these devices facilitate the collection of implicit responses, which remain unaffected by linguistic variations. Thus, neuromarketing is perceived to provide comparable data across different demographic groups, which holds particular significance for marketing researchers in South Africa, considering the country's unique cultural and linguistic diversity.

Fortunato et al. (2014) and Lim (2018) emphasised the ability of some neuromarketing tools to measure consumer responses concurrently with exposure to marketing stimuli, as well as their significance in predicting consumer behaviour. This aligns with the current study's findings, which indicated that neuromarketing tools, such as EEG and eye-tracking, are able to capture data as consumers engage with marketing stimuli such as advertisements or websites. Subsequently, it was mentioned that neuromarketing enables marketing researchers to observe emerging patterns and predict consumer responses more effectively. This allows for more accurate marketing investments and strategic planning. Therefore, the integration of neuroscientific techniques into marketing research, as a complementary resource to traditional methods, presents an opportunity to obtain a comprehensive understanding of consumer behaviour and neurocognitive processes (Royo-Vela & Varga, 2022). As the study results indicated, neuromarketing fills significant gaps left by traditional marketing research techniques and enables researchers to evaluate consumer behaviour from an implicit perspective, thus providing insights not accessible by conventional research techniques.

5.2.2 Perceptions of Neuromarketing Techniques, Applications, and Neuropsychological Output

Under the subtheme, “tools, techniques, and neuropsychological output”, the participants elaborated on various neuroscientific techniques used to gather implicit data on a consumer's experience. Specifically, these techniques allow researchers to detect and measure neural and metabolic activity when consumers are exposed to different marketing stimuli (Ćosić, 2016; Fortunato et al., 2014; Lim, 2018). As such, the participants revealed that neuromarketing can be applied across various domains within marketing research. For instance, the findings indicated that some of the main types of marketing research in which neuromarketing is often employed include communications testing, shopper research, packaging testing, product development, user experience testing, brand association testing,

neuropricing, and bespoke research. Similarly, Singh (2020) highlighted the broad applications of neuromarketing, specifically focusing on its use in product design, optimising promotions and advertising, pricing strategies, store layout, and overall consumer experience enhancement.

5.2.2.1 Applications and Neuropsychological Output of Techniques that Measure External Neural Activity. Some of the most common techniques employed by the market research companies in the current study involve utilising devices that measure external neural activity, including eye trackers, facial coding, and galvanic skin response (GSR) tools. Likewise, Bazzani et al. (2020) and Iloka and Anukwe (2020) reported that eye-tracking techniques have become some of the most frequently adopted neuroscientific devices in consumer research. Additionally, these techniques are considered cost-effective and highly accessible, especially compared to brain-monitoring devices, such as functional magnetic resonance imaging (fMRI) tools (Antoniak, 2020; Lim, 2018; Fortunato et al., 2014). The versatility of eye-tracking technology in marketing research is also reflected in studies conducted on the role of eye-tracking in understanding how in-store stimuli influence consumer decision-making (Zuschke, 2020) and evaluating consumer preferences toward product design, packaging elements, product positioning, and marketing communication (Cholewa-Wójcik & Kawecka, 2015; Ćosić, 2016).

The findings revealed that by utilising other techniques that measure external neural activity, such as GSR devices and facial coding tools, marketing researchers can evaluate changes in consumers' engagement levels throughout different types of marketing communications. Based on the findings, these methods also provide insights into the real-time emotional states of individuals as they are exposed to different marketing stimuli. This capability makes these techniques particularly useful for user experience testing, as they assist the marketing researchers in understanding emotional responses while consumers

navigate a website or mobile application. Furthermore, marketing researchers often use these techniques as complementary methods to facial electromyography (fEMG) or facial coding techniques. This relates to the fact that GSR devices only provide insights into the level of arousal rather than the type of emotional response (Kalaganis et al., 2021). Although these techniques are used to understand emotional responses during user experience and interface testing, it was revealed that facial coding software may present limitations due to its dependence on stimuli that elicit discernible facial expressions, especially considering that facial expressions can be interpreted differently depending on cultural, contextual, and individual factors. However, despite these challenges, studies emphasised the effectiveness of different types of facial coding combined with GSR technology in measuring different dimensions of emotion (Li et al., 2018; Saffaryazdi et al., 2022). For instance, Li et al. (2018) demonstrated that fEMG and GSR devices were more effective than self-report methods in accurately capturing and distinguishing real-time emotional responses to tourism advertisements.

5.2.2.2 Applications and Neuropsychological Output of Brain-Monitoring

Techniques. Apart from devices that measure external neural activity, electromagnetic devices and brain-monitoring techniques are also common neuroscientific techniques used to understand the underlying mechanisms of consumer decision-making (Gurgu et al., 2020; Lim, 2018). The utilisation of EEG devices has garnered considerable attention within marketing research, enabling researchers to explore the neurocognitive and emotional mechanisms underlying consumer behaviour (Costa-Feito et al., 2023; Golnar-Nik et al., 2019). In particular, the marketing research companies of this current study recounted the popularity of employing these devices in communications testing, including assessing the neurocognitive and emotional impact of advertisements. Likewise, Costa-Feito et al. (2023) revealed that EEG devices are commonly used to capture consumer responses to branding,

advertising, and pricing (Costa-Feito et al., 2023). For instance, Golnar-Nik et al. (2019) incorporated EEG tools to study consumer decision-making in response to mobile phone advertisements, finding that certain changes in EEG power could effectively predict consumer choices.

