



Unravelling the adoption of neuromarketing techniques in marketing organizations: insights from (neuro)marketing professionals

A study on the components influencing neuromarketing adoption from a TOE model perspective.

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17 August 2023

Abstract

Purpose – As academic interest in neuromarketing has evolved and the inclusion of neuromarketing research among organisations has increased over the last decades, it is highly relevant to study the adoption of neuromarketing techniques in organisations. Therefore, this research explores the underlying components that influence the adoption of neuromarketing techniques in marketing organisations by applying a tailor-made Technology-Organisation-Environment model (TOE) (Tornatzky & Fleischer, 1990). In this way, this study expands existing research on factors influencing neuromarketing adoption.

Methodology – Twenty semi-structured interviews were conducted to gain insights on the opinions, attitudes and experiences of (neuro)marketing professionals on adopting neuromarketing techniques in marketing organisations. A non-probability sampling method was used, combining convenience and snowball sampling.

Results – The findings reveal that the costs of neuromarketing techniques have the most influence on adopting of these techniques for marketing professionals. According to neuromarketing professionals, the costs negatively influence the adoption and act as a barrier for adoption. However, neuromarketing professionals contradict this finding. Similar to the costs, complexity negatively influences the adoption of neuromarketing techniques and acts as a barrier for adoption. In addition, organisational culture and employee knowledge on neuromarketing positively influence the adoption of these techniques. Moreover, the results suggest that competitive pressure is not yet a factor of influence. Next to these components, the results show several barriers for adopting neuromarketing techniques, the most important ones being the lack of clarity of the value of neuromarketing, the gap between the scientific and practical fields and lack of awareness and knowledge among society and the industry. In addition, technology developments particularly in the field of AI, could enhance and facilitate the adoption of neuromarketing techniques, by making these techniques more accessible.

Conclusion – This research provides new insights into components and barriers that influence the adoption of neuromarketing techniques. As this study only provides a limited perspective on these components and barriers influencing this adoption, recommendations for future research are proposed such as further investigating the barriers that came to light in this research and exploring quantitative and mixed method research approaches.

Keywords: neuromarketing, neuromarketing adoption, innovation, TOE model, consumer behaviour

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Acknowledgement

I would like to thank all the people that actively contributed to the completion of my master thesis, without them this would not have been possible. Firstly, I am extremely grateful for the expertise, support and feedback of my supervisor, Dr. Letizia Alvino. Besides, I am grateful for the feedback and suggestions of my second supervisor Dr. Shenja van der Graaf.

In addition, I am very thankful for the people that took time to participate in this study and their valuable insights they gave during the interviews. Finally, I would like to thank my family and friends for their support and encouragement in completing this master thesis.

1. Introduction

In today's society, marketing is crucial in order to create, communicate and deliver offerings that have value for customers, clients and partners (American Marketing Association, 2022). Since the emergence of marketing as a field, the attention paid to the customer has been one of its foundations (Patruti-Baltes, 2016). Marketers try to understand the customer in such a way, that the product or service fits the person and sells itself (American Marketing Association, 2022). In essence, the aim of marketers is to understand how customers make purchase decisions (Eser et al., 2011). To understand this customer decision making process, conscious perceptions, motivations, attitudes and emotions have been examined in consumer research using traditional research methods such as surveys, interviews and focus groups. Nevertheless, the availability of research on how different types of marketing stimuli are unconsciously processed by the human brain, known as *neuromarketing*, is limited (Alvino et al., 2020; Kenning & Plassmann, 2005).

The field of neuromarketing combines three disciplines: marketing, psychology and neuroscience (Plassmann et al., 2012). It focuses on understanding human behaviour related to markets and marketing exchange by using neuroimaging techniques (Lee et al., 2007). Even though there is a limited number of studies that use neuromarketing techniques to explore unconscious responses to marketing stimuli, academic interest in the topic has evolved over the last years (Martinez-Levy et al., 2021). These neuromarketing studies (Alvino et al., 2020; Bastiaansen et al., 2018; Deppe et al., 2005; Erk et al., 2002) are related to decision making, brand choice and product evaluations, but none of this research take into consideration the adopting neuromarketing techniques in the business field. Studies that focus on possible factors that influence the adoption of neuromarketing techniques are very limited and in an initial stage (Alsharif et al., 2023; Crespo-Pereira et al., 2020; Elouadifi & Essakalli 2022).

Alsharif et al. (2023) are the first authors to conduct qualitative research on the factors influencing neuromarketing adoption among academician experts. A recommendation was made to expand this research and enrich literature by including data from organisations that are potentially interested in exploiting neuromarketing research. Thus, this research integrates employed (neuro)marketing professionals. Moreover, these previous studies focus on individual level technology acceptance, whereas this study concentrates on organisational level technology acceptance. This study applies the Technology-Organisation-Environment model (TOE) (Tornatzky & Fleischer, 1990), since it is the most approved model for examining the adoption of new technologies at an organisational level (Malik et al., 2021). The TOE model

identifies three dimensions of an organisation's context that influence the process by which it adopts and implements a technological innovation: a technological dimension, an organisational dimension, and an environmental dimension (Oliveira & Martins, 2011). The original TOE model is customized and fine-tuned to fit the context of adopting neuromarketing techniques in organisations. Furthermore, Crespo-Pereira et al. (2020) gathered data of consumers of marketing research in their pilot study by taking a quantitative research perspective. Therefore, this study takes a qualitative research design. A qualitative research design, by employing semi-structured interviews, is chosen since qualitative research is particularly useful for the exploration of motivations, attitudes, intentions and beliefs of people and is able to capture the depth and richness of how and why people act in the way they do (Wright & Heaton, 2006).

It is important to study the adoption of neuromarketing techniques, since the inclusion of neuromarketing research among international companies has increased in the last decades (Crespo-Pereira et al., 2020). Over the last decade, it has been approximated that more than 100 organisations worldwide, providing various types of commercial neuromarketing services, have emerged (Spence, 2019). This growing trend underscores the relevance of investigating the underlying factors and implications of neuromarketing adoption within organisations, which can offer valuable insights into the impact of this emerging field in contemporary marketing practice.

Building on the aforementioned lines of reasoning and related literature, this study seeks to address the identified gaps in the literature on the adoption of neuromarketing. This research explores components that influence the adoption of neuromarketing techniques in marketing organisations by conducting a qualitative study. Based on the above, the primary objective of this research is to examine the following central question:

“How do technological, organisational, and environmental dimensions influence the adoption of neuromarketing techniques in marketing organisations?”

1.1 Theoretical and practical implications

This study aims to provide a contribution to both the theoretical and practical field. Within the theoretical field, this study will embellish research on the adoption of neuromarketing, since there is no research available on the adoption of neuromarketing in conjunction with the TOE model. Since the adoption of neuromarketing techniques in organisations is underexposed in

previous research, this research, incorporating the TOE model, is needed. Besides, the TOE model is the most approved theory for examining the adoption on new technologies at an organisational level (Malik et al., 2021). Furthermore, the study advances the current quantitative literature on the adoption of neuromarketing by taking a qualitative research design. Qualitative research on this topic is needed since it is particularly useful for the exploration of motivations, attitudes, intentions and beliefs of people and is able to capture the depth and richness of how and why people act in the way they do (Wright & Heaton, 2006). In addition, this research expands current research on the influential factors of neuromarketing adoption among academics (Alsharif et al., 2023) by incorporating a distinct sample comprising employed (neuro)marketing professionals at organisations.

Next to this, this study offers practical implications for organisations and marketers intending to adopt and implement neuromarketing techniques. According to Eser et al., (2011), brain scanning might become a routine part of corporate marketing strategies in the near future. Therefore, it is of relevance to investigate the components that influence the adoption of neuromarketing techniques in organisations. The outcomes of this study will provide valuable insights into the underlying components that should be taken into account by marketers and organisations that affect the process of neuromarketing adoption. In this way, marketers and organisations can make a well-informed decision on adopting neuromarketing techniques and optimise their strategy. The contributions of this research benefit both the marketing aspect of business administration and the communication context, since the study focusses on the organisational implementation and adoption of neuromarketing.

1.2 Remainder of the research

The structure of this paper is as follows. First, the theoretical framework elaborates on the concept of neuromarketing and individual and organisational level technology adoption models. In the same section the Technology-Organisation-Environment (TOE) Model is explained and tailored to the context of neuromarketing adoption. Second, the method section describes how the interviews were conducted and analysed. Third, the analysed findings are presented. Last, the main findings are discussed and reflected upon, including theoretical and practical implications, limitations, and directions for future research.

2. Theoretical framework

2.1 Neuromarketing

Early in the 2000s, a new approach to study consumer behaviour emerged: *consumer neuroscience*, also called *neuromarketing* (Alvino et al., 2020). Neuromarketing combines three disciplines: marketing, psychology and neuroscience (Plassman et al., 2012). The purpose of neuromarketing is to understand how neuropsychological mechanisms support and influence consumer behaviour and decision-making (Alvino et al., 2020). In neuromarketing, both psychological and neuroscience methods are used to investigate marketing-related issues concerning buying behaviour. The field of neuromarketing provides a scientific explanation of consumer preferences, decision-making and behaviour by using neuroimaging techniques, physiological techniques and behavioural techniques (Levallois et al., 2012). Examples of these neuroimaging techniques are: *EEG*, *fMRI*, *fNIRS*, *MEG* and *PET*. Examples of these physiological techniques are *ET*, *GSR*, *fEMG* and *ECG*. An example of the behavioural technique is *IAT* (Alvino et al., 2020; Gani et al., 2018). In Table 1 these different neuromarketing techniques are summarised. Compared to traditional marketing research, which only measures cognitive and emotional experiences as verbally expressed at the conscious level, neuromarketing makes it possible to discern unconscious states associated with processes that play a critical role in influencing behaviours (Cherubino et al., 2019). Essentially, the pertinence of neuromarketing lies in the ability to fill the gaps left in traditional marketing research. It is a relevant tool for identifying and understanding consumers' behaviour and subconscious needs, from which the findings can be practically applied in the marketing field. It can for instance be used in creating efficient brand positioning strategies and more attractive packaging (Fortunato et al., 2014).

Neuromarketing techniques	Technique	Summary	Measures	Context	References
Neuroimaging techniques	EEG (Electroencephalography)	Measures brain waves produced by the cortex, reflecting positive or negative emotions	Emotional valence, cognition, memory encoding, recognition, attention, engagement/boredom, excitement	Advertising, video material, campaigns, in-store experience, website design, usability	Vecchiato et al., 2011; Gani et al., 2018; Alsharif et al., 2021
	fMRI (Functional magnetic resonance imaging)	Measures brain activity by showing where oxygenated blood flows	Sensory perception, memory encoding, brand recall, brand loyalty, trust	Product performance, campaigns, packaging design, product prices, (re)positioning brands	Lee et al., 2007; Kenning & Linzmajer, 2011; Gani et al., 2018.
	fNIRS (functional near-infrared spectroscopy)	Measures changes in blood oxygenation levels in the brain by looking at the blood colour	consumer attention, arousal, emotions, sensory perception, valence	Purchase behaviour, (re)positioning brands	Cakir et al., 2018; Krampe et al., 2018; Alvino et al., 2020.
	MEG (Magnetoencephalography)	Measures the areas of magnetic fields generated by the brain's electrical functioning	Perception, attention, attitude, memory	New product, advertising, identify sensory measurement	Castro-Caldas et al., 2009; Gani et al., 2018.
	PET (Positron emission tomography)	Enables in vivo examination of brain functions	Perception, valence of emotions, energy discrimination	Advertising, maintaining sequence, new campaign, product moment feasibility	Mathis et al., 2002; Sebastian, 2014; Gani et al., 2018.
Physiological techniques	ET (Eye-tracking)	Measures where and how long someone looks at a certain object	Visual attention, behavioural consequences of consumers, fixations	Videos, photos, websites, user's interaction, purchasing decision making	Khushaba et al., 2013; Orquin & Loose, 2013; Solnais et al., 2013; Gani et al., 2018.
	GSR (Galvanic skin response)	Analyses changes in galvanic skin responses (GSR) when the autonomic nervous system (ANS) is activated	Emotional states	Predict buying behaviour of different products	Gani et al., 2018; Duan et al., 2018; Lai et al., 2019.
	fEMG (Facial Electromyography)	Measures observable and unobservable changes in facial expressions	Emotional responses of the face	Behaviour and decision-making process regarding purchasing	Garczarek-Bąk, 2019; Gill & Singh, 2020.
	ECG (Electrocardiogram)	Measures heart rate	Emotional state, emotional attachment	Behaviour and decision-making process regarding purchasing	Antoniak, 2020; Rawnaque et al., 2020.