In the current study, the findings revealed the prevalence of South African marketing research companies in using EEG devices to obtain insights into neurocognitive engagement, workload, and emotional valence by using an EEG-based metric known as Frontal Alpha Asymmetry. Aligning with international studies, Gonzalez-Morales (2020) and Baldo et al. (2022) highlighted similar insights obtained from EEG techniques, particularly emphasising insights related to emotional valence and its role in predicting memory and influencing consumer decision-making. Thus, EEG tools have become one of the most frequently adopted neuroscientific techniques used in consumer research (Bazzani et al., 2020). However, when considering the cost and practicality of these techniques within the South African marketing research industry, this study found that EEG devices tend to be perceived as complex, costly, and demand a higher level of control, despite Bočková et al. (2021) and Costa-Feito et al. (2023) highlighting the portability of EEG devices.

Regarding the implementation of other brain monitoring technology, only a small number of participants mentioned using fMRI techniques and no participant discussed the use of positron emission tomography (PET) in South African marketing research. This may be due to the fact that, in addition to the complexity of these devices, fMRI devices are expensive and non-portable, confining their use to controlled laboratory settings (Ćosić, 2016). PET scans are considered invasive and involve injecting radioactive agents into the bloodstream, which bind to certain substances in the brain (Ćosić, 2016; Bočková et al., 2021). Furthermore, Lim (2018) and Rawnaque et al. (2020) argued that fMRI techniques also provide low temporal resolution as opposed to electromagnetic tools, such as EEG

devices. Despite its limited usage in South African marketing research companies, several international studies illustrated the value of fMRI devices in evaluating emotional and decision-making processes underlying brand recall and favourability (Al-Kwafi, 2016; Rampf et al., 2016; Peiris et al., 2024; Shaw & Bagozzi, 2018).

Rather than relying on fMRI tools to measure changes in blood flow, there is an increased popularity among South African marketing researchers in employing a relatively new, non-invasive neuroimaging technique, known as functional near-infrared spectroscopy (fNIRS). Specifically, fNIRS devices were considered effective for detecting neural activation during neurocognitive processes, particularly in the frontal cortex. In contrast to fMRI tools, these devices are also considered lower in cost and highly portable (Meyerding & Mehlhose, 2020). In a research study replicating a well-investigated neural effect previously measured with fMRI, Krampe et al. (2018) demonstrated that mobile fNIRS can reliably measure consumer preferences and decision-making processes in real-world settings, highlighting the versatility of this technique.

5.2.2.3 Applications of Neuromarketing Techniques not involving Neuroscientific Devices. The final category of neuromarketing techniques reflected in the findings encompasses methods that do not involve neuroscientific devices. Particularly, South African marketing researchers often use implicit association testing to investigate the underlying associations that customers could have with specific products or brand traits. As this test measures response times to evaluate the strength of associations between two concept pairs, it is often considered a reliable technique for assessing implicit attitudes (Songa et al., 2019). For instance, Bosshard et al. (2016) evaluated whether likeable brands are associated with positive affect and whether disliked brands are associated with negative affect. As consumers do not have sufficient time to debate their decisions, rapid implicit association testing enables marketing researchers to tap into consumers' subconscious responses to understand implicit

associations and attitudes. Thus, by implementing neuroscientific techniques and theories into consumer research, marketing researchers can gain a deeper understanding of natural consumer behaviour, which can help inform merchandising and branding strategies and craft messages that resonate more effectively with audiences.

5.3 Challenges and Ethical Implications of Neuromarketing

5.3.1 Financial Implications, Expertise, and Standardisation

Despite the opportunities associated with neuromarketing, Alsharif et al. (2023) and Crespo-Pereira et al. (2020) evaluated the underlying factors contributing to the lack of neuromarketing firms in developing countries and their reluctance to integrate neuroscientific techniques into marketing research practices. Specifically, one of the main challenges involves the costs associated with implementing neuromarketing devices within marketing research firms (Alsharif et al. 2023). This is reflected in the findings where high costs of implementing neuroscientific devices emerged as a key challenge to implementation. Moreover, within the South African marketing research environment, firms' reliance on international companies to procure the necessary equipment relates to a shortage of local suppliers. Consequently, this poses a substantial challenge for marketing research firms in South Africa, as developing countries frequently lack the financial resources required to obtain such advanced devices (De Oliveira & Giraldo, 2017; Nyoani & Bonga, 2017).

Beyond the financial implications, the findings of this study emphasised that employee training and the development of a qualified team with expertise in consumer neuroscience and hands-on experience with the relevant devices are crucial considerations when implementing neuromarketing strategies. This is particularly important given the complexity of the data produced by neuromarketing techniques, as well as the subsequent analysis and interpretation required. These challenges align with the findings of several international research studies in which the perceptions regarding the application of

neuromarketing techniques in the advertising and marketing domains were explored (Alsharif et al., 2022; Baños-González et al., 2020; Gani et al., 2018; Isabella et al., 2015).

Subsequently, the high costs associated with implementation, along with the complexity of the tools and data are consistently perceived as significant barriers to the adoption and widespread application of neuromarketing within the marketing research and advertising domains, especially in developing countries.

Added to these challenges is the lack of standardisation of the methodologies, study designs, and techniques used across the market (Baños-González et al., 2020; Cenizo, 2022). Given that neuromarketing is predominantly an industry-driven discipline, the findings emphasised the difficulty of establishing consistent best practices, implementing standardised methodologies, and generating comparable results. Similarly, Cenizo (2022) argued that the neoteric and competitive nature of the neuromarketing context contributes to the lack of adherence to standardised regulations and employing consistent metrics throughout the industry. The findings of the current study are thus aligned with current literature, highlighting the multifaceted challenges embedded in the implementation of neuromarketing within a South African marketing research context.

5.3.2 Knowledge, Awareness and Misconceptions

As previously indicated under the subtheme, “awareness and market-related challenges”, unawareness and a lack of understanding of neuromarketing technology among marketing researchers were considered critical challenges to implementing neuromarketing in South Africa. Neuromarketing remains a relatively new concept in developing countries and many marketing researchers continue relying on traditional research techniques (Alsharif et al., 2023; Biswas et al., 2022; Gani et al., 2018). Despite the popularity of the field in developed countries such as the United States and the United Kingdom, the findings revealed that the uptake of neuromarketing techniques by South African marketing research companies

has been relatively slow, especially compared to other technology-driven methods, such as artificial intelligence (AI). In addition to the low awareness and education of neuromarketing techniques, the findings are concurrent with the results obtained in a study exploring the implementation of neuromarketing in Malaysian universities. Specifically, the study indicated a gap in Malaysian researchers' understanding of neuromarketing, including what it entails, how to conduct neuromarketing research, and the methods for analysing and interpreting the resulting data (Alsharif et al., 2023). Due to these implications, the current study emphasised that only a few South African companies have started adopting certain neuromarketing techniques with only one full-service applied neuromarketing and consultancy firm in Africa.

As with many emerging fourth-industrial revolution (4-IR) technology trends, the concept of neuromarketing has given rise to various perceptions, options, and attitudes, particularly toward the utilisation of neuroscientific technology within a marketing research context (Bakardjieva & Kimmel, 2017). Despite South African marketing researchers' excitement and favourable perceptions toward neuromarketing, the findings revealed that since the introduction of neuromarketing, a range of misconceptions, concerns, and scepticisms about the potential of these techniques have surfaced within the South African marketing research industry. However, this is consistent with international research, indicating that a high degree of experience and knowledge of neuromarketing predicts favourable perceptions about the implementation of neuromarketing techniques, while a lack of awareness and unfamiliarity with the techniques are associated with misconceptions as well as ethical concerns (Bakardjieva & Kimmel, 2017; Banerjee, 2021; Hamed et al., 2013). Specifically, as previously revealed under the subtheme, "scepticism, concerns, and misconceptions", the findings emphasised several misconceptions of neuromarketing among traditional marketing researchers and clients unfamiliar with the techniques, including misconceptions associated with mind reading and the ability to influence consumers. This

relates to the misbelief that neuromarketing manipulates consumers into purchasing products, despite research showing that neuromarketing primarily aids in monitoring brain activity without directly influencing consumer behaviour (Berčík, 2017; Nadanyiova, 2017).

The findings further revealed another misconception relating to the costs of employing neuromarketing techniques. While purchasing these tools is costly, several participants emphasised that utilising neuromarketing research services is generally priced comparably to traditional research services. However, the perceived complexity and costs of employing medical equipment generate additional concerns and scepticism about investing in neuromarketing. Based on the findings, this may create further scepticism about introducing a novel research method as many South African traditional marketing researchers have been conducting marketing research using conventional techniques for several years.

The emergence of neuromarketing has generated both excitement and debate related to the use of neuroscientific devices and theories for marketing research (Fortunato et al., 2014). Participants noted that this diversity in perspectives was also observed among respondents involved in neuromarketing studies, who found the techniques both fascinating and intimidating. Thus, creating awareness of these techniques remains an important endeavour to increase positive perceptions and eliminate misconceptions among South African marketing researchers.