Behavioural technique	IAT (Implicit association test)	Measures the strength of an association of two or more concepts	Attitude (evaluations) and associations by assessing reaction time	Advertising and brand positioning	Gani et al., 2018; Alvino et al., 2022.
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Table 1. Summary of different neuromarketing techniques

2.2 Central models on the adoption of technologies

In literature, different theories and models exist regarding the diffusion, adoption and implementation of technological innovations in the fields of products, practices, ideas and philosophies (Prescott & Conger, 1995). These models focus on the different stages of adoption and the factors that affect the intention or decision to adopt (or not) (Elouadifi & Essakalli, 2022). A distinction can be made between individual level technology adoption models and organisation level technology adoption models. The individual level technology adoption models are primarily concerned with the adoption of new technologies on an individual level, whereas the organisational technology adoption models are focused on the adoption of new technologies on the organisational level. The individual level technology acceptance models are not considered in this research since their focus is on individual intention and behaviour towards using an innovation, whereas this study focuses on organisational level technology adoption.

2.2.1 Organisational level technology adoption models

The organisational level technology adoption models include the Diffusion of Innovation Theory (Rogers, 1995), the Institutional Theory (Scott & Christensen, 1995), and the Technology-Organisation-Environment model (TOE) (Tornatzky & Fleischer, 1990). This organisational level adoption area has received less research attention in comparison to individual-level technology adoption (Li, 2020). The Diffusion of Innovation Theory and the Institutional Theory can be seen as variants of the TOE model that divide or extend its dimensions. As an illustration, the Institutional Theory examines the impact of environmental factors on technology adoption, which is already included in the TOE model (Figure 1). Similarly, the Diffusion of Innovation Theory encompasses both technological and organisational aspects that are also covered in the TOE model (Malik et al., 2021). The TOE model identifies three dimensions of an organisation's context that influence the process by which it adopts and implements a technological innovation: a technological dimension, an organisational dimension, and an environmental dimension (Oliveira & Martins, 2011). In this

way, the model is able to explain any modern technology in the technological and socioenvironmental context (Hossain & Quaddus, 2011). Furthermore, the TOE model is the most approved theory for examining the adoption of new technologies at an organisational level (Malik et al., 2021). Consequently, the model has found successful applications in the adoption of various new technologies such as e-commerce, cloud computing, customer relationship management (CRM) systems and supply chain management (SCM) (Chatterjee et al., 2021; Malik et al., 2021; Yang et al., 2015). Although the different components identified within the three different dimensions (technological, organisational and environmental) differ across different studies, the TOE model has found consistent empirical support and acts as solid theoretical basis (Oliveira & Martins, 2011).

Based on the above, the TOE model (Figure 1) is chosen in this research as the underpinning model for the investigation of neuromarketing adoption among (neuro)marketing professionals in marketing organisations. Prior studies have inadequately addressed the implementation of neuromarketing within organisations, which highlights the need for the incorporation of the TOE model. In this study, *the technological innovation decision* (Figure 1), which can be explained as: the process by which the organisation adopts and implements a technological innovation, is the process of adopting and implementing neuromarketing techniques.

The TOE model is relevant for studying the adoption of neuromarketing techniques in the professional field, since it encompasses the technological, organisational and environmental dimensions of the technology adoption decision. Several scholars have introduced customized versions of the TOE model, by adding more dimensions such as a social and human dimension (Alkhater et al., 2018; Lian et al., 2014;). However, there is no clear justification to separate these dimensions independently from the organisational and environmental dimension. Despite these efforts to expand the TOE model, the lack of a clear and consistent rationale for separating these additional dimensions has led to some ambiguity in the conceptualization and operationalization of the TOE model (Hadwer et al., 2021). As a result, in this study the human dimension is classified in this study under the organisational dimension. In line with previous studies, the original TOE model is customized and fine-tuned to fit the context of this research comprising adopting neuromarketing techniques in organisations. These dimensions and subcomponents chosen in the context of implementing neuromarketing techniques are discussed below.

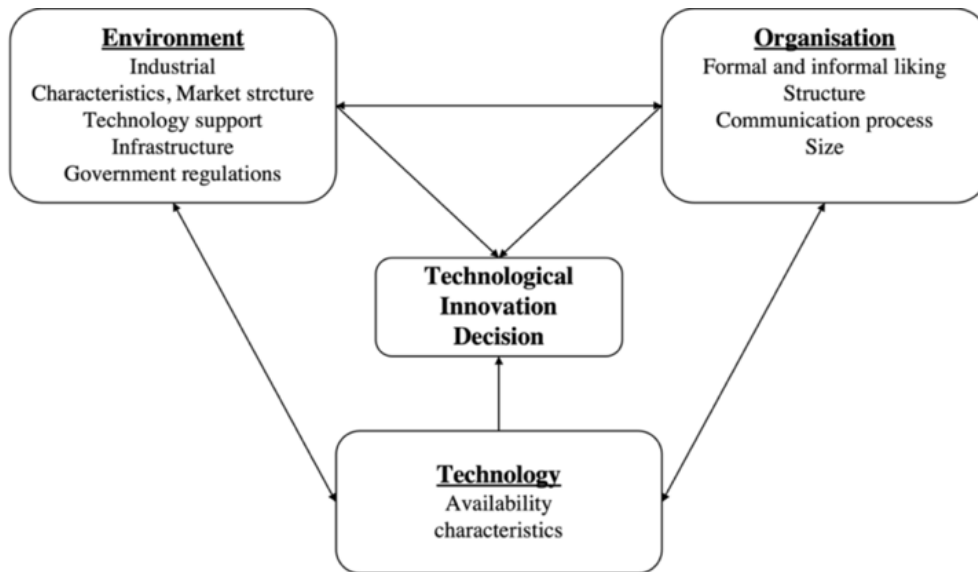


Figure 1. TOE Model (Tornatzky & Fleischer, 1990 p. 154)

2.3 Technological dimension

The technological dimension of the TOE model encompasses both exogenous and endogenous technological characteristics that are essential for the adoption and integration of a new technology (Lutfi et al., 2022). It illustrates the characteristics of a new technology that influence the adoption process and involves components such as privacy, complexity, costs, relative advantages, security and availability (Hadwer et al., 2021; Malik et al., 2021). Recent studies on the adoption of neuromarketing techniques in the academic and professional field reveal that the costs of neuromarketing techniques are one of the essential components impacting the adoption of neuromarketing (Alsharif et al., 2022; Alsharif et al., 2023; Crespo-Pereira et al., 2020; Elouadifi and Essakalli, 2022). To illustrate, the study by Alsharif et al. (2023) shows that *expensive neuromarketing tools and research*, along with *lack of facilities, equipment and experts* was mentioned most frequently as a challenging issue of neuromarketing implementation. Next to these *costs of neuromarketing techniques*, previous studies have mentioned the *complexity of neuromarketing* as a barrier for the implementation of neuromarketing (Alsharif et al., 2023; González et al. 2020). Therefore, the *costs of neuromarketing techniques* and the *complexity of neuromarketing techniques* are integrated as components of the technological dimension of the customized TOE model on the adoption of neuromarketing techniques in organisations.

2.3.1 Costs of neuromarketing techniques

In previous studies that investigated technology adoption by using the TOE model, the *costs*

for technology implementation are considered as a component in the technological dimension of the TOE model (Katebi et al., 2022; Ngah et al., 2021). Ngah et al. (2021) define the costs as *the perceived costs to be paid by the organisation if they are willing to adopt a certain technology*, which in their study entails a specific transportation technology. In this study, the costs of neuromarketing techniques refer to *the costs to be paid by the marketing organisation if they are willing to adopt neuromarketing technique(s)*.

Neuromarketing involves the use of advanced neuroscience tools, such as fMRI and EEG, to analyse how consumers respond to marketing communications. However, some of these tools are costly, making neuromarketing experiments significantly more expensive than traditional marketing research. The costs of these different neuromarketing techniques, which include both neuroimaging and physiological techniques, can be found in Table 2. It is clear that the physiological techniques are less expensive than the neuroimaging techniques. The costs of different physiological techniques range from €100,- to €30.000,- whereas the costs of different neuroimaging techniques range from €35.000 to €3.000.000,-. However, the costs of some neuromarketing techniques are frequently lower than people's expectations and only slightly more expensive than the average expenditure of organising focus groups (Eser et al., 2011). According to Katebi et al. (2022) and Tornatzky and Klein (1982) costs have been considered as a barrier for technology adoption. In a similar view Alsharif et al. (2023) argue that the high costs of neuroimaging techniques pose a significant challenge and limitation to the widespread adoption of neuromarketing research in the business field to study consumer behaviour. Since the costs of physiological techniques are considerably less expensive than the neuroimaging techniques, organisations might be willing to implement these less expensive neuromarketing techniques sooner than expensive neuromarketing techniques since it is a smaller expense. To determine the most appropriate neuromarketing technique as an organisation, it is important to weight the advantages and disadvantages of each technique in terms of the costs and technical capabilities. In previous research the variations in costs associated with different neuromarketing techniques remain underexposed, prompting the present research to explicitly consider the diversity in costs associated with these techniques. Moreover, prior research demonstrates a lack of clarity regarding the perception of costs associated with different types of neuromarketing techniques. Based on the above, *costs of neuromarketing techniques* are chosen as the first component in the technological dimension to investigate in this research.

2.3.2 Complexity of neuromarketing techniques

Previous studies on the adoption of new technologies that incorporated the TOE model found that the complexity of the technology negatively influences the adoption of new technologies (Alsetoohy et al., 2019; Maroufkhani et al., 2022). Complexity can be defined as: the extent to which a new technology is regarded as difficult to understand and use (Kapoor et al., 2014). According to Alsetoohy et al. (2019) the most critical barrier in the implementation of a new technology is the complexity of the technology. In this study, based on the definition of Kapoor et al. (2014) *complexity of neuromarketing techniques* is defined as: the extent to which neuromarketing techniques are regarded as difficult to understand and use. Conducting effective neuromarketing research necessitates expertise that includes a comprehensive understanding of the operation of sophisticated tools such as fMRI and EEG, proficiency in interpreting and analysing brain wave patterns, and the ability to effectively utilize the insights derived from such research. The complex nature of this field and the multifaceted nature of neuromarketing research imply that it requires the involvement of professionals with specialized knowledge and expertise, commonly referred to as neuromarketers (Alsharif et al., 2023). According to González et al. (2020) some neuromarketing practices are so complex and rapidly advancing that even experts interviewed in the study could not reach consensus on them. However, it is worth mentioning that the different neuromarketing techniques, which include neuroimaging and physiological techniques, differ in their level of complexity. In Table 2 the level of complexity of these various neuromarketing techniques can be found. It is clear that in general, the physiological techniques are less complex than the neuroimaging techniques in their level of difficulty to understand and use. Since previous research underexposed variations in complexity levels associated with different neuromarketing techniques, this study takes into consideration the diverse complexity levels associated with these techniques.