5.3.3 Ethical Concerns and Considerations

Beyond the misconceptions and scepticism surrounding neuromarketing, many ethical questions about the use of neuroscientific techniques in marketing research have been raised since its introduction (Biswas et al., 2022; Luna-Nevarez, 2021). Moreover, studies suggested that neuromarketing raises questions concerning the invasion of mental privacy and confidentiality, as well as the disclosure of biometric data in the commercial and marketing domains (Ienca & Andorno, 2017; Stanton et al., 2017; Ulman et al., 2015). Considering the

participants' description of the current ethical landscape in South Africa, these concerns also relate to the debate regarding the management, storage, and use of physiological data within a commercial research space, as mentioned under the subtheme, "potential ethical concerns and challenges". Despite adhering to ethical guidelines proposed by the South African Market Research Association and the Neuromarketing Science and Business Association (NMSBA), the findings of the current study revealed that there are no clear standard protocols, indicating the ownership of identifiable and non-identified biometric data, the duration of data storage, and the degree to which physiological and neurological data can be used for marketing research purposes. Additionally, to regulate the protection of personal and medical information, the recent enactment of the Protection of Personal Information Act in South Africa contributes to this ethical debate (Swales, 2022).

Ducu (2017), Isa et al. (2019), and Ulman et al. (2015) highlighted another ethical concern involving the use of vulnerable populations in marketing research, that is, individuals who are much more susceptible to being influenced, manipulated, or deceived. In alignment with the current study, participants also voiced concerns about the impact of neuromarketing on vulnerable populations and the use of these research techniques to promote harmful products, such as alcohol and tobacco, especially in low socioeconomic communities with a high rate of substance abuse. To prevent such exploitation, ethical values must guide the selection of clients and research projects with the potential of promoting harmful products.

Due to these growing concerns, the findings emphasised the importance of adhering to standard ethical procedures, including maintaining informed consent, confidentiality, and voluntary participation, as well as carefully reviewing research projects that could potentially promote harmful products. Proper communication and briefing of research respondents in neuromarketing studies were also considered essential ethical considerations to uphold transparency. Similarly, Dierichsweiler (2014), Hensel et al. (2017), and Pop et al. (2014)

indicated the need to emphasise respondents' specific contributions to the research project and provide full disclosure of the procedures, goals, and potential risks of the study.

Furthermore, the participants of the current study elaborated on the ethical considerations of handling biological data which the participants regarded as highly private information. Dierichsweiler (2014) argued that a key distinction between neuromarketing and traditional marketing lies in the fact that concerns regarding privacy have expanded considerably with the incorporation of neuroscience techniques. As such, it is important to adhere to strict data storage and protection protocols. In addition to upholding standard research ethics, the participants also mentioned rigorously following global ethical practices, highlighting the importance of the NMSBA in guiding ethical neuromarketing practices in an otherwise loosely regulated industry. Likewise, in an exploratory research study investigating international neuromarketing companies' views on ethical responsibilities in neuromarketing research, Pop et al. (2014) revealed that most of these companies strictly comply with the NMSBA's ethical protocols, methods, and procedures. However, considering the participants' description of the current ethical landscape, there remains a need to implement clear ethical standards across the South African neuromarketing industry and adhere to strict guidelines when managing neurophysiological data.

5.4 Future Directions and Strategic Recommendations for Implementing Neuromarketing

Implementing neuromarketing techniques has presented both challenges and opportunities for developing countries to understand consumer behaviour and decisions (Biswas et al., 2022; Kumar et al., 2020). Several key recommendations for incorporating neuromarketing techniques in the South African marketing research domain were indicated. Firstly, it is important to ensure that the research organisation is adequately resourced and equipped to effectively implement neuromarketing techniques. This entails not only investing

in accessible and good-quality technology but also obtaining the necessary skills by networking with industry experts and building a diverse team. Notably, it became clear that forming long-term collaborations with companies or individuals already utilising neuromarketing techniques could be a more cost-efficient and practical approach than investing directly in neuromarketing devices. These findings are in line with Malaysian researchers' perceptions of the implementation of neuromarketing in universities, which revealed the importance of collaborating with industry professionals as well as universities with proper facilities (Alsharif et al., 2023). Thus, to increase knowledge and obtain the necessary skills and expertise, networking and collaboration within the neuromarketing industry are essential steps towards implementation.

Considering the multidisciplinary nature of the field, Biswas et al. (2022), Del Mar Lozano Cortés and García García (2017) also suggested the need to build a diverse network of individuals with different experiences, knowledge, and backgrounds. Similarly, the findings of the current study revealed the importance of employing individuals with expertise in marketing as well as scientific knowledge. Therefore, the practice of neuromarketing requires a team able to collaborate effectively across various specialities.

Furthermore, the findings emphasised the value of using neuromarketing to complement and enhance conventional marketing research methods to obtain more robust data and provide an in-depth understanding of consumer behaviour, preferences, and decisions. Likewise, Bočková et al. (2021), Royo-Vela and Varga (2022) considered neuromarketing a valuable tool for marketing research, primarily used to complement both qualitative and quantitative methods. However, Mansor and Isa (2020) affirmed that neuromarketing should not be seen as a replacement for traditional methods. This relates to the fact that neuromarketing is still considered a young and underdeveloped field that often invokes misconceptions and scepticism among marketing researchers (Royo-Vela & Varga,

2022). Additionally, both neuromarketing and traditional marketing research techniques have limitations and that conventional methods play a crucial role in understanding consumer experience and preferences. Thus, by employing devices such as EEG in conjunction with traditional marketing research techniques, researchers can obtain a comprehensive understanding of the consumer experience and subsequently improve marketing strategies that resonate with consumers on an emotional level.

A noteworthy trend mentioned across the findings relates to the growing adoption of AI technology in neuromarketing and traditional marketing research. Specifically, participants deemed this integration critical for improving the predictability, efficiency, and overall convenience of marketing research processes. This increased interest in applying AI tools in neuromarketing research is reflected in several international research studies (Costa-Feito & Blanco-Moreno, 2023; Filipovic et al., 2019; Karacomak, 2023). For instance, Karacomak (2023) discussed the integration of a recently created AI tool that can effectively analyse complex eye-tracking data, while Filipovic et al. (2019) reported on the application of AI in facial coding. Thus, integrating technology-driven methods in neuromarketing research is an essential step towards driving future growth and development within the neuromarketing industry.

Regarding the future implications of neuromarketing in South Africa, participants expressed their enthusiasm about the growth and increased utilisation of neuromarketing techniques among South African marketing research firms. In particular, the findings revealed a growing optimism among South African marketing researchers regarding neuromarketing techniques, which suggests a positive trajectory for the ongoing evolution of the field. This trend is reflected in the increasing number of international studies published on the use of neuromarketing techniques in developing countries, including India, Peru, and Bangladesh (Alsharif et al., 2023; Biswas et al., 2022; Gani et al., 2018; Isabella et al., 2015; Kumar et

al., 2020; Paredes-Pérez et al., 2021). However, due to the challenges associated with incorporating neuromarketing techniques in South Africa, the current study revealed that the field has yet to reach its full potential and emphasised the need for further development, refinement of ethical principles and standardisation of methodologies. Similarly, Ali et al. (2024) reported that the uptake of neuromarketing techniques in the Malaysian marketing industry has not been high and further underscored the importance of creating awareness and disseminating knowledge through publications.

Despite these challenges, implementing neuromarketing in developing countries presents valuable opportunities, such as conducting implicit testing on diverse populations. This is important, as most neuromarketing studies are conducted in developed countries, leaving nations in developing countries underrepresented in the field of neuromarketing research (Biswas et al., 2022; De Oliveira, 2014). Additionally, Isabella et al. (2015) and De Oliveira (2014) argued that consumer behaviour varies widely across different cultures and countries. Given the country's rich cultural diversity, neuromarketing thus holds substantial potential for application in South Africa.

In addition, the findings also revealed opportunities for applying neuromarketing in diverse industries, such as architecture, healthcare, and sports. Likewise, research has demonstrated that by leveraging its capacity to capture implicit consumer responses, neuroscientific techniques can be applied to examine the influence of the built environment on consumer behaviour (Chandwaskar, 2019). Additionally, these techniques have been employed to assess the effectiveness of emotional triggers in sports sponsorships (Ercan & Kabakçı, 2019). As a result, neuromarketing presents a pivotal opportunity to understand the enigma of consumer psychology in a variety of industries. In conclusion, the South African marketing researchers perceived neuromarketing as an approach that enables them to unveil the complexities associated with the underlying processes driving consumer behaviour.

Staying up to date with contemporary research methodologies and integrating emerging practices and technologies is essential for researchers to produce more effective and accurate conclusions. Although the researchers anticipate a bright future for neuromarketing in South Africa, several challenges need to be addressed before more South African marketing research companies can fully integrate these techniques. Therefore, it is important to remain cognisant of these obstacles and actively promote awareness of the advantages that neuromarketing offers in complementing traditional marketing research methods.

5.5 Study Limitations

The research study outlines several limitations that require consideration. Firstly, the researcher conducted interviews with 11 participants working in the field of neuromarketing. As this is a relatively small sample size, this may limit the generalisability of the findings to other populations. However, it is important to note that given the experiential nature of this study and the selected analytical approach, the sample size was determined by the availability of participants able to provide sufficient data, rather than by achieving data saturation (Braun & Clarke, 2019a). Furthermore, as the study adopted an experiential framework, the aim was to obtain insights into the participants' interpretations, thoughts, and experiences of neuromarketing in South Africa, rather than generalising the results across different industries and samples.

Another key limitation of this study pertains to the type of sample used to collect research findings. Due to the lack of South African marketing research companies that utilise neuromarketing, there was a limited choice of companies to approach. As indicated, the 11 participants were recruited from two neuromarketing companies in South Africa, with eight participants employed at one of these companies. Thus, the findings are contextualised within the limitations of use in South Africa. Additionally, the findings may also be specific to the company's use of and access to certain tools and techniques available in South Africa.