Neuromarketing Technique	Technique	Equipment price	Level of complexity	Reference
Neuroimaging techniques	EEG	€35K	High	Alvino et al. (2020)
	fMRI	€1M	High	Alvino et al. (2020)
	fNIRS	€50K	Medium	Alvino et al. (2020)
	MEG	€2M to €3M	High	Stefan & Trinkla (2017)
	PET	€2K to €10K	High	Tripmont Health Team (2021)
Physiological techniques	ET	€100 to €30 K	Low	Alvino et al. (2020)
	GSR	€100 to €2K	Medium	Alvino et al. (2020)
	fEMG	€200 to €1.2K	Medium	Kornblit, (2022)
	ECG	€10K	Low	Alvino et al. (2020)

Table 2. Costs of different neuroimaging and physiological techniques

2.4 Organisational dimension

The organisational dimension of the TOE model can be understood as the set of an organisation's internal features and resources, which exert influence on the decision-making processes related to the adoption of innovation. The organisational dimension is therefore a critical determinant in shaping the organisation's overall innovation strategy (Malik et al., 2021). Components of the organisational dimension in previous studies that have integrated the TOE model for technology adoption, include top management support, organisation size, organisational culture, organisational innovativeness, and knowledge of employees (Chiu et al., 2017; Clohessy & Acton, 2019; Huynh et al., 2012; Malik et al., 2021; Thong, 1999). Prior research has indicated that the implementation of neuromarketing techniques within an organisation is influenced by the *organisational culture*. These previous studies indicate that an innovative organisational culture and support from top management can facilitate successful implementation of neuromarketing techniques in organisations (Crespo-Pereira et al., 2020; Elouadifi & Essakalli, 2022). Therefore, *organisational culture* is chosen as the first component within the organisational dimension. Next to *organisational culture*, Alsharif et al. (2022) explored the limitations and challenges of the implementation of neuromarketing in Malaysia. This study demonstrates that *lack of awareness and knowledge on neuromarketing* is one of these challenges. Likewise, Crespo-Pereira et al. (2020) investigated the factors that impact the adoption of neuromarketing in the enterprise, showing that the *level of knowledge* of the employees within Spanish companies affect the implementation of neuromarketing in these companies. Similarly, Alsharif et al. (2023) argue that *lack of knowledge* on how to use neuromarketing methods is the reason for organisations to use traditional marketing methods.

Based on the above *employee knowledge on neuromarketing* is chosen as the second component of the organisational dimension.

2.4.1 Organisational culture

Prior studies that used the TOE model for analysing the determinants of technology adoption found that *organisational culture* affects technology adoption and implementation ((Masum et al., 2016; Na et al., 2022; Scott, 2007). According to Na et al. (2022) the acceptance and speed of adoption of a new technology are influenced by the organisational culture, which plays a critical role in shaping employees' attitudes and reactions towards it. Masum et al. (2016) define organisational culture as the attitudes, beliefs, values, customs and norms within an organisation.

In this study, *organisational culture* is defined based on Masum et al. (2016) and includes the norms, beliefs, attitudes, and shared values of members of the organisation. The organisational culture is strongly related with an organisation's innovativeness. Organisational innovativeness is essential for technology adoption within organisations (Chau et al., 2020). In a similar view, Siamagka et al. (2015) state that the adoption of technology within an organisation is contingent upon the innovative climate in the organisation. Innovation-driven companies are usually those with an organisational culture of advanced innovation that is open to new practices and ideas (Elouadifi & Essakalli, 2022). Neuromarketing is an innovative technology and the adoption of neuromarketing techniques requires an organisation that is open to innovation. Moreover, an organisation that has a strong learning culture will have the capability to adeptly learn new technologies and is anticipated to positively affect an organisation's intention to adopt a new technology (Salleh & Janczewski, 2016).

Next to the innovativeness, the organisational culture also entails the vision (beliefs) of top management. If the top management is supportive and has a favourable attitude towards the implementation of neuromarketing, this will positively influence the adoption of neuromarketing techniques (Crespo-Pereira et al., 2020; Elouadifi & Essakalli, 2022). As mentioned before, the adoption of neuromarketing techniques is contingent upon the organisational cultures of organisations. It is important to acknowledge that different companies and countries exhibit diverse attitudes and practices when it comes to market research activities. Hence, this research integrates organisation culture as a potential component influencing the adoption of neuromarketing techniques.

2.4.2 *Employee knowledge on neuromarketing*

Various studies that incorporated the TOE model to explore technology adoption, have acknowledged *knowledge of employees* as an organisational component in the organisational dimension of the TOE model (Chiu et al., 2017; Huynh et al., 2012; Thong, 1999). Huynh et al. (2012) investigated the determinants of e-commerce adoption in small and medium-sized enterprises (SME's) and describe *knowledge of employees* as the degree of an employee's knowledge on e-commerce technology. The adaption to new technologies requires changes in the employees' work attitudes, the level of performance, their qualifications and their knowledge (Huynh et al., 2012). Mirchandani and Motwani (2016) discovered that a crucial problem for organisations was the inadequate knowledge of the employees on information systems and the technology behind it. This finding emphasizes that the knowledge of employees is an essential factor in the adoption of new technologies, including in this case e-commerce. As such, *employee knowledge* can be considered as a crucial component that impacts the successful implementation and adoption of new technologies in organisations. Many organisations postpone the adoption of an innovation until the organisation has adequate internal expertise, due to the barriers organisations face with developing necessary skills and technical knowledge (Thong, 1999). As a result, organisations with employees who have more knowledge on a certain technological innovation are more likely to use more of the innovation (Ettlie, 1990). This has important implications for decision-makers and managers who must prioritise investments in employee training and development to enhance their knowledge on a new technology, enhancing the likelihood of successful technology adoption and implementation.

Employee knowledge on neuromarketing can be defined as an employee's knowledge and understanding in terms of what neuromarketing entails. Despite the emergence of neuromarketing, both academia and the industry continue to rely on conventional marketing methods to investigate how consumers respond to marketing stimuli. Consequently, there exists a significant knowledge gap regarding neuromarketing, including its definition, the methodologies involved in conducting neuromarketing research and how to analyse and interpret the data obtained through such research (Alsharif et al., 2023; Alvino et al., 2020). The results of a study by Eser et al. (2011) suggest that *knowledge* is one of the most important aspects of neuromarketing studies as perceived by marketing professionals, marketing academics and neurologists. Furthermore, the discipline is unfamiliar to people and there exists confusion between neuromarketing and closely related disciplines such as neuroeconomics and sensory marketing (Elouadifi & Essakalli, 2022). Prior research does not explicitly examine

the impact of *employee knowledge* on neuromarketing adoption, as these studies primarily concentrate on knowledge in a general context. For the adoption of neuromarketing technologies in an organisational context, it is important to consider the *employee knowledge on neuromarketing* since it is, based on the aforementioned lines of reasoning, a critical component influencing the adoption of new technologies.

2.5 Environmental dimension

The environmental dimension entails the components external to the organisation (Lutfi et al., 2022). Examples of components in the environmental dimension include competitive pressure, regulations, market turbulence and customer readiness (Malik et al., 2021; Wong et al., 2020). A study by Jeyaraj et al. (2006) focussing on the adoption and diffusion of IT-based innovations by individuals and organisations, shows that *competitive pressure* is one of the leading predictors for an organisation's adoption of innovation. Likewise, previous studies on technology adoption identified *competitive pressure* as a crucial environmental factor (Musawa et al., 2012; Tornatzky & Fleischer, 1990; Zhu & Kraemer, 2005). Although this component is seen as a critical factor, prior studies on neuromarketing adoption have overlooked its inclusion. Given that competitive pressure is widely recognised as a key predictor in the adoption of technological innovations, it is selected as the environmental dimension component in this study.

2.5.1 Competitive pressure

Competitive pressure can be defined as: the degree of pressure felt by an organisation from their competitors, affecting an organisation's decision to adopt technology to preserve or enhance competitiveness (Cruz-Jesus et al., 2019; Gangwar, 2018; Hsu et al., 2014; Kumar & Krishnamoorthy, 2020). Cruz-Jesus et al. (2019) state that that the higher the level of perceived competitive pressure, the more likely the organisation will be convinced to adopt the technology. Marketing organisations with higher competition for revenue, market share, market growth and product development are more inclined to adopt new technologies (Kumar & Krishnamoorthy, 2020). When other marketing organisations are actively implementing neuromarketing techniques, it is probable that the organisation in question will feel pressure to follow suit and will incorporate these techniques as well. Therefore, the adoption of neuromarketing techniques can be viewed as a strategic response to market conditions and competitive pressures.

2.6 Adapted TOE model in this study

Concerning the three dimensions of the TOE model, the technological dimension focusses on the characteristics of neuromarketing technology that influence the adoption process. The organisational dimension focusses on the influence of the organisation's features and resources on neuromarketing adoption decisions. Lastly, the environmental dimension focusses on the influence of the external environment in which the (neuro)marketing organisation operates.

Based on the above, the customized TOE model (Figure 2) for the intention to adopt neuromarketing techniques in organisations includes in the technological dimension: *costs of neuromarketing techniques* and *complexity of neuromarketing techniques*. Several studies have highlighted the role of costs as a potential barrier to the adoption of technology (Alsharif et al., 2023; Katebi et al., 2022; Tornatzy & Klein, 1982). In particular, Alsharif et al. (2023) argue that the high costs of neuroimaging techniques impose limitations on the adoption of neuromarketing techniques in organisations. In contrast, Eser et al. (2011) state that costs of several neuromarketing techniques are lower than people's expectations and that conducting a neuromarketing experiment is almost comparable to the expenses incurred in organising focus groups. Given the lack of clear consensus in the existing literature regarding the perceived costs associated with different types of techniques, as well as the insufficient exploration of cost variations among different neuromarketing techniques, this study integrates the diverse cost aspects of these neuromarketing techniques.

In terms of complexity, previous research indicates that the adoption of neuromarketing techniques is limited by the complexity level of these techniques and necessitates expertise (Alsharif et al., 2023; González et al., 2020). Nevertheless, previous studies have not adequately explored the variations in complexity levels among different neuromarketing techniques. Thus, this study seeks to address this gap by incorporating the diverse complexity levels associated with neuromarketing techniques.

Within the organisational dimension the customized TOE model incorporates *organisational culture* and *employee knowledge on neuromarketing*. Previous studies have demonstrated that an innovative organisational climate plays a vital role in facilitating the adoption of new technologies (Chau et al. 2020; Elouadifi & Essakalli, 2022; Siamangka et al., 2015). Moreover, a favourable attitude of management towards the implementation of neuromarketing techniques positively influences adoption (Crespo-Pereira et al., 2020; Elouadifi & Essakalli, 2022). Consequently, this study considers organisational culture,

including the level of innovativeness and attitude of the management, as a component within the organisational dimension.

In terms of employee knowledge, previous research on the adoption of neuromarketing techniques has primarily focused on examining knowledge within a general context (Alsharif et al., 2023; Alvino et al., 2020; Eser et al. 2011). However, these studies have not specifically examined the impact of employee knowledge on neuromarketing adoption. Therefore, this study integrates employee knowledge on neuromarketing as a component within the organisational dimension to fill this gap.

Within the environmental dimension the customised TOE model includes *competitive pressure*. Previous research has illustrated that this is a crucial factor for technology adoption (Cruz-Jesus et al., 2019; Gangwar, 2018; Hsu et al., 2014; Kumar & Krishnamoorthy, 2020). Nevertheless, prior studies on neuromarketing adoption have overlooked the inclusion of competitive pressure as a component. Therefore, this component is integrated in the present research.

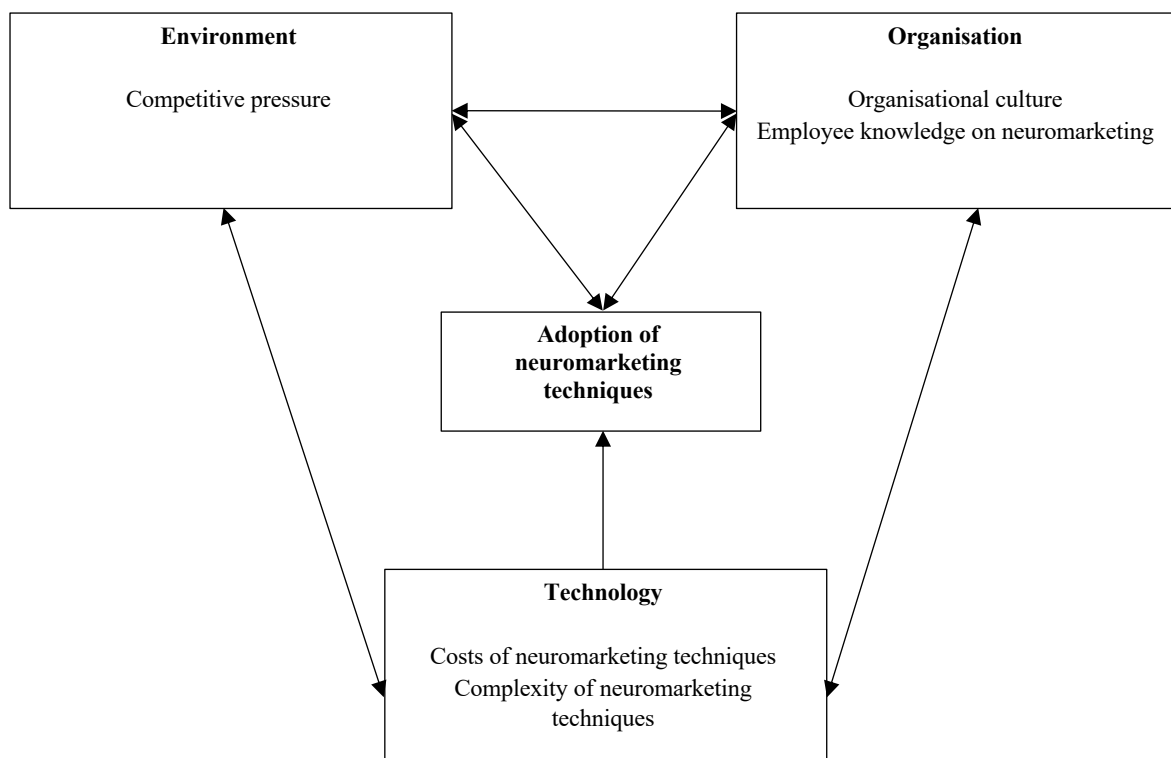


Figure 2. Adapted TOE model on the adoption of neuromarketing techniques

3. Research design and method

In this chapter, the research design and method are explained. First, the research design is presented. Following this, the sample method and the characteristics of the participants are explained. Subsequently, the instrument and procedure are outlined. Moreover, the data analysis process is explained. Moving forward, the codebook used for the coding of the interviews is discussed. Finally, the reliability and validity of the study are examined.

3.1 Research Design

The research model used in this study is derived from a combination of technological, organisational and environmental dimensions that possibly affect the adoption of neuromarketing tools. Different components within the dimensions will be investigated to determine whether these variables affect the intention to adopt neuromarketing techniques. These components include for the technological dimension: *costs of neuromarketing techniques* and *complexity of neuromarketing techniques*, in the organisational dimension: *organisational culture* and *employee knowledge on neuromarketing* and in the environmental dimension *competitive pressure*. This research takes a qualitative research approach and a qualitative data collection method will be used for this study. The data is open to interpretation, including for instance, individual's opinions. Qualitative research is particularly useful for the exploration of motivations, attitudes, intentions and beliefs of people and is able to capture the depth and richness of how and why people act in the way they do (Wright & Heaton, 2006). The research focuses on a deductive research approach, which builds upon existing theories and concepts, in this case the different dimensions of the TOE model (Tornatzky & Fleischer, 1990) and previously examined factors that influence neuromarketing adoption.

Because this research relies on in-depth information on the participants' motivations, perceptions and feelings, semi-structured interviews will be used to gain more in-depth and thorough information. In addition to exploring the dimensions examined in this research, it is possible that marketing professionals perceive other practical factors as obstacles or encouragements to the adoption of neuromarketing techniques. By conducting semi-structured interviews, these other factors will also emerge. Semi-structured interviews allow the researcher to react to the answers provided by the participant and ask for more clarification on the given answers. Through literature research, a concept version of the semi-structured interview questions was created. The questions of the semi-structured interview were pre-tested to rule out the misinterpretation of the questions or words used in the questions.

3.1.1 Pre-test

A pre-test was conducted to enhance the interview questions and to make sure that the questions asked in the interview were clear and unambiguous. In order to test the quality of the interview questions, two individuals were asked to participate in a pre-test. The criteria for the participants of the pre-test were the same as for the participants of the interview. The participants of the pre-test were interviewed according to the interview guidebook. During the interview, the researcher made notes about possible improvements. Once the interview was finished, participants were requested to provide feedback regarding the interview flow, their opinions on the various questions, and suggestions for potential modifications or any additional questions that might have been overlooked. A few questions were added and/or modified to enhance the participant's comprehension of the questions. Overall, the pre-test only resulted in minor changes of the interview guidebook.

3.2 Sample and Participants

This research is located in the Netherlands and focuses on Dutch (neuro)marketing professionals. Participants for the study can be reached via the researcher's own network (work experience in the field of online marketing) and by reaching out to Dutch (neuro)marketing professionals and organisations via LinkedIn. The participants had to meet two criteria; the first one being that they needed to have the Dutch nationality and the second one being that they should know what neuromarketing entails. 16-24 interviews are needed to reach richly textured understanding of issues (Hennink et al., 2016).

This study employed two non-probability sampling methods to recruit participants. Non-probability sampling entails the deliberate selection of participants by the researcher or through a self-selection process initiated by the participants themselves (Boeije, 2010). The combination of convenience and snowball sampling enhanced the variety of the participants in the sample, in terms of age and gender. Initially, convenience sampling was utilized to approach acquaintances (Boeije, 2010). The researcher posted a request on LinkedIn, seeking (neuro)marketers and inviting them to participate in the study. Subsequently, snowball sampling was employed to identify other suitable participants that matched the target group criteria. Therefore, the researcher asked participants of the interviews to suggest additional individuals who could participate in the study. In this way, participants that were previously unfamiliar to the researcher could be approached.

Overall, the sample consisted of 20 participants, between the age of 23 and 64, with an average age of 36. Of the participants, 8 of them were female and 12 of them were male. Table 3 shows the most important characteristics of the sample. The professional occupation is divided into “marketing agency”, “neuromarketing agency” and “other”. “Other” includes professionals that have extensive knowledge on neuromarketing and have a previous career in (neuro)marketing, but at this moment have a different profession, such as communication strategist, lecturer or a researcher.

	Number of participants (N=20)
Age	
Range	23-64
Average	36.0
Gender	64
Female	N=8
Male	N=12
Professional occupation	
Marketing agency	N=12
Neuromarketing agency	N=3
Other	N= 5
Position	
Management position	N= 8
Employee position	N= 12

Table 3. Characteristics of the participants

3.3 Instrument and Procedure

Based on the concepts in the theoretical framework, the interview guide and questions were developed. The interview questions were divided into seven main topics: “*General information questions*”, “*Introduction questions related to neuromarketing*”, “*Questions on the components that could influence the intention to adopt neuromarketing*”, “*Questions on the technological dimension*”, “*Questions on the organisational dimension*”, “*Question on the environmental dimension*” and “*Questions on the ranking of the different dimensions*”. The interview questions were derived and adapted from previous studies (Bhattacharya & Wamba, 2015; Cruz-Jesus et al., 2019; Gorgiev, 2020; Katebi et al., 2022; Kumar & Krishnamoorthy, 2022; Ngah et al., 2021; Oliveira et al., 2014; Salleh & Janczewski, 2016). A summary of the different interview topics and questions can be found in Appendix A. The semi-structured interview form can be found in Appendix B.

Before the interview took place, the participants were asked to (digitally) sign the informed consent forms (Appendix C). At the beginning of the interview the informed consent forms was checked and permission was asked to the participants for recording the interview. Only when the interviewees agreed to the informed consent and permission for the recording, the interview started. To guarantee structure during the interview, the interviewer followed the order of the questions that was made in advance. However, if a certain dimension was already addressed by the participants, the researcher switched to questions about this particular dimension (for example culture of the organisation).

All the interviews were held online via Microsoft Teams, since most of the participants did not live nearby. It was preferred to conduct the interviews in English, but if participants felt more comfortable and were able to give more extensive answers in Dutch, this was also an option. The researcher informed every participant that he or she could stop or take a break during the interview at any time. After the interview, the researcher asked if the participant had any questions related to the study. The recordings of the interviews were kept confidential and were only heard by the researcher of this study. After the study was finished, the voice recordings were deleted. The duration of the interviews ranged between 39 minutes and 1 hour and 34 minutes and the average interview took 56 minutes. After conducting 20 interviews, the researcher determined that a sufficient amount of valuable data had been collected, as there was a recurrence of answers among the participants. This indicated data saturation, suggesting that further interviews were unnecessary.

3.4 Data analysis

After all the data was collected, the researcher transcribed the recorded interviews while ensuring the omission of any personal information that could potentially disclose the participants' identities. By using Atlas.ti, a software program for the analysis of large amounts of data, the transcriptions were uploaded and analysed using a thematic analysis. A thematic analysis facilitates the process of “identifying, analysing and reporting patterns (themes) in the data” (Braun & Clark, 2006). This type of analysis is relatively easy and makes it possible to usefully summarise key features of a large body of data, while also highlighting similarities and differences across the data (Braun & Clark, 2006). Given that this research is built around different dimensions (themes) and factors that may influence the adoption of neuromarketing techniques, employing this type of analysis allows for the summarization of key findings categorised into specific themes. Besides, it enables the identification of similarities and differences among the participants' responses concerning the components influencing the

adoption of neuromarketing techniques in organisations. Braun and Clark (2006) outline six steps for conducting a thematic analysis: 1) *becoming familiar with the data*; 2) *generating initial codes*; 3) *searching for themes*; 4) *reviewing themes*; 5) *defining and naming themes*; and 6) *producing the report*.

Initially, *to familiarize oneself with the data*, the interview data underwent transcription and multiple readings. Subsequently, the process of *generating initial codes* was carried out through open coding. Open coding can be defined as: a process in which the data is divided into smaller segments which are deeply analysed to identify appropriate codes and descriptions that elucidate the phenomena described within the segment (Vollstedt & Rezat, 2019). The open coding process started with using codes that were based on the literature, but whenever the content deviated from the predetermined code descriptions, new codes were developed accordingly. The *search for themes* involved both deductive coding and inductive coding. Deductive coding employed pre-existing knowledge based on previous literature (Braun & Clarke, 2006). Additionally, inductive coding was performed to develop new codes uncovering other components influencing neuromarketing adoption. These new codes were then included in the codebook, fine-tuned and used in multiple interview transcripts. Inductive coding, characterized as data-driven, aimed to identify themes without imposing pre-existing ideas onto the data (Braun & Clarke, 2006). The steps of *reviewing themes*, as well as *defining and naming themes*, were facilitated through axial coding, which helped in identifying categories and subcategories among the codes (Boeije, 2010). The process of creating categories involved merging, separating, and modifying them until no new connections or categories emerged. Finally, the last step of the analysis, producing the report, corresponds to the results section of this study.

3.4.1 Ranking of different dimensions

After each interview, the participants were asked to rank to what extent the different components (*costs of neuromarketing techniques, complexity of neuromarketing techniques, organisational culture, employee knowledge on neuromarketing and competitive pressure*) within the different dimensions (technological, organisational and environmental dimension) were important towards the adoption of neuromarketing tools in the organisation. This was employed to gain a more comprehensive understanding of the importance of the various components among the participants.

3.5 Codebook

The codes were divided according to the interview into different categories: *general information, introduction on neuromarketing, adoption of neuromarketing, technological dimension, organisational dimension, environmental dimension* and *ranking of the different dimensions*. In total 975 sections were coded, ranging from 41 to 58 sections per interview.