Furthermore, some participants have only been involved in the field of neuromarketing for a relatively short period of time, with some participants having only one year (P1, P2, P6, P7, and P9) or less than one year (P4) of experience in neuromarketing. Consequently, this might have limited their knowledge and experience with certain neuromarketing techniques. Recruiting participants with more experience may yield more substantial insights and diverse perceptions. However, participant bias may also play a role in influencing the study results, as individual experiences, prior knowledge, and educational background can influence perceptions and interpretations of neuromarketing. The subjectivity of qualitative data adds an additional layer of complexity, as the themes identified are subject to the researcher's interpretations, personal biases, and perceptions. However, the researcher adopted a reflexive approach to data analysis, emphasising her active contribution to the data. Specifically, the researcher introduced her own understanding of the patterns of meaning, as well as her prior knowledge, values, and experiences to obtain a comprehensive understanding of the topic of neuromarketing.

5.6 Recommendations for Future Research

As only a limited number of South African marketing research firms have adopted this technology, the body of literature on the application of neuromarketing within the South African marketing research context remains scarce (Biswas et al., 2022). Thus, any furthering of exploratory research on the utilisation and practical implications of neuromarketing techniques in South Africa is necessary. The findings from this research study present several key directions for exploring future research on the perceptions and application of neuromarketing in South African marketing research. Firstly, exploring consumer perceptions, awareness, and attitudes toward neuromarketing techniques, especially regarding potential concerns about these devices, may provide a foundation for establishing more informed and standardised ethical practices. Secondly, considering South Africa's rich

cultural diversity, research exploring the contextual applicability of neuromarketing techniques can enhance marketing researchers' understanding of the influence of cultural elements on consumer behaviour.

As mentioned, using neuromarketing to complement conventional marketing research methods is considered a valuable approach to obtaining an in-depth understanding of consumer behaviour and decisions (Bočková et al., 2021; Royo-Vela & Varga, 2022). Thus, longitudinal and comparative studies evaluating the long-term effectiveness of neuromarketing techniques in conjunction with traditional marketing research methods can provide critical insights into the added value of neuromarketing in South African marketing research. In addition, with the increased application of AI in marketing research, investigating the integration of AI technology and other technology-driven research methods can provide opportunities for evaluating how these methods can address existing challenges of neuromarketing, particularly those related to complex data analysis. Finally, the study also recommends collecting data from diverse samples, such as marketing research firms that have an interest in leveraging neuromarketing research, as well as small and medium-sized enterprises. This approach may yield valuable insights into the perceptions and viewpoints of companies that could benefit from neuromarketing but have not yet implemented these techniques.

5.7 Personal Reflection

My initial motivation to conduct this research study stemmed from my interest in applying psychological principles and theories in marketing and consumer research. As a South African postgraduate psychology student with an undergraduate degree in physiology and psychology, I have been exposed to various courses introducing neuropsychological and physiological principles underlying neuromarketing research techniques. Additionally, while conducting my literature review, I have obtained insights into the strengths and benefits of

neuromarketing, as well as an overview of the current perceptions of applying these techniques and theories in the marketing research domain. As a result, I entered the research study with an idealistic mindset and a strong sense of excitement about the opportunity of neuromarketing to provide accurate and objective insights to help marketing researchers better understand consumer behaviour and decisions. Subsequently, I acknowledge that my personal fascination with neuromarketing techniques, as well as my background knowledge of neuropsychological principles might have influenced my analysis and interpretation of the data.

During the course of one of my interviews, I encountered some difficulties in comprehending the information provided by one participant due to differences in language pronunciation between myself and the participant. Consequently, I often found myself interrupting the interview for clarification, which, at times, might have affected the depth of insights gained. As a result, I realised the importance of acknowledging linguistic sensitivity in research and how this can impact the interpretation of qualitative findings, especially in the context of cultural diversity. Furthermore, while conducting my interviews, I found it particularly challenging to balance probing to confirm my own preconceptions of neuromarketing and probing to obtain direct insights from the participants. This was especially the case when I noticed that some participants introduced insights contradictory to those revealed by other participants, as well as my own ideal assumptions of neuromarketing. For example, while research suggests that neuromarketing reduces self-report and self-assessment biases, some participants noted that it might introduce a different kind of bias. This bias arises from recruiting participants who are not apprehensive about the techniques used in neuromarketing and unsuccessfully recruiting those concerned or fearful of the devices. Furthermore, despite my preconceptions of the potential of neuromarketing, it was quite disappointing to hear that some participants felt neuromarketing has experienced a slow

uptake and that the growth of the field is somewhat dependent on neuromarketing professionals collaborating and developing proper standardised practices. As a result, I realised the need to adopt a critical approach and remain mindful of the participants' varying perceptions of neuromarketing based on their own experiences and usage of the techniques. Although I was quite familiar with the challenges associated with the implementation of neuromarketing in developing countries, these insights forced me to confront additional limitations and complexities of applying neuromarketing within a South African marketing research context. These included challenges related to outsourcing equipment, a lack of standardisation, and an overall lack of understanding and awareness among South African marketing researchers. However, as I progressed through the interviews, I began to acknowledge the pragmatic viewpoint many participants adopted towards neuromarketing. Specifically, it was interesting to note that the participants emphasised the complementary use of neuromarketing with conventional research techniques, indicating the importance of adopting a practical approach towards implementing neuromarketing in South African marketing research companies.