Category	Code	Description
1. General information	1.1 Organisation	1.1 The name of the organisation
	1.2 Size	1.2 The size of the organisation
	1.3 Years of experience	1.3 Amount of years of experience
	1.4 Daily work	1.4 The day-to-day work
	1.5 Age	1.5 The age
	1.6 Educational background	1.6 The study that the participant did
	1.7 Professional background	1.7 The past career
2. Introduction on neuromarketing	2.1 Definition	2.1 Own definition of neuromarketing
	2.2 Experience	2.2 Experience with neuromarketing practices
	2.2.1 No experience 2.2.2 Experience with user-testing	
3. Adoption of neuromarketing	3.1 Components influencing adoption	3.1 The components that influence the adoption of neuromarketing
	3.2 Advantages of neuromarketing	3.2 Advantages of neuromarketing techniques
	3.3 Enablers of neuromarketing	3.3 Enablers of neuromarketing adoption in organisation
	3.4 Disadvantages of neuromarketing	3.4 Disadvantages of neuromarketing techniques
	3.5 Challenges of neuromarketing	3.5 Challenges of neuromarketing adoption in organisation
4. Technological dimension	4.1 Knowledge on costs	4.1 The costs of different neuromarketing techniques
	4.2 Perception of costs	4.2 Perception of these costs (low/medium/high)
	4.3 Costs affecting adoption	4.3 The effect of costs on adoption of neuromarketing techniques
	4.4 Complexity of neuromarketing techniques	4.4 The opinion on the complexity of different techniques
	4.5 Skills of employees	4.5 Skills required by employees to implement neuromarketing techniques
	4.6 Complexity affecting adoption	4.6 The effect of complexity on adoption of neuromarketing techniques
5. Organisational dimension	5.1 Values	5.1 Values within organisation
	5.2 Organisational culture	5.2 The organisational culture in organisation
	5.3 Organisational innovativeness	5.3 The level of organisational innovativeness
	5.4 Top management attitude/support	5.4 The attitude of top management on innovations/neuromarketing
	5.5 Culture affecting adoption	5.5 The effect of organisational culture on adoption of neuromarketing techniques
	5.6 Knowledge among employees	5.6 The level of knowledge among employees
	5.7 Employee willingness to know more about neuromarketing	5.7 Employee's willingness to know and learn more about neuromarketing
	5.8 Knowledge affecting adoption	5.8 Knowledge affecting the adoption of neuromarketing techniques
6. Environmental dimension	6.1 Competitors	6.1 Competitors of the organisation that use neuromarketing techniques
	6.2 Inclined to use neuromarketing techniques	6.2 Organisation feeling more inclined to use neuromarketing techniques if competitor does so
	6.3 Competition affecting adoption	

7. Ranking of dimensions	7.1 Ranking of different components	7.1 Ranking of different components in the technological, organisational and environmental dimension
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Table 5. Codebook

3.6 Reliability and validity

To assess the reliability of the codebook, the intercoder reliability had to be examined. The intercoder reliability can be defined as the degree to which two or more independent coders agree on the coding of the content (Burla et al., 2008). The codebook was evaluated by independently coding 20% of the interviews and computing the Cohen's Kappa coefficient. Cohen's Kappa coefficients were calculated for the following code group categories: *general information, introduction on neuromarketing, adoption of neuromarketing techniques, technological dimension, organisational dimension and environmental dimension* (Table 6). Overall, the Cohen's Kappa was 0.79. According to Strahl et al. (2019) a Cohen's Kappa higher than 0.65 is sufficient, therefore it can be concluded that the codebook is reliable.

The study's validity was safeguarded through the examination of exceptional cases, such as instances where participants provided unusual or contextually incongruent responses. Within the scope of this study, no such exceptional cases were identified, affirming the validation of the interview questions and study setup. Furthermore, the alignment between the theoretical concepts and the interview questions reinforces the validity, as the questions are grounded in the theory, ensuring the study's focus and objective.

Code group category	Cohen's Cappa
General information	1.0
Introduction on neuromarketing	0.92
Adoption of neuromarketing techniques	0.78
Technological dimension	0.60
Organisational dimension	0.62
Environmental dimension	0.66
Total	0.76

Table 6. Intercoder reliability for each code group categories

4. Results

In this section, the opinions towards neuromarketing, the dimensions (technological, organisational, and environmental) and other components that influence the adoption of neuromarketing techniques in marketing organisations are discussed in more detail.

4.1 Summary on ranking of different dimensions

Overall, comparing the different dimensions, the costs of neuromarketing techniques and the culture of the organisation were most often (N=6) mentioned as the most important component that influences the adoption of neuromarketing tools in marketing organisations. However, in the beginning of the interview when participants were asked to come up with components that in their opinion influenced the adoption of neuromarketing techniques in organisations, costs were more frequently mentioned by participants (N=12) compared to the culture of the organisation (N=1). Next, the average ranking place of the costs of neuromarketing techniques was 1.9 and the average ranking place of organisational culture was 3.0. This can be explained by the wide distribution of the organisational culture component, scoring first place 6 times, second place 0 times, third place 5 times, fourth place 7 times and fifth place 2 times. The least important component for the adoption of neuromarketing techniques was the competitive pressure, with an average ranking place of 4.1, and ranked 12 times at the fifth place. The following section provides a detailed elaboration on the different dimensions and their subcomponents.

4.2 Technological dimension

4.2.1 Costs of neuromarketing techniques

Half of the participants (N=10) did not have any knowledge of the costs of neuromarketing techniques, whereas the other half of the participants (N=10) did. It becomes clear that there is a difference between the perception of the costs of the different neuromarketing techniques. Overall, most of the participants perceived the costs of neuroimaging techniques (EEG, fMRI, fNIRS, MEG, PET) as very high, compared to the costs of the physiological techniques and behavioural techniques (ET, GSR, fEMG, ECG, IAT). In general, participants agreed upon the fact that a marketing agency would not purchase the neuroimaging techniques themselves but would instead hire a neuromarketing consultancy company to use their equipment or to conduct the neuromarketing experiment. To illustrate, participant 4 said:

“Most of the advertising agencies they are not going to buy the equipment themselves so.”

This was explained in more detail by participant 18:

“There aren't any organisations that are going to buy these types of tools, maybe eye tracking, because it is not that expensive, but it's also not about the tool. It's also about how do you use it and how do you interpret the results so an MRI scanner can be 1 to 10 million, but if you don't know how to read an MRI scan to tease out the certain emotions that you're looking for? It doesn't make sense to talk about how expensive the scanner is. So it's more, it's more interesting to look at how much... What is the hourly rate of a consultant?”

These quotes show that there is a difference in buying the equipment and conducting a neuromarketing experiment, while also illustrating that it is rather unrealistic to buy neuroimaging techniques.

For the physiological neuroimaging techniques, especially (AI) eye-tracking, a number of participants (N=9) stated that this was already implemented in their organisations or could be implemented in their organisations, mostly due to its price and accessibility. To illustrate, participant 6 said:

“The eye tracking for only a few 100 euro's is acceptable for organisations like us. So maybe then it's also our belief or still our belief that such tools are such so expensive. But then in reality it's there are solutions that are cheaper and. acceptable but. Yeah, maybe then that's. something that we do not know yet and that we do not have the knowledge about”.

This quote also represents the lack of knowledge and incorrectness of people's perception of the costs of neuromarketing experiments. Participants that worked for neuromarketing companies explain that the costs of neuromarketing research is equal to traditional types of research, as participant 16 said:

“The costs of these kinds of research have become so scaled, that instead of doing traditional research, they could do neuromarketing research for the same amount of money. It's perception as everything in the world is perception and as we know now, there's a big difference between perception and reality. The reality is solid. The traditional study of your TV commercial would cost somewhere around €10,000, - An fMRI study of you the same TV commercial at a neuromarketing company costs around €11.500, -. Yeah. So, it's not expensive.”

4.2.2 Complexity of neuromarketing techniques

Many participants (N=16) stated that they think that neuromarketing techniques are complex. However, the participants see a distinction in the level of complexity of different types of neuromarketing techniques. For example, eye-tracking and IAT are viewed by the participants as less complex than advanced techniques such as EEG and fMRI. For example, participant 6 explained that EEG is way more complex than eye-tracking and that eye-tracking can be doable and simple. In addition, participant 14 illustrates that for neuromarketing techniques that are more expensive (for example EEG, fMRI) the level of knowledge and understanding needs to be higher, compared to less expensive techniques such as eye-tracking. The participant explains this argument by stating that as more individuals and organizations adopt these less expensive techniques, the knowledge base surrounding them increases, thereby reducing the overall complexity of the technique itself. Furthermore, the participants that think that neuromarketing techniques are simple, argue that these techniques are simple if you collaborate with the right experts and scientists.

Next to this, participants suggested that there are specific skills needed by employees to implement these neuromarketing techniques. Nine participants highlighted the importance of having an academic background with research knowledge and skills. Furthermore, participants (N=9) point out the importance of knowing how to analyse and interpret the results, once a neuromarketing experiment is done. For example, participant 16 said:

“We make a big difference between analysis and interpretation. Our scientists do the analysis but to interpret that into actionable insights for marketers, that needs a marketer so, and that's I'd like to say to my clients; in the old days we were sitting in opposite to each other, the client and the agency. Nowadays, we sit next to each other. The marketer and the researcher, and we look at brain data. The brain doesn't lie. The interpretation comes with understanding each other's business, so the marketer must understand how we look at the brain at the analysis, we must understand his business in order to, you know, come up with actionable insights in how to improve. What we have tested, whether it's packaging or branding or advertising.”

Many of the participants (N=13) believe that complexity is a factor that influences the adoption of neuromarketing techniques. The other participants believe that complexity is not a factor that influences adoption if you involve yourself with the right experts and do not adopt the neuromarketing techniques yourself. To illustrate, participant 18 said:

“It's not complex if you work with the rights experts. That's why I think there are no big brands that have like in House fMRI scanners that they use themselves because you always need the experts.”

This quote illustrates that the problem of the complex nature of neuroimaging techniques can be tackled by collaboration with experts in the field.

Furthermore, participants employed in neuromarketing organisations explain that it becomes easy when organisations outsource neuromarketing research. For example, participant 13 explained:

“Why would you do it yourself if you don't do it yourself, then it becomes actually very easy, because somebody made a TV commercial and before they're going to broadcast, they want to improve it. So they give their upload they just upload the commercial on JPEG on Thursday afternoon. We scan in the weekend because we want to scan regular consumers so they are not at work. So we scan in the evenings and in the weekends and then Monday we do the analysis and Tuesday they have to results. And the only thing they have to do is upload the commercial. So it doesn't become much easier, right?”

4.3 Organisational dimension

4.3.1 Organisational culture

Most of the participants (N=18) worked in a company that has an open and innovative culture. For example, participant 12 said:

“We have a very open culture. It's very informal actually. Everyone has direct contact with each other like there's no difference in levels like we have a director and our company has four partners. They are like actual the actual bosses. But we just work directly with them. We do all the projects together.”

Furthermore, the participants agreed on the fact that the top management of the company needs to be open and supportive towards using innovations such as neuromarketing. However, not all the participants were able to tell if the management of the company was open towards the implementation of neuromarketing, since it is not a topic that was discussed frequently. This indicates that there might be a low level of awareness on neuromarketing in organisations. Moreover, the participants explained their view on organisational culture affecting the adoption of neuromarketing techniques. Many of the participants (N=13) believed that culture affects the adoption of neuromarketing techniques. Participant 11 described it as follows:

“Bigger companies they are stuck. So they don't really like change. So if then, for instance, someone said, OK, we are going do it another way. Then there might be some

stakeholders up in the trees and they are like, no, because we're used to this. So yeah, I think it depends on how innovative the culture itself within the company is, how easy they will adapt and make use of changes so to say."

4.3.2 Employee knowledge on neuromarketing

Overall, the level of knowledge of the employees ranged between low (N=12) medium (N=4) and high (N=4). The participants that described the level of knowledge on neuromarketing among employees as high, were all operating in a neuromarketing organisation. Therefore, it is observed that the level of knowledge of employees on neuromarketing in marketing organisations is quite low, as elaborated on by participant 7:

"I would say nonexistence like very basic heard of level."

While the participants explained about the level of knowledge of employees, the general level of knowledge on neuromarketing among society was also brought up. For example, participant 1 said:

"The common level of knowledge about neuromarketing is pretty low. It's very, very low because for most people it sounds and it is "Whoa", you need to do a lot of stuff."

Moreover, many of the participants think that employee knowledge affects the adoption of neuromarketing techniques. This means that the likelihood of adopting neuromarketing techniques could increase if employees possessed a higher level of knowledge concerning these methodologies.

4.4 Environmental dimension

4.4.1 Competitive pressure

More than half of the participants (N=13) indicated that they would be more inclined to use neuromarketing techniques if their competitors were also using them. The other participants (N=7) said that they would not be more inclined to use neuromarketing techniques if competitors would be using these types of techniques. A similar distribution was observed when asking participants about competition being a factor that is of influence for the adoption of neuromarketing techniques. 12 participants thought that competition would affect the adoption of neuromarketing techniques, whereas 4 participants thought that it would not affect the adoption of neuromarketing techniques. Furthermore, 4 participants were neutral on the competitive pressure affecting the adoption.

Different participants pointed out that at this point in time, competition does not play a role yet, since not a lot of organisations have integrated neuromarketing techniques. For example, participant 8 said:

“It depends, maybe it's also at this point not really relevant because there is not such high competition, so therefore less relevant for others to also implement it, maybe.”

4.5 Other components

Next to the different dimensions and the subcomponents from the adapted TOE model in this research, the participants came up with other components that in their opinion influence the adoption of neuromarketing techniques. These different components can be found in Table 7. The components from the TOE model that the participants came up with themselves (*costs of neuromarketing techniques, complexity of neuromarketing techniques, organisational culture*) in the beginning of the interview, are also added in the table. Moreover, the differences between gender, age and professional position per component are included.

It can be concluded that *costs, value for organisation and customers, gap between scientific and practical fields, lack of knowledge, technology development and AI and size of the company* emerged as the most frequently mentioned components by the participants. Upon examining the variation in responses between genders, it becomes apparent that a significantly larger proportion of male participants referred to the *costs, the gap between the scientific and practical fields, and the value for both the organisation and customers*. Additionally, a more detailed investigation of the participants' positions revealed noteworthy distinctions. It is worth noting that a substantial number of employees, rather than managers, mentioned the *lack of knowledge* and the *value for both the organisation and customers*. Furthermore, managers were found to bring up the *gap between the scientific and practical fields* more frequently compared to employees. Finally, upon examining the variations in age, it becomes evident that only participants aged above 35 identified the *gap between the scientific and practical fields* as a component influencing the adoption of neuromarketing techniques. This might be explained by the fact that older people have more experience in the field and possibly different fields, which allows for the identification of a gap between the scientific and practical field.

4.6 Summary of main findings

First of all, it is worth mentioning that marketing organisations show a preference for hiring specialized neuromarketing companies for conducting neuromarketing research instead of buying the equipment themselves. This choice may be attributed to the costs, technical

complexity and expertise required to conduct studies with these neuroimaging techniques. Conversely, physiological techniques, such as eye-tracking and implicit association test, are perceived as more accessible and easier to implement in the organizational setting due to their relatively lower costs and simplicity of use. The primary contribution of this study lies in the recognition that the costs associated with adopting neuromarketing techniques pose the most important barrier for marketing professionals when considering the adoption of these techniques. However, the perspectives of neuromarketing professionals contradicts this, since they argue that the costs of conducting neuromarketing research is comparable to those of traditional research. Consequently, it can be inferred that marketing professionals and neuromarketing professionals hold divergent viewpoints and this highlights the gap between the research and industry. The organisational culture and the employee knowledge on neuromarketing both positively affect the adoption of neuromarketing techniques, since an open and innovative culture in which employees know more about neuromarketing fosters adoption. Next, this study indicates that competition holds, at least at this point in time, less significance in driving such adoption.

Beyond the dimensions encompassed by the Technology-Organization-Environment (TOE) model, this investigation reveals the presence of additional barriers that influence the adoption of neuromarketing techniques within marketing organisations. Specifically, the lack of clarity regarding the *value for organisations and customers*, the *gap between the scientific and practical fields*, *lack of awareness and knowledge* and *size of the organisation* are identified as the most critical barriers. Moreover, the integration of emerging technologies, particularly artificial intelligence (AI), shows promising potential to revolutionise the landscape of neuromarketing.

Components influencing the adoption of neuromarketing techniques	Samples	Cases	No. of cases coded	No. of males vs females	Age ranges 0-35 and 36-64	No. of management vs employee position
Costs	“I think the cost is one of the most important reasons especially for us” (P6). “It’s relatively expensive” (P11). “That type of research is quite expensive” (P17).	P1, P2, P4, P5, P6, P8, P9, P10, P11, P15, P17, P19.	12	M= 9 F = 3	0-35= 7 36-64= 5	M = 5 E = 7
Complexity	“These tools are not very easy to use” (P14) “It is way too complex (...) the analysis and what you do with it is also immense” (P15).	P2, P8, P11, P14, P15.	5	M = 3 F = 2	0-35= 3 36-64= 2	M = 2 E = 3
Organisational culture	“The culture of the company” (P10).	P10	1	F = 1	0-35= 1	E = 1
Lack of knowledge	“The biggest barrier is that people just don’t have enough knowledge of the possibilities yet and a lot of organisations are terribly short-term driven” (P3). “Those companies mostly lack knowledge, so the awareness has been created but most will still think it’s a kind of magic in my understanding. But that comes from a lack of understanding about the technologies and techniques” (P7).	P1, P3, P5, P6, P7, P9, P10, P11.	8	M = 5 F = 3	0-35= 4 36-64= 4	M = 2 E = 6
Misassumption on the costs	“The costs of the equipment is not the issue. I would say it's quite doable. Medium sized companies marketing budget and buying a couple of Tobii eye-trackers for example. It's perfectly fine.” (P7). “People really think it will cost tons of money.” (P13) “The costs of doing such an experiment are not too bad” (P20)	P7, P13, P16, P18, P20.	5	M = 3 F = 2	0-35= 3 36-64= 2	M = 2 E = 3
Availability of specialists	“What that also has to do with, I think, is that we don't have anyone internally who knows a lot about it.” (P5) “ Maybe I would also add the availability of professionals. Because employees can school themselves, but that is going to be very difficult. Maybe they don't want it.” (P9).	P5, P6, P9.	3	M = 1 F = 2	0-35= 3 36-64= 0	M = 0 E = 3
Size of the organisation	“If you are a small organisation like less than 500 people, it's very hard to to get an expert on board dedicated to this type of research.” (P8) “Most of our customers are the larger companies in the Netherlands and mostly focused on E-commerce, but also all the big supermarkets And so basically all the insurance companies, yeah all the big, big companies test with us so to say.” (P11) “I think that almost every big company you would speak to in the Netherlands; Heineken, Albert Heijn well name like ten	P1, P8, P11, P13, P15, P16, P18.	7	M = 4 F = 3	0-35= 4 36-64= 3	M = 4 E = 3

	of those brands, they've already done it, and not once many times. So the biggest companies have already done it.” (P18)					
Time consuming	<p>“It’s the hassle, the time consuming” (P1).</p> <p>“The analysis of this type of data costs a lot of time and energy” (P14).</p> <p>“Cost not only in money, but also in time” (P6).</p>	P1, P6, P11, P14, P15, P17.	6	M = 4 F = 2	0-35= 3 36-64= 3	M = 3 E = 3
Gap between scientific and practical fields	<p>“It says something about the gap between science and marketing. Scientists are a bit in their own little bubble, actually, to do experiments and research with the public you often have to understand something about marketing and communication. And that’s a field they don’t know much about. So I always say neuroscience and marketing are kind of in love with each other, but they are far from being married to each other, so there is still a lot to be done in my view, yes.” (P3).</p> <p>“There’s a really big gap between what science can offer and what businesses and institutions think they need.” (P15).</p> <p>“If you can’t make chocolate from the knowledge of science, it’s of no use to me. No, so there I mean it with a very good sense, but if you can’t translate it into a or a better text on your website or a better design or a better structure I can’t do anything with it” (P19).</p>	P1, P3, P4, P8, P15, P18, P19, P20.	8	M = 6 F = 2	0-35= 0 36-64= 8	M = 6 E = 2
Value for organisation and customers	<p>“At this moment, I don’t really see the benefits of it and therefore it is not necessary at this time.” (P5).</p> <p>“How these tools can help, knowing what it adds for us and for our clients” (P6).</p> <p>“I would say the perceived value delivered to customers. I would say this is probably the most important thing, which is basically saying, hey, what is the value we give our client by applying this technique” (P7).</p> <p>“There needs to be a reason behind it why we should implement it” (P9).</p> <p>“I can imagine in some situations that it is a little hard for clients to assess, for example, what they can get out of it or what it actually brings them.” (P14).</p> <p>“The what’s in it for me? has to be very clear for marketeers and for their niche field, whatever field they are in” (P18).</p>	P1, P2, P3, P5, P6, P7, P9, P14, P18, P19, P20.	11	M = 7 F = 4	0-35= 2 36-64= 4	M = 4 E = 7
Awareness	<p>“Awareness on one. I think just in general the awareness of neuromarketing for advertisers and advertising agencies, that that’s the main goal and also I think even on board level or at least on the marketing directors level, they should know about this technique, this thing that they can use to, to pursue better results.” (P4).</p> <p>“The known-ness, I am not sure if that is the word in English, how known are these tools? Have I ever heard about it? So the awareness of people on neuromarketing” (P8).</p>	P3, P4, P8, P9, P13, P16.	6	M = 4 F = 2	0-35= 2 36-64= 4	M = 3 E = 3

	“I think it is maybe that People just don't know it exists at all” (P13).					
Technology development and AI	I think let's say technology like AI. So making it broadly applicable because AI is just going to completely break this open. But the accessible, technology, so AI in this case yes, that's just going to bring down the costs.	P1, P6, P9, P12, P14, P17, P19, P20.	8	M = 5 F = 3	0-35 = 4 36-64 = 4	M = 4 E = 4
No realistic setting	“I don't know who sits at home on the couch with all sorts of wires on their head watching an advert? I don't anyway, so I want to make that that situation I want to make as real as possible.” (P3). “How people behave when they for example have EEG on their head or like these glasses on, it's like not very familiar for them So I do think that that's maybe also a factor that could withhold to use such tools. A kind of barrier to use it.” (P6).	P3, P6, P20.	3	M = 2 F = 1	0-35 = 1 36-64 = 2	M = 2 E = 1

Table 7. Components influencing the adoption of neuromarketing techniques

5. Discussion

This study aimed to explore different components that influence the adoption of neuromarketing techniques in marketing organisations. More specific, this study aimed to investigate how technological, organisational, and environmental dimensions influence the adoption of neuromarketing techniques in marketing organisations. In this section, the results will be extensively explored and the answer to the research question: “*How do technological, organisational, and environmental dimensions influence the adoption of neuromarketing techniques in marketing organisations?*” will be discussed.

5.1 Technological dimension

Marketing professionals identified the costs of neuromarketing techniques as the most crucial barrier for the adoption of neuromarketing techniques. This is in line with research of Alsharif et al. (2023), which shows that the costs of neuromarketing techniques are a barrier for the adoption of neuromarketing research in the business field. However, intriguingly, neuromarketing specialists contested this perception. According to them, the costs associated with neuromarketing techniques are often wrongly perceived, and the potential benefits outweigh the investment. This contradicts the findings of Alsharif et al. (2023) but is in line with research of Eser et al. (2011), which argues that neuromarketing research is only slightly more expensive than traditional research such as focus groups.

A possible explanation for this finding is the existing stigma on neuromarketing techniques being costly, in combination with marketing organisations being not up to date on the declining costs of neuromarketing techniques in recent years. The discrepancy between marketing professionals and neuromarketing professionals highlights the need for organisations to gain a deeper understanding of the actual costs and benefits before making decisions related to the adoption of these techniques. In addition, this finding shows that in the scientific research field a distinction should be made between costs of the equipment and costs of doing an experiment.

The results show evidence that the neuromarketing techniques are perceived as complex. This perception, however, was not uniform, as participants recognized distinctions in complexity levels based on the type of technique employed. Among the various techniques discussed, eye-tracking emerged as the least complex according to the participants. This aligns with their view that eye-tracking is relatively straightforward to implement compared to more advanced techniques such as EEG and fMRI. The latter were perceived as more intricate and

demanding a higher level of knowledge and understanding. An interesting observation was made that the perceived complexity of certain techniques was influenced by their cost. Expensive techniques like EEG and fMRI were seen as more complex, primarily because of the limited adoption due to their higher costs, resulting in a narrower knowledge base.

One plausible explanation for this phenomenon may lie in the greater adoption of cost-effective techniques, like eye-tracking and IAT, which enhances the knowledge base and reduces their perceived complexity. Consequently, the wider utilisation of these methodologies likely results in a more comprehensive understanding and lower level of complexity.

The implementation of neuromarketing techniques requires specific skills. Notably, the importance of an academic background with research knowledge and skills for individuals involved in utilizing these techniques. Additionally, the ability to analyse and interpret the results of neuromarketing experiments was deemed crucial. This finding is in line with research of Alsharif et al. (2022) which found that data interpretation is one of the challenges of neuromarketing implementation. This underscores the significance of collaboration between researchers and marketers, as the interpretation of brain data necessitates a comprehensive understanding of both the neurological aspects and the marketing context.

It can be concluded that costs and complexity being barriers for adoption could be mitigated through collaboration with specialized experts. This finding suggests that organisations seeking to leverage neuromarketing may benefit from outsourcing research to specialised firms to overcome the perceived high costs and complexities.

5.2 Organisational dimension

In the context of organisational culture, the findings from this study reveal that an open and innovative culture is needed before the adoption of neuromarketing techniques in marketing organisations can take place. This is in line with research of Siamagka et al. (2015), Chau et al. (2020) and Crespo-Pereira et al. (2020) which show that the adoption of a new technology depends on the innovative climate within the organisation. Moreover, it is evident that the participants consider the attitude of top management crucial in promoting and embracing innovative practices like neuromarketing. This is in line with research from Crespo-Pereira et al. (2020) and Elouadifi and Essakalli (2022) which demonstrates that supportive top management positively influences the adoption of neuromarketing techniques.