5.8 Conclusion to the Research Study

This qualitative research study aimed to obtain insight into the present and future applications of neuromarketing in South Africa by exploring the perceptions of South African marketing researchers regarding neuromarketing and its utilisation within the local marketing research context. In doing so, the study emphasised that neuromarketing should not be viewed as a replacement for conventional research methods, but rather a complementary method to traditional marketing research techniques. Concerning the prospects of neuromarketing, most participants conveyed a sense of optimism for the adoption of neuromarketing techniques in South Africa.

While neuromarketing presents substantial opportunities for obtaining a comprehensive understanding of consumer behaviour, preferences, and decision-making, the successful implementation of neuromarketing in a South African marketing research domain requires addressing several challenges. Creating awareness and dispelling misconceptions are important endeavours to illuminate the potential of neuromarketing in enhancing traditional marketing research. Additionally, the need for standardised methodologies and refined ethical standards remains an essential step toward achieving best practices within the marketing research industry.

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Appendix A: Interview Guide

Introduction

- Begin by introducing myself as well as the purpose of this interview.
- Stipulate the aims and objectives of the research project:
- Aim: to obtain insights from marketing researchers into the present and future applications of neuromarketing in South Africa. Thus, the following research objectives are outlined: a.) To explore South African marketing researchers' perceptions of neuromarketing. b.) To explore South African marketing researchers' use of neuromarketing in a marketing research context.
- Ensure the participants that all information will be used for research purposes and confidentiality will be maintained.

Interview Questions

1. Describe your job title and years of experience working in marketing research.
2. How would you describe neuromarketing?
3. What is neuromarketing currently used for and what can it be used for?
4. How does it differ from more traditional marketing research techniques?
5. What insights and benefits can neuromarketing provide that traditional marketing research techniques cannot?
6. What neuromarketing techniques does your company use/did your company use to conduct marketing research for brands and companies and what exactly does this process entail?
7. Can you describe any specific projects or studies where you've utilised neuromarketing techniques?
8. What were the outcomes of these projects?
9. What do you think are the challenges and limitations involved in implementing neuromarketing in South African marketing research companies?

10. What do you think are the strengths or benefits of implementing neuromarketing in South African marketing research companies?
11. What, if any, ethical considerations are involved in neuromarketing?
12. What do you foresee as the future applications of neuromarketing in the South African marketing research context?
13. Do you have any recommendations for marketing research companies planning to implement neuromarketing?
14. Do you have any other insights to share regarding neuromarketing and its utilisation in a South African marketing research context?

Closing

- Thank the participant for his or her time and insights.
- Ensure the participant that he or she is more than welcome to contact the researcher if he or she has any questions regarding the research project.

Appendix B: Participant Information Sheet

TITLE OF THE STUDY

South African marketing researchers' perceptions of neuromarketing and its utilisation in a marketing research context.

Researcher: M. Roux (Research Psychology Master's Student, Department of Psychology, University of Pretoria)

Supervisor: Prof N Cassimjee (Department of Psychology, University of Pretoria)

Co-Supervisor: Dr J Muller (Department of Psychology, University of Pretoria)

Dear Prospective Participant

My name is Marie' Roux, I am currently a Research Psychology Master's student in the Department of Psychology - Faculty of Humanities, University of Pretoria. You are being invited to take part in my research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please take some time to read the following information carefully, which will explain the details of this research project. Please feel free to ask the researcher if there is anything that is not clear or if you need more information.

WHAT IS THE PURPOSE OF THE STUDY?

- The purpose of this study is to obtain a better understanding of the present and future application of neuromarketing in South Africa. Little is known about the application of neuromarketing in a South African marketing research context. Thus, I have decided to conduct a study on the perceptions of South African marketing researchers toward neuromarketing to achieve an understanding of its utilisation and application in a South African marketing research context.
- The overall aim of this study is to obtain insight into the present and future application of neuromarketing in South Africa by exploring the South African marketing researchers' perceptions towards neuromarketing and its utilisation in the marketing research context.

WHY HAVE YOU BEEN INVITED TO PARTICIPATE?

- You are invited to participate because you are a professional marketing researcher from an established marketing research company in South Africa.
- You are currently using or have utilised neuromarketing techniques or theories within a marketing domain.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?

- You will be involved in individual semi-structured interviews, which will be conducted either virtually or in a private room at your marketing research company at your convenience. This interview will take approximately 40 to 60 minutes.

CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?

- Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason, if you decide not to take part in the study without negative consequences or being penalized.

WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER BE KEPT CONFIDENTIAL?

- Confidentiality will be ensured by assigning code names to each participant, and that will be used in all research notes and documents. Findings from this data will be disseminated through my mini-dissertation, conferences and publications. Reporting of findings will be anonymous, only the researcher and supervisors of this study will have access to the information.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

- There will be no direct benefit to you for participation in this study. However, I hope that information obtained from this study may shed light on the value of utilising neuromarketing techniques and theories in a South African marketing research context and contribute to the implementation of more effective marketing strategies.