A possible explanation for this finding might be that an organisational culture that encourages openness to novel and innovative ideas encourages an environment conducive to embracing innovative marketing approaches like neuromarketing. Moreover, the absence of

hierarchical barriers and direct communication channels with higher-ups, including directors and partners, fosters a conducive environment for new ideas and collaboration on projects.

Furthermore, the participants acknowledged the potential influence of employee knowledge on the adoption of neuromarketing techniques. This suggests that enhancing employee knowledge and expertise in neuromarketing could be instrumental in promoting the successful implementation of such strategies within marketing organizations. This can be accomplished, for example, through educating and training employees, as well as through engaging with industry experts.

5.3 Environmental dimension

The results indicate that, presently, competitive pressure does not constitute a factor that influences the adoption of neuromarketing techniques. This contradicts the results of previous studies applying the TOE model for technology adoption (Musawa et al., 2012; Zhu & Kraemer, 2005). One plausible rationale for this result might be the relatively low prevalence of neuromarketing techniques integration across organisations at the present stage, in contrast to the more widely implemented innovative technologies examined in the studies conducted by Musawa et al. (2012) and Zhu and Kraemer (2005). Consequently, the scarcity of competitors actively leveraging neuromarketing practices seems to diminish the immediate relevance of competitive pressures on adoption decisions.

5.4 Other components influencing neuromarketing adoption

Besides the adoption effects of the components from the TOE model, the results of this study reveal that other components affect the adoption of neuromarketing techniques in marketing organisations. First of all, a notable barrier for the adoption of neuromarketing techniques is the lack of clarity regarding the value these techniques provide for both organisations and their customers. The results indicate that there is a lot of uncertainty about the specific gains that could be achieved through using these types of techniques. This is in line with research of Crespo-Pereira et al. (2020) which demonstrates that the reliability of neuromarketing results impacts the adoption of neuromarketing in organisations.

There are two possible explanations for this result. First, the limited accessibility and reach of neuromarketing organisations experiment results hinder the discovery by marketing professionals. Secondly, organizations engaged in neuromarketing might refrain from disclosing their experimental findings due to concerns of potential replication by neuromarketing organisations in the same field. Furthermore, clients of neuromarketing

organizations may express a preference for non-disclosure of results obtained from these experiments. To address this issue, there is a need for marketing professionals and neuromarketing specialists to present concrete examples such as case studies, demonstrating the potential advantages and value of implementing neuromarketing techniques.

Secondly, the findings highlight a noticeable gap between the scientific understanding of neuromarketing and its practical application in marketing organisations. A possible explanation for this is that the scientific and practical field are still two separated fields and not yet intertwined with one another. It might be that research conducted in neuromarketing for scientific purposes may not necessarily yield the desired outcomes sought in the practical and business-oriented applications of neuromarketing. The gap may hinder the decision-making process for organisations considering the adoption of neuromarketing techniques. Bridging this gap requires efforts from both researchers and practitioners to ensure a translation of scientific knowledge into actionable marketing strategies.

Thirdly, the results indicate that a lack of awareness and knowledge on neuromarketing techniques exists in society and the marketing industry. This is in line with research of Alsharif et al. (2023) which shows that there is a lack of awareness and knowledge in both academia and industrial society. Besides, this is line with a study by Eser et al. (2011), which suggests that knowledge is perceived as one of the most important aspects of neuromarketing according to marketing professionals, marketing academics and neurologists. A plausible explanation for this is the limited integration of neuromarketing within academia and organisations, leading to a lack of awareness and inadequate knowledge among individuals. This finding emphasizes the need for broader awareness and education about neuromarketing concepts beyond specialised circles.

Finally, the integration of technology, particularly artificial intelligence, emerged as a factor influencing the adoption of neuromarketing techniques. The potential advancements and innovations offered by AI hold promise in revolutionizing the neuromarketing landscape, making it an attractive consideration for marketing organizations seeking competitive advantages.

5.5 Conclusion

This section of the discussion will give an answer to the central research question in this paper: *“How do technological, organisational, and environmental dimensions influence the adoption of neuromarketing techniques in marketing organisations?”*

Firstly, the technological dimension has the most influence, compared to the organisational and environmental dimension, on the adoption of neuromarketing techniques in marketing organisations. More specifically, costs of neuromarketing techniques are seen as the most important barrier for the adoption according to marketing professionals. The cost-related concerns negatively affect the adoption process. However, this study suggests the existence of a misperception regarding the costs of executing neuromarketing experiments, implying that the costs of these types of experiments are equal to those of traditional marketing research. Consequently, marketing professionals tend to hire specialised neuromarketing companies for equipment or complete neuromarketing experiment execution, rather than investing in neuroimaging techniques such as EEG and fMRI themselves. Next to the costs, the complexity of neuromarketing techniques hinders the adoption within organisations. In general, the techniques are viewed as quite complex, which presents challenges to the integration in organisations. It is worth mentioning that this study identifies physiological and behavioural techniques as less complex, thereby suggesting easier organisational adoption of these types of techniques compared to neuroimaging techniques.

Secondly, this study reveals that organisational components do influence the adoption of neuromarketing techniques in organisations. More specifically, it can be acquired from this research that an open and innovative organisation culture fosters neuromarketing adoption. Next to the organisational culture, the level of knowledge on neuromarketing among employees positively correlates with likelihood of adopting neuromarketing. Hence, higher levels of employee knowledge on neuromarketing techniques can lead to higher rates of adoption. Besides, an important take away from this study is that there exists a general lack awareness and knowledge on neuromarketing techniques, not solely confined to employees. This limited awareness and knowledge currently acts as a hindrance to widespread adoption within organizations.

Thirdly, the environmental dimension, including the competitive pressure, does not yet influence the adoption of neuromarketing techniques in marketing organisations. Currently, compared to the other components, competitive pressure ranks as the least influential factor. It is assumed that competitive pressure may gain prominence in subsequent stages of adoption, once neuromarketing techniques have become further integrated within organisations. The increasing prevalence of these techniques among organisations may lead to a higher likelihood of adoption as a response to market dynamics.

Furthermore, this research uncovers different other factors that influence the adoption of neuromarketing techniques. Firstly, a lack of clarity regarding the value for organisations

and consumers of neuromarketing negatively influences neuromarketing adoption. Secondly, the gap between the scientific and practical field seems an ongoing factor that negatively impacts the adoption. Thirdly, a lack of awareness and knowledge on neuromarketing constitute a barrier for its adoption. Fourthly, the size of an organization influences its likelihood of adopting these techniques, with larger organizations being more inclined to adopt due to greater (financial) resources. Lastly, technological developments such as AI are poised to have a substantial impact on neuromarketing techniques and their adoption.

It can be acquired from this research that the adoption of neuromarketing techniques is shaped by a multitude of interconnected factors. These dimensions are intertwined, collectively influencing the adoption process. Moreover, this study raises questions concerning the direct adoption of neuromarketing techniques, particularly neuroimaging techniques, by marketing organisations. It suggests that these organisations might benefit more by hiring specialized neuromarketing companies to execute such techniques. Finally, a key takeaway from this research is the dispelling of the ongoing stigma surrounding the costs of executing neuromarketing experiments. Neuromarketing professionals challenge this misconception, indicating that the expenses are not as prohibitive as commonly believed.

5.6 Theoretical contributions

The results of this research provide several theoretical implications. For instance, it contributes new insights into the influence of technological, organisational and environmental dimensions on the adoption of neuromarketing techniques. In this research the environmental dimension of the TOE model (Tornatzky & Fleischer, 1990) does not add value and can be neglected for now. Contrary to prior research suggesting that the expense of neuromarketing techniques acts as a barrier to adoption (Alsharif et al., 2023), this study presents evidence from neuromarketing professionals and experts, asserting that the costs of this form of research are comparable to those of traditional research. Furthermore, this research sheds light on the debate surrounding the classification of Implicit Association Testing (IAT) as a neuromarketing technique, as previous studies have yielded ambiguous results. Within the practical field, this study establishes IAT as a fully-fledged (behavioural) neuromarketing technique.

In addition, this study follows up the research of Crespo-Pereira et al. (2020), Elouadifi and Essakalli (2022), Alsharif et al. (2022) and Alsharif et al. (2023), in which factors were identified that influence the adoption of neuromarketing techniques. This study expands this previous research, by being the first study that integrates the TOE model (Tornatzky & Fleischer, 1990) in conjunction with qualitatively studying the adoption of neuromarketing

techniques. Therefore, this study suggests that the TOE model can be effectively employed not only through quantitative methods but also by employing qualitative research methodologies. Furthermore, this study incorporated (neuro)marketing organisations, building upon research of Alsharif et al. (2023) which suggest collecting data from organisations instead of academics. This sheds light on the similarities and differences in factors influencing neuromarketing adoption between academia and the industry. Moreover, this study suggests that there is a gap between the scientific and practical field and bridging this gap requires efforts from both researchers and practitioners to ensure a translation of scientific knowledge into actionable marketing strategies. Besides, it combines different factors that were separately evaluated in previous research. This shows that there is not one specific factor influencing the adoption of neuromarketing techniques but that there are different factors which are connected and intertwined with one another influencing the adoption of neuromarketing techniques.

5.7 Practical implications

Along with these theoretical contributions, the findings of this study offer several managerial implications for organisations seeking to adopt neuromarketing techniques. Firstly, to overcome the perceived barriers of high costs and complexity associated with neuromarketing techniques, organisations could consider collaborating with specialized neuromarketing firms. Such collaborations would not only provide access to the necessary expertise and equipment but also facilitate knowledge transfer, allowing internal teams to gain valuable insights and skills in utilising these techniques effectively. Moreover, this would reduce the misunderstanding of marketing professionals on the costs of neuromarketing experiments.

Secondly, encouraging an open and innovative organisational culture is crucial for the successful adoption of neuromarketing techniques. This entails creating an environment where new ideas are welcomed, experimentation is encouraged, and employees feel empowered to explore innovative approaches. Furthermore, top management's unwavering support and endorsement of neuromarketing initiatives play a pivotal role in driving this cultural shift. Demonstrating enthusiasm and commitment to adopting new technologies such as AI and neuromarketing can significantly influence employees' attitudes and their willingness to embrace such approaches. Investing in employee training and development related to neuromarketing is another critical aspect for successful adoption. By enhancing the knowledge and expertise of the workforce in neuromarketing, marketing organisations can effectively leverage these techniques and improve decision-making processes. This could include

providing opportunities for employees to attend conferences, workshops, seminars, or pursue relevant academic courses.

Thirdly, addressing the lack of clarity regarding the added value of neuromarketing techniques is essential. Neuromarketing specialists should collaborate with marketing professionals to present concrete examples and case studies that demonstrate the tangible benefits of implementing these techniques. Providing empirical evidence of the value derived from neuromarketing can build confidence among stakeholders and facilitate more informed decision-making. Moreover, bridging the gap between the scientific understanding of neuromarketing and its practical application is crucial for encouraging adoption. Collaborative efforts between researchers and practitioners are needed to translate scientific findings into actionable marketing strategies. This entails developing practical guidelines and frameworks based on empirical research, facilitating the application of neuromarketing insights in real-world marketing scenarios.

Additionally, (neuromarketing) organisations should actively engage in awareness campaigns and educational initiatives to address the lack of awareness and knowledge about neuromarketing beyond specialised circles. Hosting webinars, conferences, and publishing articles that educate marketers about the potential benefits and applications of neuromarketing can enhance industry-wide understanding and acceptance.

Lastly, (neuro)marketing organisations should consider the integration of artificial intelligence (AI) as a significant factor influencing the adoption of neuromarketing techniques. As AI technology advances, it has the potential to revolutionize the neuromarketing landscape, making it an attractive consideration for organisations seeking competitive advantages. Monitoring advancements in AI and exploring its potential synergies with neuromarketing can position organisations at the forefront of innovation in the field.

5.8 Limitations

Although this research provides new insights on the underlying components that influence the adoption on neuromarketing techniques in marketing organisations, several limitations should be acknowledged that appeared during the process of this study.

The first limitation is the employed sampling method, as the participants were recruited through convenience and snowball sampling techniques. In this sampling method, the sample composition is contingent to the subjective selection of participants from the outset (Etikan, 2017). As a consequence, the resulting sample may lack representativeness and cannot be generalised to the broader population. Furthermore, twice two participants are working at the

same organisation, which diminished the diversity of the sample. In addition, the sample did not consist of an equal number of males and females. Having the same number of males and females would give more accurate results.

Another limitation is the difference of the participants' level of knowledge and experience with neuromarketing. Although the participants all had an adequate level of knowledge on neuromarketing, it differed how advanced their level of knowledge was and the type of experience they had with neuromarketing practises. Since not all the participants had the same level of knowledge and experience, this could have influenced the depth of the answers and the equalness of participants to one another.

5.9 Recommendations for future research

Further research is needed to gain more insights in the underlying components that influence neuromarketing adoption. Firstly, future research could investigate the other factors that emerged in this study that influence the adoption of neuromarketing techniques. Future research could potentially subdivide these factors under the dimensions of the TOE model.

Secondly, it is advised to explore the distinctions between different neuromarketing techniques. For instance, research focussing on the factors that influence the adoption of one or two neuromarketing techniques. These outcomes can provide a deeper understanding on the differences between neuromarketing techniques and to what extent the neuromarketing technique affects the adoption in organisations.

Thirdly, to attain a more profound and comprehensive understanding of the adoption process, future research should conduct simultaneous research with a diverse set of participants, including marketing professionals, neuromarketing specialists, and academics. The incorporation of multiple stakeholder perspectives in this manner will facilitate an intricate comparative analysis, enabling researchers to discern potential gaps that may exist between the theoretical underpinnings of neuromarketing and its practical implementation. Understanding these disparities can provide valuable insights into the barriers and challenges encountered when applying neuromarketing techniques in real-world marketing contexts.

Lastly, acknowledging the relatively small sample size of 20 experts in marketing and neuromarketing in this study, it is essential for future research to explore alternative investigative approaches. The qualitative research approach may require further validation by incorporating quantitative research methods, case studies and mixed method designs. In this way, the findings can be more reliable and generalisable for a larger population. The adapted TOE model for this study can for instance be tested by using a quantitative research approach.

By employing a combined methodology, research conclusions are extended and enriched, providing greater depth and insights (Schoonenboom & Johnson, 2017).

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Appendices

Appendix A – Summary of different interview topics and dimensions

Topic	Question	Source
1. Warm up question	1. Could you tell me something about yourself, your age and your educational background?	
2. Introduction questions	1. What is the organisation you work for? (if organisation is known, you work for (name of the company), can you tell a bit more about your current job? Follow up: What is the size of the organisation you work for? 2. How many years of experience do you have in this work field? (in this company and before working for this company)	Adapted from Gorgiev (2020)
3. Introduction questions related to neuromarketing	1. What is neuromarketing to you? Follow up: How would you define neuromarketing? 2. Do you have any experience with neuromarketing tools? Follow up: Have you ever been involved in a neuromarketing experiment?	Adapted from Gorgiev (2020)
4. Questions about the components that could influence the adoption of neuromarketing	1. What are in your opinion factors that influence the adoption of neuromarketing techniques in organisations? 2. What are in your opinion the benefits of neuromarketing? 3. What are in your opinion the enablers of neuromarketing adoption in your organisation/organisations in general? 4. What are in your opinion the disadvantages of neuromarketing? 5. What are in your opinion the challenges/barriers of neuromarketing adoption in your organisation/organisations in general?	Adapted from Kumar & Krishnamoorthy (2020)
5. Questions related to the technological dimension	5.1 Costs of neuromarketing techniques 1. In your experience, what are the costs associated with a neuromarketing experiment? Is there a difference in terms of costs depending on the type of tool and application? (machine costs, costs of an experiment, costs of implementation) 2. How do you perceive the costs of implementing neuromarketing techniques? 3. Do you think that the costs of neuromarketing tools might be a factor that can affect the implementation/adoption of neuromarketing in an organisation? And why? 5.2 Complexity 1. How complex or easy would you describe neuromarketing tools? 2. Which skills are required by employees to implement neuromarketing techniques? Do employees have these skills? If not, how would you counter this problem? 3. Do you think that the complexity of neuromarketing tools might be a factor that can affect the implementation/adoption of neuromarketing in an organisation? And why?	Adapted from Ngah et al. (2021), Katebi et al. (2022)
6. Questions related to the organisational dimension	6.1 Organisational culture 1. Do you think that organisational culture affects the implementation of new technologies, including neuromarketing techniques? If yes, to what extent? 2. What are the main values of your organisation? 3. How would you describe the organisational culture towards innovation in your organisation? (Ask for examples of adopted innovations) Follow up: Do you think that the organisation would be open to adopt neuromarketing tools?	Adapted from Bhattacharya & Wamba (2015), Salleh & Janczewski (2016)

4. What is the attitude of the management of the organisation towards innovations? Do you know what their attitude is towards neuromarketing?
5. In your experience, what could contribute to adoption of such tools in your organisation? (If they already adopted the tool, give some examples)

6.2 Knowledge on neuromarketing among employees

Adapted from
Gorgiev (2020)

1. How would you describe the level of knowledge on neuromarketing techniques in your organisation among employees?
2. Are there people within the organisation (colleagues/managers) would like to know more about neuromarketing techniques? If yes, how would the organisation facilitate that?
3. Do you think that the knowledge of employees on neuromarketing might be a factor that can affect the implementation/adoption of neuromarketing in an organisation? And why?

7. Questions related to the environmental dimension

7.1 Competitive pressure

Adapted from
Oliveira et al. (2014),
Cruz-Jesus et al. (2019)

1. Do you know a competitor that adopted neuromarketing in their organisation?
 2. Do you think that you would be more inclined to adopt neuromarketing techniques if your competitors were using them? Why?
 3. Does in your opinion competitive pressure affect the implementation of neuromarketing techniques? How?
- Do you think that competitive pressure on neuromarketing might be a factor that can affect the implementation/adoption of neuromarketing in an organisation? And why?

8. Ranking of different dimensions

1. If you had to rank these different concepts that we just discussed from most influence to least influence the component has on your intention to adoption neuromarketing within your organisation, how would you rank the components?

Appendix B - Semi-structured interview form for marketing professionals

Introduction

Thankyou for participating in this interview, are you okay if I record this interview?

Note: It might be that the questions will be asked slightly different or that a follow up question will be added depending on the context.

1. Introduction questions

1. What is the organisation you work for? Follow up: What is the size of the organisation you work for?
2. How many years of experience do you have? (in this company and before working for this company)
3. Can you tell a bit more about your job and the work that you do on a daily basis?

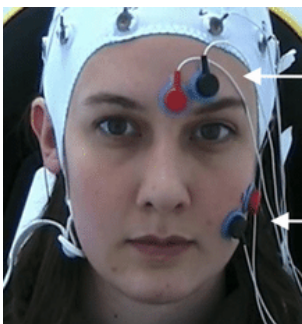
2. Introduction questions related to neuromarketing

1. Do you know what neuromarketing is? Follow up: If yes, how would you define neuromarketing? (knowledge question)

(Mention the definition of neuromarketing that I use in this research to make sure that we are on the same page)

Neuromarketing is a combination of three disciplines: marketing, psychology and neuroscience. The purpose of neuromarketing is to understand how neuropsychological mechanisms support and influence consumer behaviour and decision-making. Compared to traditional marketing research, which only measures cognitive and emotional experiences as verbally expressed at the conscious level, neuromarketing makes it possible to discern unconscious states associated with processes that play a critical role in influencing behaviours. In neuromarketing, both psychological and neuroscience methods are used to investigate marketing-related issues concerning buying behaviour; for example fMRI, EEG, Eye tracking (ET) and Facial Electromyography (fEMG).

(Show pictures of the different examples mentioned)



EMG *M. Corrugator supercilii*

EMG *M. Zygomaticus major*



2. Do you have experience with neuromarketing practices? → Have you implemented neuromarketing in your current job? Follow up: if not, are you planning to use neuromarketing practises in the near future? (What is needed to implement these techniques)?

3. Questions about the factors/components that could influence the intention to adopt neuromarketing

1. What are in your opinion factors/components that influence the adoption of neuromarketing techniques in organisations?

2. What are in your opinion the enablers of neuromarketing adoption in your organisation?
(And in organisations in general?)
3. What are in your opinion the challenges of neuromarketing adoption in your organisation?
(And in organisations in general?)

In this research, several components that might influence the adoption of neuromarketing techniques are researched. We will discuss all of these components next.

4. Questions related to the technological dimension

4.1 Costs of neuromarketing techniques

1. Do you have any idea about the costs of different neuromarketing techniques? If yes, what do you think different techniques costs? If no, what is your estimation on the costs?

(Show table with costs of different neuromarketing techniques)

2. How do you perceive the costs of implementing neuromarketing techniques?
(Low/medium/high)
3. Do you think that the costs of neuromarketing techniques affect the implementation of neuromarketing techniques? How?

4.2 Complexity

1. What is your opinion about/How would you describe the complexity of neuromarketing techniques?
2. Which skills are required by employees to implement neuromarketing techniques? Do employees have these skills? If not, how would you counter this problem?
3. Do you think that the complexity of neuromarketing techniques affects the implementation of neuromarketing techniques? How?

5. Questions related to the organisational dimension

5.1 Organisational culture

1. What are the main values of your organisation?
2. How would you describe the organisational culture in your organisation? Follow up: Is there a learning culture within the organisation?

3. Could you describe the level of innovativeness of your organisation? (If applicable: can you give examples of innovations within your organisation)?
4. What is the attitude of the management of the organisation towards innovations? Do you know what their attitude is towards neuromarketing?
5. Do you think that organisational culture affects the implementation of new technologies, including neuromarketing techniques? How?

5.2 Knowledge on neuromarketing of employees

(Build upon the question in section 2)

1. How would you describe the level of knowledge on neuromarketing techniques in your organisation among employees?
2. Are there people within the organisation that are willing to know more about neuromarketing techniques?
3. Does in your opinion knowledge of employees on neuromarketing affect the implementation of neuromarketing techniques?

6. Questions related to the environmental dimension

6.1 Competitive pressure

1. What are your company's main competitors?
2. Do you know a competitor that adopted neuromarketing in their organisation? Follow up question: Do you feel any pressure to adopt neuromarketing techniques?
3. If competitors would adopt neuromarketing techniques, would you be more likely to also adopt neuromarketing techniques? Why?
4. Does in your opinion competitive pressure affect the implementation of neuromarketing techniques?

7. Ranking the different components from most influence to least influence on the adoption of neuromarketing techniques in the organisation

1. If you had to rank these different concepts that we just discussed from most influence to least influence the component has on the adoption of neuromarketing tools within the organisation how would you rank the components?

1 is most important and 5 is the least important.

- Cost of neuromarketing techniques
- Complexity of neuromarketing

- Organisational culture
- Knowledge on neuromarketing
- Competitive pressure

Thankyou very much for participating in this interview! Do you have any questions or anything that you would like to add?

Appendix C – Informed Consent Form

Informed consent form

The purpose of the research is to find out what the underlying factors are for organisations to adopt neuromarketing techniques. The research project has been reviewed and approved by the BMS Ethics Committee.

The procedure of the study is as follows:

1. Answering questions during an interview.

The participant is free to quit the study any time they want. Participants can get access to their data or a summary of the research if they want so. In this case, they can contact the researcher. Data can be rectified or erased any time. Data will be anonymized, and no personal data will be used. The outcomes of the study will only be used in our research and will not be published anywhere.

Contact details of the researcher:

Esmée Slager

n.e.slager@student.utwente.nl

06-33177942

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-bms@utwente.nl.

Consent Form

Please tick the appropriate boxes

Yes **No**

Taking part in the study

I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.

I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.

I understand that taking part in the study involves giving my personal opinion.

Use of the information in the study

I understand that information I provide will be used for a Master thesis and that the collected data is not shared for other purposes.

I understand that personal information collected about me that can identify me, such as [e.g. my name or where I live], will not be shared beyond the study team.

I agree that my information can be quoted in research outputs.

Consent to be audio/video recorded

I agree to be audio/video recorded. Yes/no

Signatures

Name of participant

Signature

Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Researcher name

Signature

Date