WHAT ARE THE ANTICIPATED RISKS FROM TAKING PART IN THIS STUDY?

- The risks in this study are minimal because it involves an interview with you on your perceptions of neuromarketing and its utilisation within a marketing research context. No additional tests or assessments will form part of this study.

WHAT WILL HAPPEN IN THE UNLIKELY EVENT THAT SOME FORM OF DISCOMFORT OCCUR AS A RESULT OF TAKING PART IN THIS RESEARCH STUDY?

- Should you have the need for further discussions after the interviews an opportunity for virtual or in-person meetings with the researcher (Marie' Roux) will be arranged for you.

HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?

- Electronic information will be password protected (accessible only to the researchers) and stored for a period of 10 years. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable.
- All paper documents will be converted to electronic documents and stored as password-protected files accessible only to the researcher and supervisors and all paper documents will be destroyed.

WHAT WILL THE RESEARCH DATA BE USED FOR?

- Data gathered from the participant would be used for research purposes that included:
- A mini-dissertation.
- Article publications, national and international conference presentations.
- For further research as secondary data analysis.

WILL I BE PAID TO TAKE PART IN THIS STUDY?

- There will be no reimbursement for study participation.

HAS THE STUDY RECEIVED ETHICS APPROVAL?

This study has received written approval from the Research Ethics Committee of Faculty of Humanities, University of Pretoria. Ethical approval number is HUM035/1123. A copy of the approval letter can be provided to you on request.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?

- You may request the published findings of the research study and this will be provided to you by Marie' Roux.

WHO SHOULD I CONTACT IF I HAVE CONCERN, COMPLAINT OR ANYTHING I SHOULD KNOW ABOUT THE STUDY?

If you have questions about this study or you have experienced adverse effects as a result of participating in this study, you may contact the researcher whose contact information is provided below. If you have questions regarding the rights as a research participant, or if problems arise which you do not feel you can discuss with the researcher, please contact the supervisors. The contact details are provided below.

Thank you for taking the time to read this information sheet and in advance for participating in this study.

Researcher

Name Surname: Marie' Roux

Contact number: 0836410922

Email address: u19053798@tuks.co.za

Supervisor

Name: Prof Nafisa Cassimjee

Contact number: +27 (0)12 420 2911

Email address: nafisa.cassimjee@up.ac.za

Co-Supervisor

Name: Dr Jacomien Muller

Contact number: +27 (0)12 420 3685

Email address: jacomien.muller@up.ac.za

Appendix C: Informed Consent Form

South African marketing researchers' perceptions of neuromarketing and its utilisation in a marketing research context

HUM035/1123

WRITTEN CONSENT TO PARTICIPATE IN THIS STUDY

I, _____ (**participant name**), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

STATEMENT	AGR EE	DISAG REE	NOT APPLIC ABLE
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without any consequences or penalties.			
I understand that information collected during the study will not be linked to my identity and I give permission to the researchers of this			
I understand that this study has been reviewed by, and received ethics clearance from Research Ethics Committee Faculty of Humanities of			
I understand who will have access to personal information and how the information will be stored with a clear understanding that, I will not be			
I give consent that data gathered may be used for dissertation, article publication, conference presentations and writing policy briefs.			
I understand how to raise a concern or make a complaint.			
I consent to being audio recorded.			
I consent to being video recorded.			
I consent to having my photo taken.			
I consent to have my audio recordings /videos/photos be used in research outputs such as publication of articles, thesis and conferences as long as my identity is protected.			
I give permission to be quoted directly in the research publication whilst remaining anonymous.			

STATEMENT	AGR EE	DISAG REE	NOT APPLIC ABLE
I have sufficient opportunity to ask questions and I agree to take part in the above study.			

Name of Participant

Date

Signature

Name of person taking consent

Date

Signature

Appendix D: Ethical Clearance



Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotheo



02 April 2024

Dear Miss M Roux

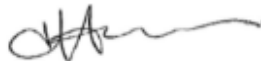
Project Title: South African marketing researchers' perceptions of neuromarketing and its utilisation in a marketing research context
Researcher: Miss M Roux
Supervisor(s): Prof N Cassimjee
Dr J Muller
Department: Psychology
Reference number: 19053798 (HUM035/1123)
Degree: Masters

I have pleasure in informing you that the above application was **approved** by the Research Ethics Committee on 02 April 2024. Please note that before research can commence all other approvals must have been received.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely,



Prof Karen Harris
Chair: Research Ethics Committee
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: tracey.andrew@up.ac.za

Research Ethics Committee Members: Prof KL Harris (Chair); Mr A Bizos; Dr A-M de Beer; Dr A dos Santos; Dr P Gutura; Ms KT Govinder Andrew; Dr E Johnson; Dr D Krige; Prof D Maree; Mr A Mohamed; Dr I Noomé; Dr J Okeke; Dr C Puttergill; Prof D Reyburn; Prof M Soer; Prof E Taljard; Ms D Mokalapa

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